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ABSTRACT

The purpose of this paper is to discuss the assessment of intelligence as it relates to reading. Its primary focus is upon criteria that might be applied to the information about intelligence and how it relates to reading. The contents include: "General Considerations," which discusses the concept of intelligence, measuring instruments used to assess intelligence, general evaluation of measuring instruments, interpretation of intelligence tests, and generalizing from the results; "Criteria," which looks at the relationship between intelligence and reading achievement, distortion of test results due to limitations on the part of the child, additional factors that may limit a child's performance, the currency of available information about intelligence and reading, test scores in relation to the child's total behavior during testing, the use of test information about intelligence in a meaningful way, the contribution of information about intelligence to the goal of teaching children to read, and the extent to which information about intelligence and reading contributes to the understanding of either of them; and "Conclusion," which urges psychologists and teachers to work cooperatively in assessing information about intelligence and reading. (WR)

ASSESSING INFORMATION ABOUT INTELLIGENCE AND READING

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The general purpose of today's symposium presentation is to discuss the assessment of intelligence as it relates to reading; this paper addresses itself to this topic and attempts to list some criteria by which a teacher can evaluate the product of that assessment.

Intelligence and reading are all too frequently dealt with as unrelated concepts. Reading is seen as the responsibility of the teacher; intelligence and its evaluation is the realm of the psychologist. The assessment of intelligence takes place in the privacy of the psychologist's office, and in many cases the most that a teacher can anticipate is a written summary of that assessment. Yet, teachers are involved with the concept of intelligence in a number of important ways.

Classroom teachers generally remain responsible for the referral process whereby those children who have questionable intellectual abilities are brought to the attention of the psychologist (Keogh, 1972). Thus, the teacher must observe the child and decide whether or not to request formal evaluation of his intelligence. The child's future educational experiences are then guided by the findings of the psychologist. Too many educators passively accept these conclusions without critically assessing the information gained in that formal evaluation, even though the teacher, special education or not, must then assume the major responsibility for the future educational development of that child. Teachers need to do more than passively accept information about intelligence if they are to apply it to understanding reading achievement or other phases of school performance.

The primary focus of this paper will be upon criteria that might be applied to the information about intelligence and wherever possible, to relate it to reading. Although there are some newer and highly promising approaches to measuring intelligence, the focus here will be upon traditional psychometric approaches since these are almost always the basis for the information made available to teachers.

General Considerations

Before considering specific criteria by which to evaluate information about intelligence and reading, there are some broad, interrelated considerations that educators must make. The first relates to the educator's understanding of the concept of intelligence. The problem of definition will undoubtedly recur throughout this symposium, so it will not be examined comprehensively here. However, educators do need to be frequently reminded of their tendency to reify intelligence. Intelligence is not a thing that can be directly measured, rather it is inferred from observations of behavior that is said to reflect intelligence. It is a concept, a hypothetical construct which has been used to try to better understand, predict and influence behavior.

Vernon (1958) describes three approaches to conceptualizing intelligence. The first is consideration of the excellence of the nervous system. The second is the result of the interaction between neural excellence and environmental stimulation. The last is a sample of some aspects of the second. While the first could be considered a serious possible explanation for reading disability, only the third approach to intelligence can be measured.

Educators by virtue of their professional role should be committed to a concept of intelligence which definitely leans in the direction of nurture in the nature-nurture disputation. Intelligence, for the most part, should be viewed as an array of abilities that will have an important effect on the rate, quality and perhaps sequence of a child's learning. This seems educationally a more optimistic and practical concept than viewing intelligence as an upper limit established for a child by his genetic structure. While this optimistic point of view is the general framework for the criteria that follow, the point is that before educators can evaluate information about intelligence and relate it to reading, they must begin with a clear understanding of what intelligence is and what it is not.

A related general consideration is that educators must know the instruments by which both intelligence and reading are measured. Fifty years ago, Boring (1923) wrote: "intelligence as a measurable capacity must at the start be defined as the capacity to do well on an intelligence test." This operational definition goes beyond tautology, for although we will consider criteria to apply to conclusions and reports of others regarding intellectual performance, the assessment of this information will remain very incomplete if the teacher is not familiar with the measurement instrument. Yet, it is not at all unusual to find a teacher who has been receiving information about intelligence for 20 or 30 years, but who has no idea about the composition of the intelligence test. Such teachers, if given illustrative items from an intelligence test, are often horrified at the extent to which test items are dependent upon achievement, background of experience or language abilities. The attitude of some school psychologists has undoubtedly contributed to teacher ignorance in this area. For example, one school psychology text says, "It is not necessary for teachers to be intimately familiar with the tests that the psychologist uses. It is part of his expertness to select and interpret data and to communicate results in a manner useful to teachers" (Eiserer, 1963, p. 34). It is both cumbersome and inefficient for a psychologist to communicate the results of an intelligence test, if the teacher does not know the measurement instrument. In addition, a teacher who is unfamiliar with the test is totally reliant on the psychologist for conclusions drawn and interpretations made. This places teachers in an inferior, dependent position from which they cannot challenge conclusions or offer alternate explanations or interpretations. I would go so far as to say that the results of formal measures of intelligence should not be made available to teachers unless they are familiar with the content, strengths and weaknesses of the instruments being used.

Another general consideration follows naturally from the above. Before attempting to assess information about intelligence and relate it to reading, the teacher should apply some general evaluation criteria to the instruments used to measure both these areas. Are they reliable? Are they valid? Was the standardization procedure appropriate? Is the cost reasonable? Is the time required for administration justifiable? Texts such as Cronbach (1960), Freeman (1962) and Nunnaly (1972) provide helpful guidelines in this regard. The reviews published in the Mental Measurements Yearbooks (Buros, 1956) can help answer some of these general considerations. Since these overall criterion considerations are dealt with in many sources, they will not be reviewed here in order to allow for a more focused discussion of the specific topic. Their importance should not, however, be underestimated.

A final general consideration is that teachers receive information about intelligence secondhand in almost all cases. Test scores, or more frequently a report summarizing the results, is submitted to them by a psychologist. Teachers do seem to actively make judgments about the professional capabilities of the psychologist, and there are some general questions that are frequently asked. However, the teacher is not in a position to answer some of them. Questions include: Is his

administration of the tests standard, and accurate? Is he generally capable of establishing rapport with the child being evaluated? Are his interpretations distorted by personal or theoretical biases? Can he communicate helpful information or does his evaluation result in simply labeling or classifying the child? Does he imply an accuracy of results that is unreasonable in light of the precision of the test instruments?

School psychology is a relatively young professional area. Yet an unfortunately large number of teachers have developed negative attitudes toward school psychological services. While teachers need to remain critical and be cautious in accepting the results of a psychologist whose capabilities seem questionable, they must be wary of becoming unreasonable. They should not generalize on the basis of limited experience. They should also make an effort to overcome some of the areas of difficulty. If, for example, they feel the results of intellectual evaluations are not helpful, they should try addressing specific questions to the psychologist. It is sometimes difficult for him to know what information will be useful to an individual teacher. Some of these problems will be discussed more fully and specifically later in this paper.

Criteria

Once the above preliminary considerations have been made, the practioner may be ready to look at the available information. Among the first questions to be asked in assessing that information should be: Were appropriate instruments used to evaluate intelligence and reading? Not all intelligence tests measure the same skills. There is widespread agreement that there is a highly significant relationship between intelligence and reading achievement; however, beyond this general conclusion, the relationship depends on the nature of the instruments used to measure reading and intelligence as well as the stage of development that the child has reached in the process of learning to read. For example, there is good agreement that the correlation between the two areas is greater in groups of older as compared with younger children (Farr, 1968; Harris, 1970). Summarizing the results of several studies, Harris (1970) reports the correlations are generally in the .40's and .50's in first grade, rise to the .70's by fourth grade and tend to remain about .70 for group verbal tests into the freshman year of college. Although there are a number of possible explanations, one that seems quite plausible suggests that in most cases measures of intelligence and reading become more similar beyond the earliest grade levels; both become increasingly dependent upon verbal and reading comprehension skills. For example at first grade, the perceptual and spatial subtests from the Thurstone Primary Abilities Test correlate best with reading but in seventh grade, the verbal meaning subtest correlates best (Reed, 1958).

For some testing purposes, gross misinterpretations could result if both measures were highly reading-dependent. The conclusion might be drawn that although a child is reading well below a level appropriate for someone his age, he is in fact reading up to his capacity and doing as well as could be expected, based on his intelligence test scores. The purpose for which the testing is being done is of critical importance. If the intelligence measure is being used simply to select children who need special help with reading, no violence may be done if a language and reading-dependent test is used (though this does not seem an efficient procedure). On the other hand, if the test is being used to try to better understand the child's potential for learning or the probability of his being intellectually capable of profiting from special help in reading, a reading-dependent test would be totally inappropriate.

Another general principle that seems reasonable in this area is that group measures might be used as preliminary screening devices or to draw conclusions about a group of students; however, if conclusions are to be used to make decisions about individuals, an individually administered intelligence and reading test are usually a necessary, though not sufficient prerequisite for reliable and valid information. As early as 1933, Durrell found that group, pencil and paper measures of intelligence penalized sixth graders in direct proportion to the extent of their reading ability. Studies such as that by Fitzgerald (1960) have shown that children with reading problems score significantly lower on a group verbal test such as the verbal section of the Lorge Thorndike as compared with the results from an individually administered test such as the W.I.S.C. Schiffman found a discrepancy of nearly 20 IQ points in the performance of a group of disabled readers on the W.I.S.C. as compared with the Columbia Test of Mental Maturity.

Another important question might be: Have the results been significantly distorted because of some special, identifiable limitations on the part of the child? On the surface the results of an evaluation might suggest low intelligence, but in reality the presence of sensory, motor, orthopedic, neurological or psychological problems may invalidate the results of the intelligence test.

Citing clinical cases is somewhat dangerous, but the following is cited, not as proof but in order to illustrate. A deaf child was recently tested so as to "determine the extent of mental retardation." The child, ten years old, had been given a Stanford-Binet Intelligence Test five years ago and the resultant IQ was 55. It appears that most of the teachers who worked with this boy felt that his potential for reading and other learning activities as well, was essentially non-existent. An evaluation performed two months ago resulted in a W.I.S.C. Performance IQ of 109. The boy was alert, spontaneous, and able to meet the demands of this intelligence test easily. Although the Stanford-Binet might have yielded some useful information, reporting an IQ was inappropriate and any interpretations should have first considered the fact of the child's serious hearing loss.

Granted, this is an extreme case; less severe limitations will have less dramatic effects, but the effect will probably be there. Essential criteria questions that must be asked when assessing the results of intelligence tests and making educational decisions based upon them include: How does a special limitation that a child has relate to his performance in intelligence and reading? Were the appropriate measurement instruments used in light of the limitations? Were the limitations considered by the person computing the score or in making the interpretations?

There are other factors, not usually considered in the same category as the limiting factors mentioned above, which can significantly influence performance. Among these are motivation, personality, sociability, attitudes, value system, cultural background and probably many others. How much did factors such as these contribute to available information and were they considered in interpreting the results? Zimmerman and Silverman (1967) summarize and illustrate this consideration. "Intelligence tests have been based on a number of tacit assumptions that must at times be spelled out to make results meaningful. For example, the inherent interest of test material to the child and the motivation to solve the problems presented, are assumed to be relatively similar for each child. However, the anxious or emotionally disturbed child may have little interest in testing and this reaction may be clearly evident to an observant examiner. The danger in not utilizing such information is clearly and tragically illustrated in a recent investigation (Garfield and Affleck, 1960) of individuals who had been

institutionalized as mentally defective, only to be released as within normal limits at a later date. A review of the original testing indicated repeated evidence of disturbance that limited the child's ability to perform adequately on test material. For example, negativeness, peculiarity, or other unusual behavior was frequently reported, yet the influence of this on the test performance had been ignored" (p. 269). There are two considerations. First, if the available information is in the form of a report or conclusions, are factors such as rapport, motivation, attitude, etc. discussed as possible influencing factors? Second, if you are evaluating the meaning of test scores, then it is important to ask if there are assumptions made by the test that are not met in the case of this child because of characteristics he possesses.

A rather simple criterion is: How recently was the available information about intelligence and reading gathered? Group reading test scores are frequently fairly up-to-date. Unfortunately, conclusions are sometimes drawn on the basis of outdated information about intelligence. In the case of the deaf child cited earlier, educational decisions and teacher judgment were guided by information that was five years old. Earlier re-evaluation might have avoided the perpetuation of inaccurate bases for educational planning.

The information evaluated is frequently in the form of test scores. Tests are very limited, restricted samples of behavior. Therefore, another important question is: How broad is the basis for the available information? One hallmark of a good psychological or educational report is that it goes beyond the test scores and reports specific responses and reactions of the child during the evaluation. Test scores are then considered in the context of the child's total behavior during the testing. However, there is also the obligation to consider test data and behavior during the evaluation in the context of the child's day-to-day behavior. The mysticism of testing, the awe for the unknown frequently leads to teachers placing far more credance in a test score than they do in consistent observable behavior. Almost ten years ago, McDonald (1964) reported that he felt there was an encouraging sign wherein teachers were willing to leave "the safe, familiar level of objective tests" and to undertake the challenge of "making tentative assessments involving observation and study of the background, nature of thought processes, personality structure and other attributes acquired in the course of living" (p. 118). Although there is effort by practioners in this direction, there is still an over-reliance on "objective" test scores. There are at least three related questions then: How broadly based is the information about intelligence and reading? Are test scores considered within the context of the behavior during the testing? Is test performance considered within the context of the child's day-to-day behavior? Test data that do not coincide with the consistent behavior of the child need to be assessed especially carefully. This is not to imply that formal intellectual testing cannot provide fresh insights that might be difficult to obtain through observation of daily behavior.

In a recent article in the Journal of School Psychology (1972), Barbara Keogh states that 'Many school psychologists' reports are chronicles of disaster" (p. 143). It may be added that this is also true of the reports of many reading clinicians. When the information about a child's intelligence and reading is in the form of a report, an important criterion question is: Are skills and strengths listed and discussed in addition to deficits and weaknesses? If the information is to be used in any meaningful way, the person responsible for the educational program of that child should capitalize upon the strengths that he brings with him. There is a need to withdraw from the disaster-orientation of psychological and educational reports.

The final two criteria are probably the most important: First, to what extent does the information about intelligence and reading contribute to our understanding of either of them? As noted earlier, there is a substantial correlation between the two. We have perhaps been too quick to assume that the problems in reading are the results of problems in intelligence. While it may be true, it is also possible that the poor reading performance can help explain the poor performance in intelligence. At a very obvious level, if the intelligence test is reading dependent, then quite probably the reading is responsible for the poor performance in intelligence. At a more clinical level, consider the finding that children with reading problems frequently do poorly in the Information subtest of the W.I.S.C. The interpretation is frequently made that the sparse background of information has been a major contributor to the reading problem, yet it is possible that the information called for by this subtest is usually acquired through reading so that the child with a reading problem will not be able to meet its demands. The question of causality in this second illustration is, of course, not settled. Regardless, the important consideration remains: Can the child's reading problem be better understood because of the information about intelligence and obversely, can his intellectual performance be better understood because of the information about reading skills?

Although it may be psychologically and intellectually important for the psychologist, diagnostician or teacher to better understand the nature of the child's reading or intellectual functioning, it is largely academic. The crucial issue is of course: How does the information about intelligence contribute to the goal of teaching children to read? This is indeed the sine qua non. If all former criteria are fulfilled and this one is not, the information is useless. Does or does not the information lead to recommendations that result in improved performance on the part of the child?

For example, one of the favorite research areas with regard to the relationship between reading and intelligence centers about the configuration of W.I.S.C. subtest scores in a population of disabled readers. Farr (1969) in reviewing this area cites 18 studies which have looked at the co-relationship of these two variables and notes that there are indeed fairly consistent patterns of W.I.S.C. scores for disabled readers. Huelsman (1970), reviewing 21 studies, reached a similar conclusion. Farr notes that although three of the studies he reviewed suggested that W.I.S.C. subtest patterns could be employed to determine the type of remedial reading program needed, not one study was directed at trying to validate this suggestion. He concludes, "The sub-test patterns of the W.I.S.C. have been shown to be related to retardation. What is now needed are studies which attempt to relate this test performance to instructional programs in order to investigate the validity of these scores for planning effective remediation (p. 96)... While correlations between poor reading and performance on these (psychological) tests have been found, the reasons for them have never been determined. Unless researchers begin to validate these correlations against remedial programs or some other valid criterion, attempts to use psychological tests as diagnostic reading tests should be abandoned. Instead efforts might best be channeled toward improving diagnostic testing through a more valid sampling of reading behavior rather than through an assessment of behaviors which are related to reading in some unknown manner" (p. 97).

Discussion in textbooks dealing with the diagnosis and correction of reading disability also address very little attention to the question of how to use information about intelligence in improving reading performance. Far greater emphasis is placed upon using the mental age of the child as the means by which existence or extent of reading retardation is determined. This activity is sometimes useful-

it can help us understand an educational situation better. For example, a group of teachers working with a thirteen year old girl were quite upset because she was not apparently making progress in reading. The results of an intelligence test done six years ago indicated a Performance IQ score of 96. When the child was re-examined, the results on the W.I.S.C. were: A Verbal IQ score of 71 and a Performance IQ score of 76. The score from a Peabody Picture Vocabulary Test was 56. The reading score from the Wide Range Achievement Test was 4-2. Reading comprehension scores were quite deficient at all levels of an Informal Reading Inventory. Perceptual, vocabulary and cognitive development as demonstrated in the evaluation were quite restricted and coincided with day-to-day observations.

The new information about her intelligence did not suggest that the teachers should "give up" in trying to teach the child to read. It did, however, suggest that before reading instruction could be successful, greater background of experience and vocabulary development would be necessary. Listening comprehension activities should be initiated to train some fundamental comprehension skills. Language experience stories utilizing known vocabulary, mastered sentence structure, and well-founded experiences might prove valuable for building reading skills.

In the case just cited, the results of the intelligence test did lead to educational changes and somewhat better progress in reading on the part of the child. It is unlikely that it would have occurred if the evaluation had ended with the calculation of her reading expectancy.

Incidentally, there is a very false precision frequently implied by such calculations. Let me illustrate. Based only on the mental age of the case cited above, her reading grade expectancy is 4.4; her score on the Wide Range was 4.2, therefore, she is approximately two months retarded in reading. However, if we use the formula suggested by Harris, her reading expectancy is 5.6 and so she's 1.4 or approximately a year and a half behind in reading. If we follow the formula suggested by Bond & Tinker (1957) her reading expectancy is 7.4 and she's three years behind. Naturally, if we substitute the results of the Informal Inventory for the results of the Wide Range, three new estimates of extent of retardation result. This is also a good illustration of why care must be taken in choosing a measure of reading and why the results of the reading test must also be critically evaluated.

Calculations of grade expectancy and extent of retardation may be somewhat interesting and occasionally helpful, but they are frequently irrelevant and sometimes detrimental. Rather than asking about the years of retardation, teachers need to relate intelligence test results to reading in ways that have implications for overcoming the problem. Important specific questions might include: Are there specific techniques for successfully teaching reading to children with IQ's less than 60? Are there strategies that should be used for children who score well on verbal but poorly on performance measures of intelligence? If a child does poorly on vocabulary measures of intelligence, does this affect the sequence in which reading materials are introduced? At present, there is very little evidence to suggest that the remediation of reading problems is hastened because of implications drawn from intelligence tests. In some practical situations, the IQ score is simply used as a justification for a low level of performance. If this continues to be the case, there is little justification in the administration of these measures.

One specific way in which the results of intelligence measures have been applied to the area of reading instruction has been to use them as a selection criterion in situations where the need for remediation exceeds available facilities. It is

generally assumed that the child with higher measured intelligence will profit most from remedial instruction. Three fairly recent studies challenge this conclusion. Frost (1963) working with two different groups of Canadian children that if IQ, determined by the Jenkins Non-Verbal Intelligence Test and Raven Progressive Matrices, had been used as the selection procedure, it would have resulted in the exclusion of almost half of the children (36 of the 79) who improved their reading age by more than one and a half years. In a 1963 study, Chansky obtained a correlation of .01 between intelligence and reading when age was controlled in a group of elementary children with reading problems. More recently (1968) using the California Short Form Test of Mental Maturity and the reading improvement of elementary age children, he obtained a correlation of .17 between the two. However, when age was parcelled out he obtained a correlation of -.36, which indicated an inverse relationship between measured intelligence and improvement in reading! It may be that we will be surprised as other frequently made assumptions about intelligence and reading are empirically examined.

Conclusion

Assessing information about intelligence and reading is a complex task at least partially because there is far from full agreement on what reading is and how it should be taught; nor is there better agreement on what intelligence is or how it can best be measured. However, as stated earlier, the most important criterion question is: How does the information about intelligence contribute to the goal of teaching children to read? Since there is wide diversity among children as well as methods for teaching reading, it may be that information that is not helpful in one educational setting may be eminently helpful in another. Individual teachers and psychologists will need to answer the question cooperatively. In spite of some of the difficulties in cooperation between these two groups that sometimes exist, effective communication does seem to be increasing. Researchers in reading could also help a great deal by addressing themselves to evaluating the extent to which various types of information about intelligence contributes to developing more effective strategies for teaching reading rather than continuing to focus on correlates of reading disability.

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