Commentary: The role of intrapersonal psychological variables in academic school learning

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Abstract

Intellectual abilities may contribute up to 25% of the variance on measures of academic school learning. However, the role of intrapersonal variables other than cognitive ability (personality traits, motivational dynamic factors, transitory emotional states) has usually been considered as fairly trivial. Past research, to the contrary, suggests that under stressful conditions, the relative contribution of such intrapersonal factors may even become predominant in influencing achievement. When analyses are based on change scores rather than single-occasion measures (which include trait contamination variance), the influence of emotional states on learning is shown to be very significant indeed.
Early in the development of school psychology emphasis was placed on the role of intelligence in school achievement. Investigations have demonstrated that cognitive abilities may account for up to 25% of the variance in achievement measures. However, the role of intrapersonal variables other than cognitive ability has often been misunderstood. Notions of over- and under-achievement have meaning only if intelligence is regarded as the predominant intrapersonal influence on school learning. This assumption is not supported by the literature (Cattell & Butcher, 1968).

Within the Cattellian framework, Gillis and Lee (1978) have indicated that "for some areas such as reading and mathematics, the ability, motivation, and temperament modalities each can separately account for as much as 20-25% of the achievement variation, to give a total of 60-75% accounted-for-variation (p. 241)." Cattell, Barton, and Dielman (1972) and Cattell and Child (1975, pp.186-193) reported that even the factors measured in the School Motivation Analysis Test (SMAT) accounted for almost 25% of variance in school grades.

Personality traits powerfully influence school learning (Cattell et al., 1972; Eysenck, 1976). According to Eysenck (1978) "the exaggerated stress on selection for IQ, to the detriment of attention being paid to personality, has probably had very unfortunate effects on education (p. 137)." Eysenck demonstrated that neuroticism generally has a debilitating influence on school learning, whereas introversion has a positive impact at senior high but a negative effect at elementary school. These findings have critical pedagogical implications as "extraverted and introverted children differ profoundly in the ways that learning tasks can be presented to them optimally.... Extraverts learn much better than
introverts with the discovery method ... introverts ... with the direct teaching (reception) method" (Eysenck, 1978, pp.144-146).

The role of emotional states has been documented in the anxiety/achievement area-anxiety typically impedes encoding and retrieval processes, although there is an intelligence/anxiety interaction (Culler & Holahan, 1980; Gross & Mastenbrook, 1980). Depressed mood has been reported to have negative effects on school learning (Tesiny, Lefkowitz, & Gordon, 1980), independently from mood-state-dependent effects (Boyle, 1986a). Research on positive states has demonstrated the importance of variables such as curiosity (Boyle, 1979, 1983a). The importance of other non-ability-variables (such as home background and subjective experience) has also been reported (Lynn, Hampson, & Magee, 1983; Nicholls, 1984; Humphreys & Revelle, 1984; Ellis, Thomas, & Rodriguez, 1984).

Most studies have been conducted under "neutral" emotional conditions. In contrast, Boyle (1983b) compared learning of a group of 69 undergraduates exposed to a disturbing film depicting horrific scenes of road accident victims, with a group of 66 students who had been subjected to no mood-state treatment. The samples were made up predominantly of females of about 23-24 years of age, who were matched on age, IQ, personality, and mood-state and motivational factors. IQ measured on the ACER-AL (a broad test of general intelligence) was the most significant predictor under neutral conditions (IQ correlated .35 with posttest scores of immediate factual retention-based on a 30-item multiple-choice objective test). Under the stressful condition, the total predictive variance increased from 38% to 60%, but IQ dropped out as a significant predictor. In stressful situations, therefore, non-cognitive intrapersonal variables may be- come
predominant determinants of learning, irrespective of actual ability levels. However, it is unlikely that ability would totally wash out of the prediction equations used for stressful conditions.

As to correlations between the non-ability-variables (measured by the Sixteen Personality Factor Questionnaire [16PF], the Motivation Analysis Test [MAT], and the Eight State Questionnaire [8SQ]) and posttest learning scores, there were 17 significant correlations for the stressed group, but only three for the control group. Seven of the 16PF factors correlated significantly with posttest scores under emotional activation, whereas only one factor did so for the neutral condition. Despite some unfavorable reviews, Bolton (1978), at least, has shown that the 16PF is adequately reliable and valid psychometrically. Boyle (1983b) reported a number of significant correlations between MAT factors and posttest learning scores. Previously, Kline (1979) reported several significant correlations between MAT factors and high school grades in mathematics and reading.

Of the 8SQ states (Anxiety, Stress, Depression, Regression, Fatigue, Guilt, Extraversion, Arousal) measured in Boyle's (1983b) study, seven significantly correlated with posttest learning scores under the stressful condition, whereas under the neutral condition, none exhibited significant learning correlations. This finding suggested that the role of emotional states is fairly trivial under normal (neutral) classroom conditions, but is greatly increased under emotional circumstances, as would be expected. Nevertheless, it remained unclear what role emotional states play in school learning under normal circumstances. The single-occasion 8SQ scores in Boyle's (1983b) study included trait contamination variance, which undoubtedly reduced the apparent association with learning. When change scores were calculated for the 8SQ subscales by subtracting pretest
from posttest scores (the 8SQ had been administered twice, with an interval of 4 weeks) so that only the state variance in the 8SQ scores could be correlated with posttest learning scores, no fewer than 12 of the total 24 correlations were significant (under the neutral emotional condition). Accordingly, while trait components correlated significantly with learning scores under emotional activation, state-change components actually related strongly under both stressful and neutral, non-emotive circumstances.

In conclusion, it appears that non-cognitive intrapersonal variables play an important role in school learning. In regard to state measures, previous analyses have failed to partial out trait contamination variance in single-occasion scores, leading to the erroneous conclusion that such variables play only a trivial part in academic learning. In practical terms, when undertaking psychoeducational assessments, school psychologists should ensure that they investigate not only a given student's cognitive abilities, but also other factors that might be important in affecting learning outcomes. Since learning, motivation, personality, and emotional states are very complex concepts, single tests with limited samples cannot provide a definitive answer to the nature of their dynamic interactions. This dilemma also pertains to much research that defines intelligence in terms of an IQ score. Hence the present conclusions are clearly tentative, albeit important for school psychologists, as they concern issues of school performance that are often ignored. Non-ability-related factors plainly are not trivial in understanding school achievement.

When single-occasion scores are used, both state and trait variance is incorporated into the measures, “frozen” at a particular instant, just as a still photograph is fixed at a given moment in time. Despite criticisms of the reliability of change scores, their use is important when working with state measures. Cattell (1982) has demonstrated that when the before and after
measures are essentially uncorrelated as in Boyle's (1983b) study, the ratio of error to true variance is not significantly increased. Boyle (1986b) examined the reliability of the 8SQ change scores by using the formula in Cattell (1982, p. 95). The change-score reliabilities (dependability coefficients) ranged from .83 to .92, suggesting that the scores were sufficiently reliable to justify further analysis.

References


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