THE EFFECT OF VOCATIONAL PERSONALITY TYPES ON ACCEPTANCE OF COMPUTER-BASED TRAINING AMONG PHARMACEUTICAL SALES REPRESENTATIVES

ANDREW F. HARTNETT

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Andrew F. Hartnett

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The Effect of Vocational Personality Types on Acceptance of Computer-Based Training Among Pharmaceutical Sales Representatives

By:

Andrew F. Hartnett

Approved April 1996

Sydney A. McClary
Chairperson

W.A. Breytspraak
Supervisory Committee

W.A. Breytspraak
Director of Graduate Studies

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" The highest reward for a man's toil is not what he gets for it but rather what he becomes by it."
- Unknown

No one gets to this point in his or her life without the help of others.

To those who gave me life, repeatedly, my Mom and Dad, thank you for never losing faith in me. To my brothers and sister, no matter where the map said you were, you've always been where I needed you.

To the three people who have given my life meaning, Pat, Andy, and Jimmy, your love and support have made so much possible. I love you.

To Sybil and Gus, my two guides on this adventure, thank you for your patience, guidance, and friendship.

Thanks,

Andy

Abstract

Holland contends that educational achievement can be directly related to personality types in a predictable fashion. The purpose of this study was to test the effect of personality on attitude towards computers.

Two hundred and twenty-five randomly selected sales representatives from three Pharmaceutical firms were asked to complete two surveys; the Holland Self-Directed Search (SDS) and the Computer Attitude Survey (CAS). All *225* representatives used laptop computers, of varying types, in their day-to-day field work. 144 responses were obtained from the pool of 225.

Analysis of Variance was used to determine the effect of personality on resultant CAS scores.

The hypothesis was that the Conventional (C), Investigative (I), and Realistic (R) personality types of the Holland model would have a more positive attitude towards computers than the other three types.

Of the three above it is believed that (I) will have the strongest correlation. The specific careers associated with (I) are computer- and mathematics-related. Considering the strong correlation between mathematics and computer ability (I) was a logical choice. The hypothesis was shown to be valid as long as one of the personality components R, I, and C was present in the individuals personality code. When personality codes were broken down into two groups, those containing R, I, and C and those not containing these three, significance was reached, $dF = 1$, $F = 9.65$, and $p = .0023$.

When the data were evaluated for any relationship with the personality factor I, none was found. When the I component was evaluated in the primary position the dF = 1, F = 0.16, and p = .6926. When the I component was evalauted in the primary or secondary position the dF = 1, F= 1.20, with a p = .2760.

From a research viewpoint, such a strong significance regarding the three selected personality types, along with the small sample size and trending towards significance in the subset analysis, it appears that additional study with larger populations is appropriate.

The existence of such a significant relationship between certain personality types and computer acceptance could mean that, with further study, a simple-to-administer personality profile could easily identify those within a workforce with the attitude to accept a high-tech learning medium.

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THE EFFECTS OF VOCATIONAL PERSONALITY TYPES ON ACCEPTANCE OF COMPUTER-BASED TRAINING AMONG PHARMACEUTICAL SALES REPRESENTATIVES

The use of computers in training and education is becoming more and more prevalent. Technological advances in this field are being touted almost daily. In spite of these advances, resistance by end-users to computer-assisted learning is a widespread problem. The computer is a reality, and curriculum design an advanced art, but little is known about the third part of the equation: the end-user's attitude and its impact on the acceptance of computer based learning.

While the literature reveals a wealth of research in the area of personality, learning style and academic achievement, little research that specifically addresses vocational personality type and the acceptance of the computer, as a learning tool, is available.

Technical and formal education is being designed for, and underwritten by, business. This trend is on the increase. As the need for information dramatically increases, the time frame for assembling and dispensing information decreases. Computers and all their capabilities are seen by the business community as the answer to this situation.

Also, as opposed to traditional educational formats (high school, college), results of business education must be immediate and measurable. Therefore, any unseen problem that detracts from the quick and efficient transfer of information can have dramatic effects. Based on these unique characteristics, the selection of a business-based population was deemed appropriate. Due to prevalence of computers and computer-based training (CBT)

in the field, Pharmaceutical Sales Representatives were selected as the target subject group.

The literature regarding personality, learning style, and academics is huge. Studies involving computer acceptance have largely been done on traditional student populations (high school, college). Also, most personality studies deal with a correlation between the personality tool and a style of learning. This research addresses the topic of personality type and the acceptance of a specific tool. While studies do exist evaluating acceptance of computer technology, few studies address learning technology specifically. The studies addressing computer learning use performance versus acceptance as a criterion. Finally, the major drawback to many of these studies was the unwieldy tools used to determine the personality "make-up" of the respondent.

While volumes of books are dedicated to measurement tools, few were actually designed to measure attitude towards computers. The great majority of tools found emphasized aptitude, not attitude.

If the measured item was not aptitude, it was anxiety. While closely related to attitude, anxiety is but one factor in the makeup of attitude. As stated by Triandis (1971) "....attitude has three components, cognitive, behavioral, and affective". In this sense any study , not addressing all (3) components, would have been incomplete.

Background

The impetus for this research is found in a study by Dille and Mezack (1991). The study, "Identifying Predictors of High Risks Among Community College Telecourse Students", was designed to, among other things, determine if Kolb's Learning Styles Index was a reliable predictor of risk among college telecourse students. While Kolb's Learning Styles is considered a valid tool, it is used to define learning styles. It was felt that in the evaluation of a business population, in this study, Holland's Self-Directed Search would be a more useful tool. Holland's tool would be more effective in determining relationship between personality and computer attitude.

Another reason for deciding against further use of Kolb's tool was a study by Ruble and Stout (1992). In this study the Kolb Learning Style Inventory was shown to have only modest reliability and classification stability. These two findings and the existence of a more specific tool for this population led to the selection of the Holland Vocational Personality Types as part of this research.

The theory behind this research is based on the work of J.L. Holland (1959, 1966, 1973, 1985). Holland's theory of vocational personalities is considered one of the most influential career development theories in vocational psychology. In fact, his theory is the basis for the most widely used vocational interest surveys today.

Holland's theory is based on the premise that people in similar occupations have similar personality characteristics. As Holland himself explains it, "people search for [work] that will allow them to exercise their skills and abilities, express their attitudes and values, and take on agreeable problems and roles." (Holland, 1985, p.4) Steele and Morgan (1991)

described Holland's six basic vocational personality types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional, below:

REALISTIC - People in this category enjoy activities requiring physical strength or skill, aggressive action, and motor coordination. They prefer to deal with concrete, well-defined problems as opposed to abstract, intangible ones.

INVESTIGATIVE - People in this category are inclined to be analytical and inquisitive, tending towards careers and environments that require intellectual, independent, and "thinking" activities.

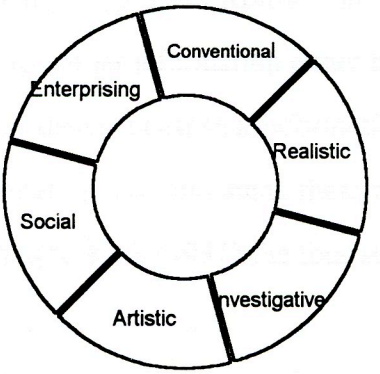
ARTISTIC - This category includes people who are independent, creative, intuitive, imaginative, impulsive, and idealistic, and have a great need for self-expression.

SOCIAL - In this category are people who have verbal and interpersonal skills; are more susceptible to social, humanitarian, and religious influences; and prefer to deal with others by being friendly, helpful and cooperative.

ENTERPRISING - This group is characterized by people who possess leadership and speaking ability, and see the world in terms of power, status, setting of goals, managing an organization, and otherwise assuming responsibility.

CONVENTIONAL - This group is characterized by the dominance of environmental demands that require law and order, and where goals, tasks, and values are sanctioned by custom and society.

A positive characteristic of the theory, as it relates to this study, is the hexagonal model of the theory. This demonstrates a relationship between closely located types on this wheel. While it is postulated that those of a particular career path should have certain personality traits in common, it is recognized that not all members of a specific specialty are identical. The hexagonal structure allows for individual differences, and environmental variations that do occur. In short, those types closest on the wheel share similarities while those located across from a certain type have the least similarities.



This wheel concept is important to note because computer work is no longer restricted to a few well defined job categories. As computer use becomes more common, more and more personality types, regardless of career selected, will have to interact with this technology.

Career Personality Types and Learning Styles

Holland further postulated that there was a congruence between personality type and career development/educational behavior. In 1990, George Atkinson, et al, published a study in Psychological Reports that established a relationship between Holland's personality types and Kolb's learning styles.

Atkinson (1990) reported the results of a preliminary study of the relationship between Holland's (1985) Career Personality Types and Kolb's Learning Styles. In short, Kolb believes that individuals prefer to gather information either through concrete experience or abstract conceptualization. They then process that information either through reflective observation or active experimentation. By combining these two processes, Kolb presents four styles of learning. According to Kolb (1981) the four styles are:

CONVERGER - People with this learning style are best at finding practical uses for ideas and theories. Convergers would rather deal with technical tasks and problems than with social and interpersonal issues.

DIVERGER - People with this learning style are best at viewing situations from many different points of view. Their approach to situations is to observe rather than take action. Divergers enjoy a situation that calls for generating a wide range of ideas, such as a brainstorming session.

ASSIMILATOR - People with this learning style are best at understanding a wide range of information and putting it into concise, logical form. Assimilators are less interested in people and more interested in abstract ideas and concepts.

ACCOMMODATOR - People with this learning style have the ability to learn primarily from "hands-on" experience. Accommodators enjoy carrying out plans and involving themselves in new and challenging experiences.

Both Holland's and Kolb's studies were administered to 169 students at a small liberal arts college as part of a longitudinal educational outcomes study.

Using a Chi-square analysis of results, Atkinson, et al, found a basic relationship between Holland's Codes and Kolb's Learning Style. While the match was not perfect and some findings were inconsistent, the results of this were used to accept Holland's Codes. One limitation of this study is that a Vocational Personality Coding may not be as valid among college freshman as it is among those who have, through choice, entered a profession.

Drummond and Stoddard (1992) investigated the relationship between the Myers-Briggs Type Indicator and the Gregore Style Delineator. The Gregore Style Delineator is a self-report inventory designed to investigate two types of mediation abilities in individuals, perception and ordering. The two dimensions of perception measured are abstractness and concreteness. The two dimensions of ordering are sequential and random. Though neither indicator is proposed for this study, Drummond's findings further strengthen the point that personality profiles may, when properly assigned and used, be a strong indicator of learning style.

While Atkinson (1990) found a correlation between learning style and personality type, a study by Schneider and Overton (1983) found little correlation between Holland's personality types and academic achievement as measured by test scores. (see Holland's Personality Types and Academic Achievement, p. 10)

In 1991, I. Gati (1991) criticized Holland's model as being incomplete. This statement was refuted in a meta-analysis study by Terence J. Tracy and James Rounds (1993). While these studies initially caused some concern about using the Holland Self-Directed Search, it should be noted that these studies used scores to determine validity and reliability. It should be noted that this proposed area of research will deal with attitude, as opposed to aptitude.

In this study, by Tracey and Rounds, both indicators were administered to 41 under-graduate students at a large, urban university. The group consisted of upper classmen and was all female. Of thirty-two comparisons, twenty were statistically significant with some level of correlation existing between the remaining twelve. The only drawback to this study is that the population, in addition to being small, was quite homogeneous.

The findings of both studies, as presented here show that personality, while needing more intense research, has been shown to have a positive relationship with learning styles.

Holland's Personality Types and Academic Achievement

Schneider and Overton (1983) investigated first-semester grade point averages and SAT scores in relation to the Holland Personality Type Indicator. The findings of this study were mixed. While males tended to be more predictable when using only test scores, there was a wider divergence for both sexes when SAT scores were taken into account. Although both I, S, A, and C males and females achieved the highest GPAs in the present study, the observed ordering of the groups did not conform with Holland's prediction. The sex difference was consistent with Holland's previous reports. It should be stressed that this study tried to establish a relationship between personality type and performance versus personality and attitude.

In their discussion, Schneider and Overton felt that Holland's Codes showed great promise. One factor raised that would be of concern in any study would be the 'personality' of the governing institution. Holland believes that educational achievement may be related to type of environment, which Holland believes is defined in part by the situation or atmosphere created by the people who dominate the environment. Due to the decentralized nature of sales representatives, this impact may be lessened. In fact, since the representatives would be completing the study in the privacy of their homes, with the results being held in confidence, any impact by the corporate personality should be minimized.

Tracey and Rounds (1993) compared the personality construct of Gati versus Holland. Gati had stated that Holland's construct was incomplete and failed to note certain types of groups. In fact Gati's position was that Holland had, in using the "wheel approach" versus his more linear approach, missed strengthening the correlation between every other point on the circular model. In their analysis both Tracey and Rounds found no basis for this

and, in fact, strengthened the argument that the Holland Types are probably one of the more sensitive indicators available. It is thought to be more sensitive because, unlike many of its counterparts it takes into account vocational interest, as well as interpersonal behavior. In other words, it was postulated that Holland's Type may bridge that division between vocational interest assessment and personality assessment. The importance of this would be seen in the way Holland's Types may better interact with a group of sales representatives who, except for their corporate allegiance and divisional assignments, are "lone wolves." This lone wolf mentality would lead to a greater emergence of personality. Therefore, a tool that is sensitive enough to assess personality and vocational type has an applicability in this instance that can not be ignored. In addition, a study that is sensitive enough to detect personality and computer attitude, yet is easy and quick to administer would lend itself to widespread use in the hiring phase, or preliminary employment phase, of many corporations.

Attitude and Attitude Testing

To better predict and increase user acceptance, it is important to know why people accept or reject computers. No matter how obvious the perceived gain, some end-users are reluctant to implement or use computer systems (Alavi and Henderson 1981; Nickerson 1981).

According to Aiken (1980), attitudes are "learned predispositions to respond positively or negatively to certain objects, situations, concepts, or persons." They can be thought of as a reflection of an individual's global perspective on a topic and can be predictive of behavior. (Kinzie, 1993). Some have suggested that attitudes toward new technologies are predictive of their adoption. (Anderson, Hansen, Johnson, and Klassen, 1979)

While many studies have sought to address this issue, results have been mixed and inconclusive. In part, this may be due to the wide array of different beliefs, attitudes, and satisfaction measures which have been employed. (Davis, 1989)

A review of the literature revealed a study of computer attitude (Ahl, 1976). In this study no scales were developed and the results were descriptive. Some 843 people responded to a survey presented in Creative Computing magazine. The seventeen question survey covered four topic areas: Impact on Quality of Life, Threat to Society, Understanding the Role of the Computer, and Understanding the Computer Itself.

In 1982, Ellsworth and Bowman devised the "*Beliefs About Computers*" scale. Thirty-eight undergraduate students majoring in computer science were administered the above discussed Ahl computer attitude survey with three questions added. The questions were scaled on a five-point scale ranging from strongly agree to strongly disagree. This tool was

then administered to 109 undergraduate, non-computer majors and the results were lower for the second group. The tool used by Ellsworth and Bowman was deemed too generic for the purposes of this study. Also, the study group did not take into account the computer experience of the student groups. In the representative pool used for this research all participants were expected to have used computers.

Reece and Gable (1982) developed the *"General Attitudes Toward Computers"* tool. The alpha internal consistency reliability of the 10 item general attitude scale was found to be 0.87. The focus of this study was seventh- and eighth-grade white middle class students. This survey was based on the work of Triandis (1971) who stated that attitude has three components: cognitive, behavioral and affective.

Building on the work of Reece and Gable, Bannon, et al (1985) designed a study consisting of cognitive and affective scales for assessing computer attitudes. The test was designed to determine computer attitude among students, teachers, educational administrators and other educators. The study had an alpha reliability of 0.87. This research was a further refinement of Reece and Gable's work.

Gressard and Loyd (1984) developed the "*Computer Attitude Scale"* (CAS) . Loyd and Loyd (1985, 1986) later made additions and refinements. The initial test consisted of thirty statements that covered computer anxiety, efficiency and liking. Later a fourth dimension, usefulness, was added. Repeated validating studies including Kluever (1992) have shown the CAS is a reliable instrument for measuring attitudes toward, and impressions of, the educational applications of computers. Internal consistency reliability as estimated by co-efficient alpha has been reported by the authors as 0.86, 0.91, and 0.91, corresponding to the factors of computer anxiety, computer confidence, and computer liking, respectively and 0.95 for the total score.

The scale being used for this research is an outgrowth of the Gressard and Loyd CAS. The tool developed by Bandalos and Benson (1990) took the original CAS of 30 statements and reduced it to 23 through both exploratory and confirmatory factor analysis. The intention of Bandalos and Bensen was to test the invariance of this factor structure across two subsamples: male/female and graduate/undergraduate. The results of the study suggest that the 23-item CAS is measuring the same construct to a similar degree for males and females. A similar finding was shown for graduate versus undergraduate.

The test contains 23 Likert-style items that present statements of attitude towards computers and their use. This scale, as was Gressard and Loyd's, is designed to measure three separate factors: computer anxiety, computer confidence, and computer liking.

Four reasons stand out as to why the Bandalos/Benson scale was selected for use in this study. First, the underlying scale, CAS, has multiple studies attesting to its reliability and validity. Second, the CAS, more than any other scale, attempted to define specific components of anxiety/attitude. Third, the focus of the study matches the needs of this research. And finally, Bandalos' adapted study addressed the variability between male and female subjects. This is an important consideration for this study, in light of the large percentage of women in the pharmaceutical sales field.

One question arose during the literature search phase of this project. Is it valid to test for computer attitude via computer, or should some other medium be used? Since attitude has been shown to affect performance, would administering the tools via computer skew the responses? Perkins (1993) studied 83 undergraduate/graduate students enrolled in a mandatory basic computer course. Two groups were formed, 44 in the computer group and 39 in the non-computer group. Both groups took a written pretest, but one group was

administered an anxiety scale (pre and post) and post-test on the computer while the other group used a paper and pencil version of these measures.

An ANOVA of the pretest revealed no significant differences between the computer and paper/pencil group F (1,81), p=0.71. The post-test also showed no significant difference between the two groups F (1,81), p=0.99. While scores gained significantly, there was no significant difference relatable to computer usage.

Two concerns expressed by Perkins were the fact that the questions were multiple choice and that this study reflected student response to the measure, not the class content. For the purposes of this study both of these issues would be considered strengths. The Holland *"Self-Directed Search"* and the Bandalos adaptation of the *"Computer Attitude Scale"* are, after all, multiple-choice select questions, and one additional purpose of this study has been to validate these measures.

Due to factors outside of my control the decision of which vehicle to use was rendered moot. Since the 145 subjects in this study use four different computers with varying modem and communication abilities, and management at the four involved companies had reservations regarding the use of their computers for non-company related business, computer delivery was deemed inappropriate for this study.

Computers and Industry Use

No literature was found linking computers and the pharmaceutical industry specifically. Training magazine has a regular annual feature that reports on training in general, and computers in training specifically. More interesting than single facts are the trends that are found in a review of three years of reporting on the status of training and industry.

The results are based on returned surveys that reflect the training status of U.S. organizations with 100 or more employees. Responses for the years cited, along with that number as a percentage of total surveys distributed, are as follows- 1992:1,600 & NA, 1993: 2,496 & 48%, and 1994: 2,313 & 13.5%.

Almost 41 million working Americans were projected to receive some kind of formal training from their employers during 1992 (Filipczak, 1992). As further reinforcement for the use of sales representatives for this study, the 1994 report cited sales representatives as the type of employee to get the greatest amount of formal training.

The first relevant trend that impacts on this industry is that in 1992 there was no category listed under "Instructional Methods" for computers. Computer conferencing was used by 3% of the respondents (Filipczak, 1992). Conversely, in 1994, computer-based training was listed by 46% of respondents. Along with this change was a listing for CD-ROM (8%) and computer conferencing (4%) (Training, October, 1994).

These numbers reflect the prevalence of computers for training purposes. Computers impact the territory sales representative in many other ways. In the 1994 study in Training magazine, many of the responding companies were using computers for data-base management, word processing, graphics, and spread-sheet capabilities. As computers

become laptop and palmtop sized and, more importantly, inexpensive, the representative will only be brought in-line with being ”on line”.

Rationale and Purpose of Study

The goal of this study will be to determine if a personality type affects attitudes toward acceptance of computer-based training. The hypothesis is that the Investigative, Conventional, and Reality personality types will be the most accepting of computer based training.

If, in fact, an affect does exists between personality type and acceptance of computers in training, the learning vehicle could be personalized in an attempt to optimize the learning experience. The development, implementation, and testing involved in computer-based education could be altered to suit the personality types (and resulting needs) of a specific population. In addition, support materials could be developed, or improved upon, to maximize the impact of CBT. Finally, such information would allow the training department to determine if computers would be the preferred training vehicle in certain situations.

Immediate use of these potential findings would result in more effective training. In high-tech industries where change is the rule and quick, effective training a must, the ability to identify the most effective training is a priority. The ability to identify the most effective training vehicle or tailor the selected vehicle for greatest impact would have widespread ramifications. Long-term, whether one approves or not, a person's ability to utilize CBT in learning could very well become a hiring criterion in certain industries.

Butler (1988) postulated four major advantages of the assessment of learning style. Two of these are especially applicable to this study, they are:

a) it can assist the teacher in examining whether they are harming or

frustrating their students by how they teach, and

b) it can provide a basis for developing strategies to help students who have different learning styles, including those different from their teacher's styles.

This second point becomes even more important in light of research by Elliott and Sapp (1988). Their study of the MBTI types of college students and faculty members revealed that a majority of students prefer Extraversion and Sensing while professors' preferences ran towards Introversion and Intuition. In other words, if educators and learners already have strong differences in preferred styles of learning, introducing a non-preferred medium can only further reduce learning in a certain subpopulation.

If a predictable relationship does in fact exist between the CAS and Holland's model, then industry would have at its disposal a personality test that is also sensitive to, and predictive of, computer and computer learning attitude. Since personality measures are widely used in employee selection (Bernadine and Bownas, 1988) already, the concept of using an enhanced tool should not be foreign to industry human resource departments.

With the growth of computer use in training, a tool of this type would become even more important. According to Liu and Reed (1994), the rich environment of hypermedia technology has the potential to accommodate learners with different needs. But before we can adapt the hypermedia environment to meet the needs of our trainees and students, we must identify the attitude of our trainees towards computers. To do this we must identify an easy-to-use, reliable tool to assist the course designers in identifying at-risk learners.

Hypothesis

The hypothesis is that the Conventional, Investigative, and Realistic personality types of the Holland model would have a more positive attitude towards computers than the other three types. Careers beginning with the letter R (realistic) include skilled trades, technical careers, and some service positions. Careers beginning with the letter I (investigative) include scientific and some technical positions. Careers beginning with the letter C (conventional) include positions that require skills in office administration and support, record and data management, and accounting.

Of the three above it is believed that "I" will have the strongest correlation with positive computer attitude. The specific careers associated with "I" are computer and mathematics related. Considering the strong correlation between mathematics and computer ability "I" was a logical choice.

Method

Subjects

The participants in this study were employees of three pharmaceutical firms. All selected participants were field sales representatives. The term field sales representative is defined as those sales representatives covering territories outside of the home office, excluding telephone sales. The study group consisted of 146 representatives. The study group was composed of 87 (60.42%) males and 57 (39.58%) females (two responses did not indicate sex). Ages ranged from 23 to 57, with 98 (68.1%) ranging between 31and 50. All participants had baccalaureate degrees, with 16 having master's degrees. All had at least one year of computer experience, with 82 (57%) having at least four years.

Measurements and Instruments

For the purposes of this study, 145 (1 representative completed the CAS but not the SDS) field sales representatives were administered the full Holland Self-Directed Search, Computer Attitude Scale (as amended by Bandalos, et al) and a standard demographic questionnaire.

Holland Self-Directed Search

Holland's theory of vocational and work environments is widely considered one of the most influential career development theories and occupational taxonomies in vocational psychology. The Self-Directed Search is a multiple-item paper-pencil test yielding six interest scores (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional). The survey is self-administered and takes

approximately 30-45 minutes to complete. The study is written to be used by ages 15-70.

The respondent completed a series of yes/no, like/dislike choices to include areas such as activities, competencies, and occupations. In addition the respondent completed a self-estimate section covering the following abilities: mechanical, scientific, artistic, teaching, sales and clerical.

The responses were then tallied according to different assigned headings and resulted in numerical scores being assigned to the six personality types. The three letters with the highest scores form the summary code.

See Attachment 1 in the Appendix to review Holland's Self-Directed Search and accompanying instructions.

Computer Attitude Scale

The Computer Attitude Scale, as modified by Bandalos and Benson, is a 23 item, self-administered scale. The 23 items represent three factors. Those factors are computer anxiety, computer confidence, and computer liking. Internal consistency reliability as estimated by coefficient alpha has been reported by the authors (Loyd and Gressard, 1984b) as .86, .91and .91, corresponding to the factors of computer anxiety, computer confidence, and computer liking, respectively, and .95 for the total scale.

The 23 items in the scale are rated using a Lickert scale of 1 to 7. Items 1,2,5,6,8,11,13,15,16, and 21 are reversed scored and an average is obtained. A

score of 1 shows a strongly positive attitude towards computers, while a score of 7 is strongly negative.

See Attachment #2 in the Appendix to review the Bandalos and Benson Computer Attitude Scale.

Demographic Information

The participants were asked their gender, age, level of education and computer experience. This information was obtained to identify the makeup of the participating representatives.

Procedures

Permission to conduct the study was granted by the vice-president of sales and the director of training at each company.

Selection of representatives was randomly made using the secretary of the training director, who selected territory numbers. These numbers did not indicate the representative by name. Mailing labels for the selected representatives were prepared and sent to the researcher. Those selected representatives were assigned a number between 1 and 275 prior to the mailing of the packet.

Since all studied representatives reported to the director of training or vice-president of sales, it was important that the subjects be made aware that their responses could not be linked or traced back to them. In fact, part of the agreement process was that the administration of each company would receive only a copy of the completed study and not individual or company-specific results. Individual participation was free, without any threat of reprisal or reporting back to management of such participation. Essentially, representatives were participating freely to assist in a master's research project. This was indicated in a cover letter that accompanied each packet of surveys (see Attachment #3 in the Appendix). To further ensure anonymity, the companies involved provided the mailing addresses of the representatives so that all correspondence between the researcher and participant would be outside the control of the company or its representatives. Each company did insist on informing its sales representatives that this project was sanctioned by the company but that the company was in no way involved.

Attachment 4 in the Appendix is a copy of the letter sent to representatives in the researcher's company. The letter was designed to negate any impact that a request by the researcher may have caused.

Since both surveys are self-administered there was no need for one-on-one interaction between the researcher and participant.

Participants were asked to complete the enclosed surveys within 10 business days of receipt and return them in the stamped, self-addressed envelope provided.

In the letter of introduction that accompanied each packet was an explanation of the research that was limited to the study's evaluation of personality. No mention of computers or attitude was made.

The returns were identified by a number affixed to each packet prior to mailing.

Data Analysis

Analysis of variance was used to analyze the data. The researcher has tried to show which personality types affect a positive attitude towards computers as learning tools. In addition, factors in the model, personality traits, sex, age, work experience, and years of college were studied for impact on the raw score. Raw scores were adjusted to have all positive scores going in the same direction. The appropriate software used was SAS, using their general linear models procedure. For unbalanced data the appropriate sum of squares is Type 1. (see Appendix Table 1)

Results

The hypothesis is that the Conventional, Investigative, and Realistic personality types of the Holland model would have a more positive attitude towards computers than the other three types (A,S,E).

Of the three above it is believed that "I" will have the strongest correlation with positive computer attitude. The specific careers associated with "I" are computer and mathematics related. Considering the strong correlation between mathematics and computer ability, "I" was a logical choice.

The hypothesis was shown to be valid as long as one of the personality components "R", "I", or "C" was present in the individual's personality code. When personality codes were broken down into two groups-- those containing "R", "I", or "C" and those not containing any of these three--significance was reached (F value 9.65, dF = 1, and p = .0023. [see Appendix, Table 2a]).

When the data were evaluated for effect of the personality factor "I" alone on computer attitudes, none was found. When the "I" component was evaluated in the primary position, the result was F = 0.16, dF = 1, and p = .6926 (see Appendix, Table 2b). When the "I" component was evaluated in the primary or secondary position the result was F = 1.20, dF = 1, with a p = .2760 (see Appendix, Table 2c).

After evaluating the hypothesis, additional studies were performed. In performing Duncan Analysis of Variance the researcher combined the top two personality characteristics into a variable, then a similar combination was done for the top three personality traits (see Appendix, Tables 3 & 4). This was done as preliminary analysis and indicated that the primary personality characteristic has no impact on the CAS score. Results for two factors were F = 1.02, dF = 18, and p = .4428. Results for three factors were F = 1.34, dF = 39, and p = .1228. A trending towards significance was noted.

Combination of the First Two Components of the Three-Component Holland Score and Demographic Variables

Primary and Secondary Components Plus Sex - Table 5

When sex replaced age as the next test of significance there was no difference in the scores . whether sex was evaluated independently (F=.17, dF= 1, and p=.6825) or in combination (F=.72, dF=5, and p=.6063[see Appendix Table 5]).

Primary and Secondary Components Plus Age - Table 6

The first two characteristics combined with age show that this combination does not have a significant impact on the adjusted scores (F=1.16,dF=5, and p=.3082). Age alone was significant at F = 1.16, dF = 1, and p = 0.0181. Duncan's multiple range test shows

significantly higher positive computer attitude in the age range 21-30 as opposed to the other three age groups.

Primary and Secondary Components Plus Job Experience - Table 7

When job experience replaced sex there was a significant difference in experience as it impacts the adjusted scores (F = 3.97, dF = 3, and p = 0.0100). Here people with up to three years' experience showed a significantly lower attitude towards computers than the group with greater than three years' experience. When combined with personality significance disappeared (F=.59, dF=17, and p=.8957[see Appendix Table 7]).

Primary and Secondary Components Plus College- Table 8

Interestingly, college alone and combined with the top two personality trait shows no difference between groups. College as a single factor resulted in the folllowing findings-: F=1.98, dF=3, and p=.1207. In combination with personality the findings were (F=.70, dF=14, and p=.7716 [see Appendix Table 8]).

Combination of the Three-Component Holland Score and Demographic Variables

This analysis was repeated with the three primary personality traits and the results are nearly similar to the two-component analysis (see Appendix Table 3). Alone, the personality traits tend toward significance (F = 1.34, dF = 34, and p = 0.1228) and, interestingly enough, the same parameters which were significant using the first two personality traits are significant in the three-component analysis.

Three-Component Holland Score Plus Sex - Table 9

Sex is not significant when combined with personality traits (F=.61, dF=11, and p=.8125). Alone Sex showed even less significance (F=.03, dF=1, and p=.8658 [see Appendix Table 9]).

Three-Component Holland Score Plus Age - Table 10

Age was not significant when combined with the three personality trait (F=1.17, dF=30, and p=.2884). The category Age tended towards significance (F=1.98, dF=3, and p=.1251). The Duncan Grouping showed significant deviation between group 21-30 and the other three groups: 31-40, 41-50, and 51-60 groups (see Appendix Table10).

Three-Component Holland Score Plus College - Table 11

College had no significant effect when combined with the three personality components (F=.54, dF=26, and p=.9603). College alone tended towards significance (F=1.84, dF=3, and p=.1478). The Duncan Grouping showed significant intragroup differences, with the group with highest education level being significantly more likely to accept computers than any other group (see Appendix Table 11).

Three-Component Holland Score Plus Job Experience - Table 12

Job experience combined with the three personality traits was not significant (F=.70, dF=30, and p=.8617). Experience alone was nearly significant with (F = 2.39, dF = 3, and p = 0.0755 [see Appendix Table12]).

Discussion

Hypothesis Overview

The hypothesis was that the Conventional, Investigative, and Realistic personality types of the Holland model would have a more positive attitude towards computers than the other three types. Careers identified with the letter R (realistic) include skilled trades, technical careers, and some service positions. Careers identified with the letter I (investigative) include scientific and some technical positions. Careers identified with the letter C (conventional) include positions that require skills in office administration and support, record and data management, and accounting.

Of the three above it was believed that "I" would have the strongest correlation. The specific careers associated with "I" are computer and mathematics related. Considering the strong correlation between mathematics and computer ability, "I" was a logical choice. However, the findings of this study did not bear this out.

The hypothesis was shown to be valid as long as one of the personality components "R", "I", or "C" was present in the individual's personality code. When personality codes were broken down into two groups--those containing "R", "I", or "C" in the code and those not containing any of these three--significance was reached (dF = 1, F value 9.65, and p = .0023). The Holland Self-Directed Search shows that the personality type most consistent within sales representatives of chemicals and drugs is ESA. ESA occurred 17 times out of the 144 surveys received and was the largest single personality type in the study. ESA or any of its varaints (SEA, SAE, EAS, ASE, or AES) occurred 30 times out of the 144 surveys received. Important to note is that this personality code does not contain "C", "I", or "R" components. In training a sales force that deals with chemicals and drugs the training designer should at least be aware that there may be a fundamental personality

predisposition to reject the computer as a training tool. This does not mean that the computer should not be used, but the designer of programs supported by computers should include components that will allow for easier acceptance.

It should be noted that the use of computers in the pharmaceutical sales field is relatively new (on average less than six years). Therefore, computer ability or attitude was not a factor in hiring decisons until recently. With the new job expectation of computer capability being added to the sales profile, the common personality type among pharmaceutical sales representatives may change. The realization that there is such a significant relationship between certain personality types and computer acceptance could mean that with further study a simple-to-administer personality profile could easily identify those within a workforce with the attitude to accept a high-tech learning medium. Since computer-based training seems to be the trend in industry, employees could possibly be screened based on their attitude towards different learning technology. This screening could be used used positively to determine the need for educational support necessary for that employee rather than employee selection.

When the data were evaluated for any relationship with the personality factor "I", none was found. When the "I" component was evaluated in the primary position the results were dF = 1, F value = 0.16, and p = .6926. When the "I" component was evaluated in the primary or secondary position the results were dF = 1, F value was 1.20, with a p = .2760. This result was fascinating due to the strong correlation of the "I" type to mathematics and in turn research indicating mathematics association with computer aptitude. In multiple studies computer aptitude and mathematical aptitude have shown strong correlation. It was believed that this relationship would carry over to attitude. The above findings may lead one to believe that the correlation between attitude and aptitude may not be as strong as initially believed.

If true, this finding would be important in determining training design characteristics. The proven computer aptitude of a sales force may not translate into the positive attitude necessary for optimum training.

Computers and Sex

Findings here were consistent with the literature. No affect on computer attitude was found based on the sex of the participant. This finding is important to the training designer. Pharmaceutical sales was a male dominated field less than ten years ago. Today it is nearing an equal distribution of males to females.

Computers and Age

The findings that younger subjects (21-30 year olds) had a significantly better attitude towards computers than any other age group, has both positive and troubling implications. As sales forces naturally turn over through retirement and attrition, new hires raised in a computer generation will have computer skills and possibly more positive attitudes towards computers for training.This evolution will have a positive effect on CBT.

From a human resources perspective, hiring employees based on a predisposition to computers, or a positive attitude towards their use, could be troublesome if testing is shown to preclude certain age groups.

Computers and Experience

It was found that computer experience by itself had a significant impact on computer attitude, but lost all significance when combined with personality. As our society becomes more computer literate this differentiation may disappear. We presently have a large component of our sales forces who were college graduates before the first home

computers were available. As this number decreases and our sales forces consist of those who were raised on computers, this statitical finding could diminish.

Computers and College

Those representatives attending graduate school had the strongest positive attitude towards computers, though the educational level of the representative was not significant. Those attaining graduate level education may have been exposed to computer-based training more recently than other representatives. As stated in the above discussions on experience and age, as our sales force reflects more computer savvy this finding may lose it's importance.

Implications for Training and Human Resources

The findings of this study support the idea that the area of attitude, and not just aptitude, warrants deeper research. The potential impact of these future studies could dramatically impact the design and delivery of educational and training programs in the business sector.

When time and cost constraints demand that every educational effort be as effective as possible and measurable according to well-defined criteria, every factor must be taken into account. For years employees have been tested for aptitude, and proven performance. As finer and finer parameters for success are being placed on training programs the trainees attitude, towards the message and the medium, must also be taken into account.

In the reality of the business world, computer-based training has become a stock answer to many training initiative questions. Whether selected because it is an educationally sound methodology or because it was forced on a training department by evangelical superiors, computers are a medium that may harbor some unseen problems purely because they are computers. A possible concern, as shown in this research, is that there may be personality

constructs that are predisposed to unfavorable attitudes towards computers. While computer-based training will not go away for these people, instructional design approaches can be taken that can help bridge this attitude gap.

Learning methodologies evolve and become accepted over long periods of time, while corporate strategic needs and their subsequent educational ramifications occur more quickly. Therefore, recognizing the attitude and aptitude of the learner can allow quicker, more seamless acceptance of the information through whatever medium is chosen.

The problems that surround "personality" testing should be a human resources concern. While it may be true that eventually a personality map of a sales force could be used to better design computer-based training, it must be acknowledged that the possibility exists that a personality map could be used to design sales forces. While this is not a problem in itself, concerns arise regarding the additional findings related to age and other demographic factors. Even if more concrete findings related to this topic are found, these findings should be used primarily to design educational initiatives and not design employment protocols.

Study Limitations

The primary limitation to the research attempted here was population size. While significance was reached in certain areas, other areas, such as the three-component personality code, tantalizingly approached significance. In many cases the N values were not present to support strong findings.

It could be argued that the size of the two surveys , SDS 14 pages and CAS 2 pages, was a limiting factor. The high response rate to the study would indicate otherwise. Out of 250 surveys mailed 144 were returned, a response rate of 57.6%.

Recommendations for Future Research

With such a strong trending towards significance regarding the three selected personality components, but limited by the small sample size, additional study with larger populations is appropriate. It is recommended a study reflecting the evaluation of at least 500 participants be accomplished following this protocol. As three-type personality codes neared significance as compared to single- or two-type codes, a greater number of participants will be needed to reach relevant findings.

It is also suggested that age and experience be evaluated in any future studies. The significant relationship shown in this study cannot be overlooked in future study.

In general this experiment is not quite large enough to show that the personality traits themselves can be used to predict the adjusted scores. But differences may emerge when these traits are combined with age or experience. These two variables should be studied in any subsequent analysis.

With the strong trending towards significance obtained by using the three component personality code, it does appear that a larger sample may possibly cause the single variable of combining the first three personality components to become significant, though the results of combinations with two personality traits have smaller p. values in most cases. Also, it must be noted that in all of these models the interaction term is not significant, meaning individual parameters outside of personality can be individually analyzed as to effect on the model.

Overall while the hypothesis was partially proven, the sensitivity needed for in-depth analysis was lacking due to sample size. The role of personality type cannot be denied, but

its direct effect has not been specifically shown. More importantly, the role of factors outside of personality type--specifically has been shown to correlate with computer attitude. In future studies these factors should be defined and tested alone, as well as in combination with personality types.

Summary

Regardless of the findings, basic learning design should never lose sight of the learner. This study raises the question of whether the learner's personality and subsequent attitude, as well as aptitude, may drive specific design issues.

Does personality play a role in attitude towards computers as learning tools? Yes. How strong is personality's effect on computer attitude? Further research will be needed to establish the strength of this linkage.

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