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## A Cognitive Inventory of Business Students

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### ABSTRACT

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Different cognitive-psychological assessments in higher education can help students to understand their own thinking and behavior patterns and help them to plan and have a successful career. In the 1970's Mintzberg drew attention to two different styles on thinking: the use of the left side of the brain versus the right side of the brain. According to Mintzberg the analytical side of brain, which is the left side, focuses on planning. The holistic side of brain is the right side and it focuses on management. Until the 1970's the trend in business was to favor analytical thinking as opposed to holistic thinking. However, since Mintzberg's observations the educational community has attempted to balance the business curricula to accommodate both the left and right sides of the brain, in order to develop and produce business graduates that have the ability to use both sides of the brain. The objective of the study is to ascertain the cognitive style differences between students that major in the different business disciplines: accounting, finance, marketing and management and suggest institutional and classroom accommodations. An inventory instrument, which measures left and right brain preferences, was used to gather information about different business majors. Additional variables are included in the study such as grade point average, age, and gender to explain demographic differences.

**Keywords:** cognitive psychology, assessments, business students.

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### Introduction

The student population in higher education has increased over the past years. This expansion has created a need to facilitate critical thinking in teaching and learning for the 21st century. Cognitive skills used in this process could fall under three categories: human capital, social capital, and psychological capital (Luthans, Luthans, & Luthans, 2004). Workers of today need critical skills such as, documenting, explaining, and persuading, while using data, concepts, policies, and plans (National Assessment of Educational Progress, 1981). Teachers should help students develop their human, social, and psychological abilities by developing relevant curricular and assignments in different disciplines.

Educators began to explore the different brain functions needed for developing critical thinking skills and understanding behavior patterns by asking the question "Are You Teaching Only One

Side of the Brain." (Samples, 1997) pointed out that most students are more likely to respond to the structure of societies hierarchies in solving a problem rather than to invent a different structural hierarchy to solve it. For example, by emphasizing related parts and structures the student uses the systematic-left brain function and leaves out the intuitive right brain function, which requires individuals to take unrelated concepts and ideas to produce a new structure or plan.

The purpose of this research is to determine whether the cognitive styles of students in finance, accounting, marketing, and management at a state four-year school are relevant to their respective majors. The results will help teachers to develop curriculum programs and classroom strategies that promote a balanced developmental approach to improving student achievement. Students could benefit in three ways. They would understand their own style, the style of others' and how to apply these styles in a hierarchical or other

type of organizational environment. The paper is organized into six sections, namely, the review of the literature, the methodology, the results, institutional implications, classroom implications and the conclusion.

### **Review of the Literature**

Mintzberg (1976) discussed the two brain hemispheres. He indicated that people process information differently according to their different brain preferences. For example, individuals who have a left-brain preference prefer logical, rational, systematic, linear and analytic thinking. This contrasts with individuals that are right brained, who prefer, a holistic, visual, intuitive, creative, synthesizing, relational or associational approach to thinking. Even though Mintzberg addressed the left and right side of the brain functions in relationship to managing, he did indicate that the trend in management from Frederick Taylor to 1970's was to handle problems analytically. According to Mintzberg, this conscious analysis will continue, but we may lose the keys to management in the process by not paying attention to other unconscious patterns of thinking present in all of us in different degrees.

Because of the academic trend toward left-brain courses in the last thirty or more years, a number of journal articles have suggested educational methods and strategies to balance the two hemispheres of the brain. For example, using the Torrance Test of Creative Thinking 62 undergraduate students were divided into a control and an experimental group with the experimental group receiving a course in enhancing creativity (Harkins, 1990). The results indicated that the right hemisphere of the brain could be enhanced through training, which implies that business courses and businesses can select training procedures

that improve the creativity of the right brain (Alder, 1994). Several articles have been written in the area of human resources pertaining to training the right hemisphere of the brain. The assumption was scientists were predominantly left-brain. They operated in a rational scientific environment that demanded analytical precision. To balance this left-brain emphasis, programs with right brain strategies were developed for scientists who had moved into management positions (Karp, 1990). Because of the left-right brain awareness a variety of techniques were identified in human resource management to encourage intuitive-right brain development (Johnson, 1993). For example, individuals can write anything down that comes to mind fanciful or otherwise, visualizing ideas, and developing affirmations. This would allow them to develop an inner state of conscious or unconscious thinking consistent with their genetic predisposition and environmental development. In addition to the programs for scientists, other disciplines such as marketing began to use both sides of the brain approach (Williams, 1995) and to apply the whole brain approach to develop different marketing and advertising techniques to reach the consumer (Marney, 1996).

What began to transpire in the business community with the whole brain approach was awareness that training can have an impact on managers to enable them to use their entire brain (Richardson, 1992). A number of training programs that are heavily dependent on left-brain activities are now introducing methods for right brain problem solving. For example, time management programs emphasize left-brain sequential procedures, ignoring the fact that there are certain right-brained individuals that may work in a structured systematic manner (Siebert, 1991). According to the article, these right brain individuals may be

more suited to an unstructured, spontaneous atmosphere that permits individuals to work informally in an intuitive manner. Therefore, the different management styles and the type of company culture become important variables for individuals to consider if they intend to reach their full work potential.

Other applications encourage a whole brain approach. These applications include Total Quality Management (TQM) and Project Management. Total Quality Management relies on statistical techniques to solve quality control problems. Because of the emphasis on the left side of brain, various articles encouraged companies to use brainstorming, a right brain creative problem solving method to start the process (Bookman, 1992). Teams also use brainstorming before concentrating on the more analytical aspects of project management (Brown, 2002).

The team approach has led researchers to identify four different cognitive categories: the knower, the conciliator, the conceptor, and the deliberator. Each category represents a different method of processing information based on each employee's intellectual capabilities (Miller, 1999). A balanced entrepreneurial environment is created when members from each of the four categories with different cognitive capabilities are included in a team.

Business education has developed a scientific-systematic approach using different techniques that build human capital, social capital and psychological capital. In education, the technical knowledge or human capital approach has been dominant and proven to be valuable in increasing performance outcomes when human capital is aligned with corporate strategy. Social capital focuses on network relationships in the immediate social group at work and outside of work (Adler & Kwon, 2002). These network relationships

are positively related to career choice, job satisfaction, productivity, and turnover (Harter, Schmidt, & Hayes, 2002).

## Methodology

A cognitive-style inventory developed and published by Martin (1989) was used to measure student preferences between the left-systematic side of the brain and the right-intuitive side of the brain. Management and marketing students were placed in one group and finance and accounting students were placed in another group (Goldstein, 1985). In addition to the differences between each group on the inventory instrument, grade point average and sex differences were compared between and among the groups. These combinations represent different critical thinking patterns. The suggested hypothesis is that accounting and finance students will score higher on the left or systematic side of brain, and the management and marketing students will score lower on the left side of the brain, and higher on the right side or intuitive side.

Bloom, et.al (1956) & Gronlund (1978) clarified different educational objectives associated with each critical thinking category. These critical thinking categories were listed from low to high in this sequence: knowledge, comprehension, application, analysis, synthesis, and evaluation. Taxonomy of educational objectives was identified for each category (Gronlund, 1978). For example, the accounting and finance disciplines emphasize procedures and discuss how the parts of these procedures relate to one another in problem solving. This approach is left-brain because it enables individuals to break down the related parts to understand the structure, which is defined as the analysis category of Bloom's Taxonomy. For the management and marketing disciplines, the synthesis category allows

these disciplines to integrate different and unrelated theories and concepts into a new scheme, plan, or strategy.

## Results

This study tested several outcomes by using the analysis of variance. The first question pertains to whether there are any differences within the finance/accounting sample or within management/marketing sample. The second question relates to whether there are differences between the two above groups when comparing each side of the brain. The third question is concerned with the effect of grade point average on the two groups. The fourth question analyzes the impact of sex (gender) on the right-brain function, the left-brain function, and grade point average.

Statistical means were used to compare results within and between groups of students. To provide for adequate sample size students from accounting and finance were combined to produce a sample size of 44, and marketing and management students were combined to produce a sample size of 57. However, in the management/marketing group, 20 out of 57 had higher left-brain scores, whereas 8 out of 44 in the finance/accounting group had higher right brain scores. Despite the 28% variation within each group, the statistical results still produced differences.

For both the accounting/finance sample and the management/marketing sample, the one sample t-test indicated there was no significant difference between the means within each group. However, in testing for the equality of the means using the independent samples test, the right-brain (intuitive) variable is significantly higher ( $t(98) = 2.64, p < .01$ ) than the left-brain (systematic) variable. The mean for the 44 students in the accounting /finance group is 61, and the mean for the 56 students in the

management/marketing group is 83.92. For the left-brain (systematic) t-test there is no significant difference between the two groups. For grade point average there is a significant difference between the accounting/ finance group and the management/marketing group. The mean grade point average is significantly higher ( $t(87) = 2.624, p < .01$ ) for the accounting/finance group ( $m = 3.2, sd = .411$ ) than the mean of the management/marketing group ( $m = 2.97, sd = .409$ ). In comparing sex differences with the right-brain, left-brain, and grade point average there is no significant difference between males and females on the right brain and on grade point average, but there is a significant difference on the left side between 37 males and 57 females ( $t(81) = p < .045$ ). The males' scores were significantly higher than the females: males ( $m = 70.3, sd = 6.69$ ), females ( $m = 67.3, sd = 7.23$ ).

## Institutional Implications

The results indicated statistically significant differences between the accounting/finance students and the management/marketing students on the right brain-intuitive variable, and grade point average. There was a significant difference between males and females on the left brain-systematic variable. Because of these statistically significant differences, educational institutions and corporations need to develop processes that involve a whole brain approach. Executive training programs should emphasize team building, organizational missions, and organizational strategies. There should be a fit between workplace positions and the preferred or better-developed hemispheric orientation of the holder of that position. However, in many instances individuals choose the positions that do not favor their brain

preference, and end up in the wrong career (Milne, 1985).

There are four areas that higher educational institutions need to address and coordinate to better develop students for the workplace. The first pertains to insuring a curriculum balance between left and right brain courses. The second relates to incorporating cognitive and psychological assessments into the classroom to teach students about different brain preferences and personalities. These assessments will promote student development, and encourage them to recognize the different behavior patterns of others. Students should be required to maintain a personal portfolio containing these assessments as they progress through school along with other classroom work, to help them understand and manage others better. The third area revolves around incorporating these assessments into the classroom assignments and the selection of courses and instructors. The fourth area should be helping students to evaluate their professional choices making sure that such choices are consistent with their cognitive and psychological preferences. When the prospective employee understands his or her own behavior, the employer receives an employee that fits into the company culture.

Many business departments in colleges and universities have adjusted their programs to balance the left and right brain courses. For example, students in accounting and finance have to take courses that develop the intuitive side of the brain. Such courses include content related organizational behavior and strategic management. Similarly, management and marketing students are now required to take several left-brain courses such as advanced statistics, marketing research, management science, and/or production management. However, a better balance can be achieved

by adding an additional course in management and leadership.

### **Classroom Implications**

Students should gain a more thorough understanding and comprehension of the different types of individual behavior patterns when left and right side of brain assessments are used in the classroom, such as the Herrmann Brain Dominance Instrument (Herman, 1992), the Myers Briggs, and the Five Factor Model (McCrae, 1992). These assessments are personal in nature, but the students will have fun taking the assessments. If the instructor places them in groups to identify friends and family that fit into the various cognitive and psychological categories, the students gain an understanding of different types of individuals. Instructors can also use these assessment tools to help clarify individual behavior and leadership patterns of managers, which in turn can affect strategic management decisions. Therefore, incorporating these assessments into the classroom assignments can further develop students in different ways to enable them to acquire confidence in behavior patterns that are not part of their natural thinking preference, or not consistent with their normal personality pattern. Because of these assessments, human behavior becomes more scientifically predictable for students, teachers, managers, planners, human resource professionals, and other occupational category.

More experiential-integrated learning experiences need to be introduced into the curricula, in addition to balanced business curricula between the left and right brain. For example, teachers can design and coordinate assignments that focus on the different critical thinking categories with different types of educational objectives. First, teachers may start their class with

brainstorming. The second phase of the classroom instruction may focus toward understanding how related parts of the subject matter fit into the structure of the course, and the third stage may focus on how unrelated parts are used to form a new strategy or plan of action to provide direction or solve the problem. The second phase encompasses the left-brain critical thinking category of analysis. The third phase is the right-brained category of synthesis. Ultimately, with the use of analysis and synthesis students then proceed with the final category of critical thinking: evaluation. Writing assignments, specific problems, group case studies, research projects, and practical experiential learning, such as internships, are some of the suggestions, which permit instructors to vary critical thinking patterns to develop both sides of the brain.

In this study, a critical thinking variation exists with 28% of the students not showing the expected brain preference, considering the type of major they selected. Despite the unexpected number of students who exhibited a brain preference not consistent with the overall group, the statistical variations between groups still produced differences between groups. However, this variation promotes diversity in the classroom on a technical, interpersonal, and conceptual level, and places a responsibility on the teachers to develop this diversity to enable students to select the appropriate career path consistent with their abilities.

Teachers should be aware that integrity, enthusiasm, motivation, curiosity, empathy, and self-confidence are some of the variables that are difficult to assess in the classroom because real life situations cannot be exactly duplicated in the classroom. However, appropriate classroom planning and implementation, enthusiasm, motivation, and self-confidence can be

improved when these assessments are used. For example, building self-confidence and self-efficacy comes from four principle sources (Bandura, 1997). First, mastery experiences that overcome obstacles through continued perseverance builds one's success and efficacy. Secondly, understanding self and others can help promote a positive attitude toward success. Thirdly, teachers can demonstrate different management models that may or may not work for students. The fourth principle builds self-efficacy, enhances psychological status, minimizes negative emotional states, and corrects misinformation.

### **Conclusion**

Colleges and universities need to further integrate right and left-brain cognitive styles development into their classes, and encourage students to develop personal educational assessment portfolios during their four-year degree program. These assessments together with class assignments would provide students with a body of knowledge for understanding themselves and others. A concerted effort by instructors to balance overall curricula, teaching assignments, and teaching techniques between various courses should increase the quality of teaching and learning. The author suggested additional courses to enlarge students' understanding of their individual behavior and that of others. A management and leadership course should integrate a student's previous course work, emphasize behavior and leadership, and further build self-esteem and self-confidence. A portfolio approach should enable students to build a personal portfolio, choose an appropriate career path consistent with their cognitive (learning style) brain preference, personality, and their self-esteem into positive psychological capital.

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