CASE STUDY PERFORMANCE, INTELLIGENCE AND PERSONALITY

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Abstract

The authors tested intelligence and personality traits as the predictors of performance on a case study and found that openness to experience was significantly positively correlated with an individual's score on problem identification and that intelligence was significantly positively correlated with an individual's score on analysis. Additionally, there was a positive relationship between extraversion and agreeableness and an individual's analysis score and a significant negative relationship between conscientiousness and an individual's score on problem identification. Moreover, intelligence and conscientiousness interacted to predict an individual's analysis score with high conscientiousness partially compensating for an individual's relatively low intelligence.

KEY WORDS: Intelligence, personality, case study performance

INTRODUCTION

There is a considerable literature on the use of case studies in management education. This paper deals with an aspect of the assessment of case responses. Assessment in this sense is the use of student's responses to a case to determine their outcome achievement in respect of the educational focus of the learning situation (and should not to be confused with an alternative meaning of assessment that relates to the formative or summative judgment of a course or instructor by students or other parties). Case assessment results are perceived as being a measure of the competence of the student and of the effectiveness with which that student has mastered the educational objectives to which the case was directed. This paper reports on factors relating to both personality and general intelligence that are associated with case assessment results.

It is a reasonable expectation that intelligent, hardworking students should do well. A student's previous GPA is commonly included in empirical studies as a proxy for general intelligence. Being hardworking is a personality characteristic. According to the “big five” personality theory (for a discussion of which, see below) it is a large part of the “conscientiousness” dimension. It is also possible that other dimensions of personality are correlated with high or low scores on case study assessment. Furthermore, case study assessment itself is not an indivisible whole: it is made up of discrete parts. This paper will try to determine if the factors that herald success are different for two elements of case assessment: problem identification and issue analysis.

When a case is assessed the authors presume that it is the intention of the assessor to judge the case response fairly and dispassionately. If the behaviors associated with a perception of a good case response are intimately entwined with the behaviors associated with personality, then there is a potential problem. Personality is rewarded (or penalized), in conjunction with the achievement of the overt educational objectives. Only by identifying and understanding the affect of individual traits can the
underlying educational process be effectively tested [cf. Duff et al., 2003; Boyle, Duff, & Dunleavy, 2003]. This has implications for case selection and case assessment.

In sum, the purpose of this study was to test antecedents of two critical phases of individual case assessment—problem identification and analysis in a longitudinal study.

CASE STUDY THEORY

It has been assumed for a long time that writing cases could be an effective part of the professor's teaching dossier. The AACSB now recognizes the inclusion of cases as research [Jacob et al, 1987], who say that for inclusion in the professor's teaching or research it is required, amongst other things, that the case include a substantial teaching note/case note/instructor's manual.

There is some disagreement about what defines a case. On the one hand, there are those who insist that a case is (a) based on reality [e.g., Naumes, 1989], (b) long and complex, and (c) that it must have a decision focus [e.g., Chrisman, 1987; Naumes, 1989; Campbell & Lewis, 1991]. However, there are also those who completely disagree with all these criteria and say that a case can be (a) fictional, (b) short and simple, and (c) not have a decision focus (this viewpoint is implicit in the writings of Erskine et al., 1998; Knechel, 1992; Sharplin, 1990). For example, perhaps the most popular accounting case on transfer pricing is the Birch Paper case [Harlan & Rotch, 1957] which is an armchair case (i.e., fictional) and is short.

Despite the above differences in defining a case, in general, there is a lot of agreement that cases are useful. One reason is that they enable higher-level learning. Bloom et al [1956] and Andrews & Krathwohl [2001] proposed a taxonomy of educational objectives running from the lowest levels (knowledge acquisition) through comprehension, application, analysis, synthesis, and evaluation (the highest level). Whereas traditional lecture/demonstration based teaching can only aspire to the lower levels, it is suggested that the case approach has the capability to deal with the entire range. “Cases afford the opportunity to address all seven levels of Bloom’s Taxonomy, provided that is the instructor’s intent” [Erskine et al, 1998, p. 49]. This idea is neatly captured by the title of one of the seminal articles on cases “Because wisdom can’t be told” [Gragg, 1960].

Erskine et al [1998] identify decisions as one of the three dimensions of their “case difficulty cube” (the other two being the conceptual dimension and the presentation dimension). A difficulty level of 1 would be the evaluation of a decision that has been taken by others; a difficulty level of 2 is would be the recommendation of a decision in a situation where the exact nature of the decision has been clearly spelled out. A difficulty level of 3 requires the identification of the decision as well as its resolution (referred to as an undirected case). In the present study an undirected case was used.

It is a fact that the case study method is widely used in business education, and that is reflected in the lively discussion of the nature of cases and the case teaching process. Perhaps, in an ideal world, that is where the process should end: cases should be used for teaching alone. Reality at the time of this writing, however, is that cases are also used for assessing outcomes [Michlitsch & Sidle, 2002]. They are used during courses (e.g. a report submitted for all or part of a term-work grade; a participation mark based on contribution to case discussion); they are used at the end of courses (as all or part of a final exam); they are used by outside agencies (e.g. the comprehensive exams of the Canadian Institute of Chartered Accountants).

If cases are to be used for assessing outcomes, then a discussion of the theoretical aspects of that assessment process is justified and desirable. Sadly the literature is sparse in this area. Erskine et al [1998] refer to the identification of issues and issue analysis as the first two steps in preparing a case response. Parkinson [1999] surveyed the ways case assessment was carried out, concluding that assessment differed as a function of instructor, of subject area and of level within subject area. Analysis was weighted highest in the assessment process, followed by problem identification. Hence, in this study the focus is only on problem identification and analysis.

PERSONALITY TRAITS

An individual’s behaviour is a function of both his or her context [e.g. Barrick & Mount, 1993; Huttucuff et al, 1996] and his or her predisposition to behave in a certain way [Hogan, 1991]. The focus of the authors is on the latter. Personality traits refer to relatively stable internal states that help to explain
behaviours [McCrae & Costa, 1990], and this would include students’ learning behaviours. A trait is some unique dimension of that behaviour and reflects “stylistic consistencies in a person’s behaviour” [Hogan, 1991].

Psychologists uncovered a myriad of trait variables and about 60 years ago it became obvious that the main research question facing trait psychologists was the need for an adequate taxonomic organization of personality that recognized its hierarchical nature. It was not until the late 1980s that personality psychologists came to a general consensus that five robust factors of the Five Factor Model (FFM) could serve as a meaningful and useful taxonomy for organizing the confusing array of findings in the personality literature [Costa, 1996; Digman 1990; Salgado et al, 2001].

The elements of the Five Factor Model are described below (in no particular order). Extroversion: extroverts are assertive, active, sociable and talkative; introverts on the other hand tend to be reserved, even-paced and independent. Emotional stability (sometimes called neuroticism): individuals who score high on this trait tend to experience effects such as fear, sadness, embarrassment, disgust, anger and guilt; those who score low in this area are usually calm, relaxed and even-tempered. Agreeableness: agreeable individuals are sympathetic to others, cooperative and expect others to be accommodating in return; disagreeable individuals are egocentric, competitive and sceptical of other’s intentions. Conscientiousness: conscientious people are determined, strong-willed, reliable and punctual; a low score on this dimension suggests that the individual is less precise in applying moral principles and less directed when working toward goals. Openness to experience: high scores on openness to experience mean that the individual has an active imagination, enjoys variety, is attentive to inner feelings, and demonstrates intellectual curiosity; those who score low on openness tend to act more conventionally and have a more conservative outlook.

The focus of this paper is that personality is an important part of how students deal with cases and other educational situations. Duff et al [2003] examined the effect on academic performance of both personality and learning style. He found that personality is linked to learning style. Others have suggested that “learning styles are simply aspects of personality displayed within the context of education” [Boyle et al., 2003; p. 3].

HYPOTHESES

The two factors that were identified as likely to predict success in a case response are general intelligence (here: previous GPA) and the personality variable of conscientiousness. General intelligence is manifested in ease in comprehending or solving problems [Hunter, 1986]. Conscientiousness has been related to success in training programs [Barrick & Mount, 1991].

Both problem identification and analysis are likely to be better done by more intelligent students.

H1: a higher GPA will be positively associated with a higher score on problem identification.
H2: a higher GPA will be positively associated with a higher score on analysis.

Both problem identification and analysis are likely to be better done by more conscientious students.

H3: a higher score on conscientiousness will be positively associated with a higher score on problem identification.
H4: a higher score on conscientiousness will be positively associated with a higher score on analysis.

Additionally the authors are interested to know if any of the remaining four of the big five personality variables are associated with success in a case response; that is: emotional stability; extraversion; openness to experience and agreeableness. They have no initial expectation about these.

METHODS

Participants and Procedures

Participants (n = 305, 48% male, average age = 21 years) were third-year undergraduate business students taking an Introduction to Human Resources Management course at a medium-sized Canadian University. Students volunteered to participate in the study. The response rate was 76%.
In week 3 of the course, a personality assessment was completed by each student as part of the regular course requirement. In week ten of the course an (undirected) case study was assigned with a 3 week completion window. It was completed on an individual basis.

**Measures**

FFM traits were measured by the revised NEO Personality Inventory [NEO-PI-R; Costa & McCrae, 1992]. The 20-minute questionnaire has sound psychometric properties [Costa & McCrae, 1992; Hogan, 1991] and is valid and reliable when administered to college students [Costa & McCrae, 1992]. The factor structure of the NEO-FFI has been replicated in several diverse cultures [McCrae & Costa, 1997] and similar factor structures have been found for men and women, older and younger adults, and whites and non-whites [Costa, McCrae, & Dye, 1991; Piedmont, 1994].

Students’ case solutions were graded by the course instructor for each section of the course. Each instructor followed a standardized case assessment form. Separate marks were recorded for the problem identification and the analysis of the case issues. All sections had similar overall average grades.

**RESULTS**

The zero order correlation matrix for study variables is shown in Table 1. Hypotheses 1 to 4 were tested using the Table. Hypothesis 1 was that a higher GPA was associated with a higher score on the first stage of the case analysis – problem identification. The hypothesis was not supported (r = .08; p > .05). However, hypothesis 2 was supported. That is, GPA was significantly and positively correlated with the score on analysis (r = .61; p < .001). Conscientiousness was negatively correlated with the score on problem identification (r = -.14; p < .05). Hence, since a positive relationship was expected, hypothesis 3 was not supported. Hypothesis 4 was not supported – conscientiousness was not significantly correlated with the score on analysis (r = .06; p > .05).

In addition to the hypothesized relationships, some additional significant relationships were noted. Openness to experience was positively correlated with the score on problem identification (r = .28; p < .001). Extraversion and agreeableness were positively correlated with the score on analysis (r = .13; p < .05 and r = .16; p < .05 respectively).

**TABLE 1**

**CORRELATION MATRIX OF STUDY VARIABLES**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>1 Problem identification</td>
<td>1.00</td>
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<td></td>
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<td></td>
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<tr>
<td>2 Analysis</td>
<td></td>
<td>0.25***</td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>3 Final mark</td>
<td></td>
<td>0.76***</td>
<td>0.73***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4 GPA</td>
<td></td>
<td>0.08</td>
<td>0.61***</td>
<td>0.37***</td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>5 Neuroticism</td>
<td></td>
<td>0.10</td>
<td>-0.07</td>
<td>0.04</td>
<td>-0.23****</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6 Extraversion</td>
<td></td>
<td>0.02</td>
<td>0.13*</td>
<td>0.11</td>
<td>0.32***</td>
<td>-0.37***</td>
<td>1.00</td>
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<tr>
<td>7 Openness to experience</td>
<td></td>
<td>0.28***</td>
<td>0.06</td>
<td>0.15*</td>
<td>0.15*</td>
<td>-0.14*</td>
<td>0.20**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>8 Agreeableness</td>
<td></td>
<td>0.06</td>
<td>0.16*</td>
<td>0.19**</td>
<td>0.11</td>
<td>-0.26***</td>
<td>0.33***</td>
<td>0.03</td>
<td>1.00</td>
</tr>
<tr>
<td>9 Conscientiousness</td>
<td></td>
<td>-0.14*</td>
<td>0.06</td>
<td>-0.03</td>
<td>0.23*</td>
<td>-0.12</td>
<td>0.05</td>
<td>-0.16*</td>
<td>0.16*</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>7.80</td>
<td>7.85</td>
<td>7.87</td>
<td>16.14</td>
<td>18.80</td>
<td>32.12</td>
<td>27.40</td>
<td>34.02</td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td>.84</td>
<td>.98</td>
<td>.77</td>
<td>1.14</td>
<td>8.68</td>
<td>6.08</td>
<td>6.81</td>
<td>5.60</td>
</tr>
</tbody>
</table>

Note. ***p < .001, **p < .01, *p < .05. Two-tailed tests.
POST-HOC ANALYSIS

FIGURE 1
Interaction plot of the impact of GPA and conscientiousness on the score on analysis
Using estimated marginal means.

The relationship between conscientiousness and analysis (hypothesis 3) was further explored in a post hoc test. The interaction between GPA and conscientiousness and their main effects on analysis were examined. The main effects were determined in the first step of a hierarchical regression analysis. In Step 1, the $R^2 = .35$ ($F(2, 220) = 58.08; p < .001$) with a significant GPA main effect ($\beta = .60, p < .001$) but an insignificant conscientiousness main effect ($\beta = -.10, p > .05$). In Step 2, the $R^2 = .03$ ($F(1, 219) = 12.08; p < .001$) with the interaction term being significant ($\beta = -3.11, p < .001$). The plot of the interaction is in Figure 1. The Figure illustrates that when GPA is high conscientiousness has little impact on the score on analysis. However, an individual’s conscientiousness can compensate somewhat for his or her low GPA.

When problem identification was regressed on GPA, conscientiousness and GPA X conscientiousness, the interaction effect was not significant ($\beta = -.36, p > .05$).

DISCUSSION

In this study the intent was to test the intelligence and personality antecedents on the assessment of two important stages of case responses. Consistent with the hypothesis, the authors found that intelligence was correlated with success in the analysis stage. Surprisingly, intelligence was not correlated with success in problem identification and conscientiousness was negatively correlated with
problem identification. In addition, openness to experience was correlated with success in problem identification, and extraversion and agreeableness were correlated with success in analysis. These findings are consistent with Taggar [2002] who suggested that intelligence may make the greatest contribution through the domain relevant knowledge that the individual brings to the case problem, but the problem identification phase may benefit most from the individual’s openness to experience.

Most research in personality and business has concentrated on single traits of personality or on individual personality-related variables. An illustrative list from the literature on accounting research and personality includes, for example, the following approaches: locus of control [Fru cot & Shearon, 1991, Tsui & Gul, 1996]; professionalism [Goetz et al, 1991]; authoritarianism [Harrison, 1993, Foran & deCoster, 1974]; self-disclosure style [Belkaoui, 1981]; cognitive style [Benbasat & Dexter, 1979, Gul, 1984]; ambiguity intolerance [Dermer, 1973, Gul, 1984, McGhee et al, 1978]; decision style, [McGhee et al, 1978] and analytic/heuristic [Mock et al, 1972]. The authors looked at traits in combination. Success in case analysis was found to be an interaction of an individual’s intelligence and their conscientiousness, such that, conscientiousness was able to partially compensate for an individual’s lower intelligence. When an individual was high in intelligence, their conscientiousness had little impact on success in analysis of the case.

Implications of our results are as follows:
• First, individuals can self-select into or out of situations where the assessment process is not a good match with their trait attributes.
• Second, individuals can compensate for a low score on a personality trait that is associated with success on problem identification or case analysis by working in teams with others who have complementary skills.
• Third, and more problematically, as an instructor it should be recognized that in assessing an undirected case, what may seem like a fair and dispassionate assessment process is likely to favor students who have elevated levels on the “openness to experience” trait. That can only be avoided by restricting assessment to directed cases, where problem identification would be a trivial element of the assessment. In a similar way, though not to the same extent, an instructor should recognize that the assessment of the analysis portion of a case is a joint assessment of both the student’s skill at analysis and the student’s intelligence and personality traits of extraversion and agreeableness.

It is likely that there are students who are inherently disadvantaged in comparison to their peers. This could happen in an undirected case situation to a student who had low openness to experience. Equally, that same student could have a comparative advantage when dealing with a directed case, where other traits were correlated with success.

FUTURE RESEARCH AND LIMITATIONS

While this study was carried out on a substantial sample (over 200 management students at a Canadian University), it would be desirable to replicate it on students in other disciplines and in other countries.

Another aspect that is worthwhile following up is the relationship between the personality of the instructor and the type of case he/she chooses. It may be, for example, that an instructor with a high level of openness to experience would choose to set undirected cases, because that was a good match with their own skill-set.

Another topic worth further investigation is the negative correlation between conscientiousness and problem identification. The authors found this to be counter-intuitive at first glance. Perhaps, though, a high level of attention to detail interferes with the ability to identify wide-ranging and novel problems.

One limitation of this study was that only one instructor was available to evaluate each student’s case response. However, each instructor used a standard marking scheme and each section obtained similar average marks. Nonetheless, future studies should endeavor to use multiple raters and seek inter-rater agreement.
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