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Creativity in Dental Hygiene Students and Dental Hygiene Professionals

Frances Lynne Jarrett
Old Dominion University

CREATIVITY IN DENTAL HYGIENE STUDENTS AND DENTAL HYGIENE PROFESSIONALS

by

Frances Lynne Jarrett
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B.S. December 1975, Old Dominion University

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Approved:

Michele L. Darby (Director)

Susan Schwartz

Roger Johnson

Deanne S. Allen

ABSTRACT

CREATIVITY IN DENTAL HYGIENE STUDENTS AND
DENTAL HYGIENE PROFESSIONALS

F. Lynne Jarrett
Old Dominion University, 1977
Director: Michele L. Darby

The purpose of this investigation was to examine creativity in dental hygiene students, dental hygiene educators, and dental hygiene practitioners.

Torrance's creativity test, What Kind of Person Are You?, was used to measure creativity in a convenience sample of 231 subjects. Data were organized according to an ex post facto research design utilizing educational and occupational status as the non-manipulated independent variables, and What Kind of Person Are You? creativity scores as the dependent variables. The statistical tests, analysis of variance and chi-square were employed to analyze data for significant differences between and among the mean scores of all sample groups.

Results revealed (a) no significant differences among aspiring, first year, and second year dental hygiene students in creativity scores; and (b) a significant difference between dental hygiene practitioners and dental hygiene educators in creativity scores, $p=<0.01$.

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Chapter 1

INTRODUCTION

Prior to 1950, research findings in the area of creativity have been sporadic, but recently, interest and research in this area have increased.[1] Investigators have explored creativity as it relates to education, science, personality development, and career choices; however the literature reveals a paucity of research relating this construct to dental hygiene education and dental hygiene practice. In order to better understand the factors affecting dental hygiene students and dental hygiene professionals, research in the area of creativity is needed. Creativity research in dental hygiene might prove beneficial in (a) guiding and counseling students, (b) determining predictors of success and gratification in dental hygiene curricula and eventual career choices, and (c) modifying dental hygiene teaching methods to enhance student creativity levels.

This study investigated creativity as measured by Torrance's creativity inventory, What Kind of Person Are You? (WKOPAY) in (a) individuals aspiring to enter dental hygiene

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[1] J. P. Guilford, Intelligence, Creativity and Their Educational Implications (San Diego, Calif.: Robert R. Knapp, 1968), pp. 78-79; Kaoru Yamamoto, "Creative Thinking: Some Thoughts on Research," Creativity: Its Educational Implications, ed. John C. Gowan, George D. Demos, and E. Paul Torrance (New York: John Wiley & Sons, Inc., 1967), p. 308.

schools, (b) dental hygiene students, (c) dental hygiene educators, and (d) dental hygiene practitioners. The components of creativity--Acceptance of Authority, Self-Confidence, Inquisitiveness, Awareness of Others, and Disciplined Imagination--were measured as was overall creativity.

Statement of the Problem

This research was concerned with answering the following questions:

1. Is there evidence indicating that the dental hygiene curriculum tends to discourage creativity?

Do the WKOPAY creativity scores of first year, second year, and aspiring dental hygiene students differ?

2. Is there evidence indicating that creativity level is related to dental hygiene career choice?

Is there a difference between the creativity levels of dental hygiene practitioners and dental hygiene educators?

Significance of the Problem

Dental hygiene curricula might be categorized as rigidly guidelined science curricula when considering their mandatory adherence to the curricular requirements established by the American Dental Association, Commission on Accreditation[2] and the curricular standards suggested in

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[2]American Dental Association, Commission on Accreditation, Requirements and Guidelines for Accredited Dental Hygiene Education Programs (Chicago: American Dental Association, August, 1975), p. 1.

Curriculum Essentials for Dental Hygiene Education: Performance Standards Based on Task Analysis and Instructional Objectives.[3] Research indicates a negative relationship between creativity and success in a rigidly guidelined science curriculum.[4] The creativity of an individual might, therefore, have a significant effect on success or failure in a dental hygiene curriculum. The degree to which creativity affects dental hygiene student performance remains unknown. The implications of determining creativity levels in dental hygiene students might have a bearing on admission into dental hygiene programs, dental hygiene career counseling and student preferences for differential methods of learning.

In general, the number of applicants admitted to a given dental hygiene program is limited.[5] Consequently, students are compelled to meet various requirements for admission, which might include, but not necessarily be limited to the following: above average grades in previous high school and/or college courses, an aptitude for and interest in dental hygiene, satisfactory performance in

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[3]Irene R. Woodall, ed., Curriculum Essentials for Dental Hygiene Education: Performance Standards Based on Task Analysis and Instructional Objectives (3rd ed.; Chicago: American Dental Hygienists' Association, 1975), pp. vii, 1-40.

[4]Benson R. Snyder, "The Education of Creative Science Students," The Creative College Student: An Unmet Challenge, ed. Paul Heist (San Francisco: Jossey-Bass Inc., 1968), pp. 56-69.

[5]American Dental Hygienists' Association Brochure, Dental Hygiene Testing Program (Chicago: American Dental Hygienists' Association, 1976), p. 1.

specific college courses, and satisfactory scores on the Dental Hygiene Aptitude Testing Program.[6] These various admission requirements function as predictors for success in a dental hygiene curriculum. "Measuring particular abilities that are related to success in dental hygiene education and practice is an essential factor in selecting students for admission to dental hygiene schools."[7] If creativity is related to success and gratification in dental hygiene, then knowledge of an individual's creative ability would enhance the selection process and increase the possibility of successful completion of a program.

Torrance purports that the degree of individual creative ability influences career aspirations.[8] Knowledge of creativity in dental hygienists may be helpful in understanding career choices made by dental hygienists and in counseling students into careers which are most tolerant of creative abilities.

Researchers indicate that a student's creative ability influences his/her preference for differential methods of learning.[9] Determination of the creative level of

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[6]Ibid.; American Dental Hygienists' Association, Dental Hygiene Aptitude Testing Program Guide for Admissions Officers and Dental Hygiene Program Directors (Chicago: American Dental Hygienists' Association, 1976), p. 1.

[7]American Dental Hygienists' Association Brochure, p. 1.

[8]E. Paul Torrance, Torrance Tests of Creative Thinking (Princeton, N.J.: Personnel Press, Inc., 1966), p. 29.

[9]Ibid., pp. 15-19.

dental hygiene students at various educational plateaus might provide guidelines for faculty desiring to implement teaching methods which are better adapted to student creativity levels.

The vocational needs and career aspirations of individuals vary with regard to their creativity level.[10] Individuals scoring high in creativity tend to aspire towards occupations such as teaching, direct service to others, psychology, and social work.[11] Both dental hygiene practitioners and dental hygiene educators are primarily involved with direct service to others and teaching. Yet these positions vary in responsibility and activity. The degree to which educators and practitioners differ in creativity is unknown. The gap of knowledge lies in the effects creativity might have on individual career choices within the field of dental hygiene.

Definition of Terms

The following terms are defined for purposes practical to this study:

Creativity: The

> . . . process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results.

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[10] Ibid., p. 29. [11] Ibid.

[12] Ibid., p. 6.

Creativity was measured by WKOPAY (see Appendix A).

What Kind of Person Are You? (WKOPAY): One measure of two which comprise the Khatena-Torrance Creative Perception Inventory. WKOPAY is based upon the rationale:

> . . . that the individual has a psychological self, whose structures have incorporated creative and non-creative ways of behaving, and whose purpose is to present verbal stimuli to trigger those sub-selves that would yield an index of the individual's disposition or motivation to function in creative ways. . . . [This test] contains 50 items of paired characteristics randomly arranged in forced choice format such that an item may call for a choice between two socially desirable and undesirable characteristics, or between two creative and non-creative characteristics. The subject is asked to choose one of each pair and mark this on an . . . answer sheet.[13]

Accredited Dental Hygiene Program: A program which includes at least two years of college education leading to a certificate or associate/baccalaureate degree in dental hygiene; and that has been accredited by the Commission on Accreditation of Dental and Dental Auxiliary Educational Program.[14]

Dental Hygienist: A

> . . . licensed, professional, oral health educator and clinical operator who [may], as an auxiliary to the dentist, . . . [utilize] preventive, therapeutic, and educational methods for the control of oral diseases to aid individuals and groups in attaining and maintaining optimum oral health. . . .[15]

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[13]Stoeling Brochure, Khatena-Torrance Creative Perception Inventory (Chicago: Stoeling Co.), Cat. No. 24534.

[14]American Dental Hygienists' Association Brochure, p.1.

[15]Esther M. Wilkins, Clinical Practice of the Dental Hygienist (4th ed.; Philadelphia: Lea & Febiger, 1976), p. 3.

Dental Hygiene Practitioner: A dental hygienist who practices in a dental office, clinic, or dental service facility.

Dental Hygiene Educator: A dental hygienist who is employed for at least nine contact hours weekly to instruct dental hygiene students who are in pursuit of a dental hygiene certificate, or baccalaureate or master's degree.

Dental Hygiene Professional: A general term used for convenience in this research. Included are dental hygiene practitioners and dental hygiene educators as defined by the study.

Aspiring Dental Hygiene Student: An individual who has taken the Dental Hygiene Aptitude Testing Program, but has not yet begun formal study in a dental hygiene program.

First Year Dental Hygiene Student: A student enrolled in the last month of the second semester of a two-year accredited dental hygiene program.

Second Year Dental Hygiene Student: A student enrolled in the last month of the final semester of a two-year accredited dental hygiene program.

Dental Hygiene Student: A general term used for convenience. Included are aspiring dental hygiene students, first year dental hygiene students, and second year dental hygiene students as defined by the study.

Assumptions

The following assumptions were made for this research:

1. WKOPAY is an appropriate data collection instrument for measuring creativity and its components in dental hygiene students, dental hygiene educators, and dental hygiene practitioners, since it has been shown to be reliable and valid for adolescent and adult populations.[16]

2. All subjects received the same testing directions since printed instructions were employed (see Appendix A).

3. Subjects followed testing instructions and answered all questions honestly and to the best of their ability.

4. The principal investigator scored and interpreted all WKOPAY tests appropriately according to the procedures stated in the Manual for Khatena-Torrance Creative Perception Inventory.[17]

5. Individuals tested did not have accumulated specialized knowledge concerning WKOPAY or the subject of creativity.

6. Interscorer reliability of WKOPAY is high (r=.99), and scoring was done objectively;[18] therefore intrascorer reliability is adequate.

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[16]Joe Khatena and E. Paul Torrance, Manual for Khatena-Torrance Creative Perception Inventory (Chicago: Stoeling Co., 1976), pp. 15-24.

[17]Ibid., pp. 2-5. [18]Ibid., pp. 4-5.

7. Characteristics such as age, sex, and race were not relevant variables, since WKOPAY is designed for both adolescent and adult populations.[19]

8. Without specialized knowledge of creativity and WKOPAY, subjects are unable to distinguish between creative and non-creative responses. Therefore, the Hawthorne effect was not evident.

9. Inequality of sample group Ns did not bias study results. The five convenience sample groups available were composed of unequal subject numbers; however, all available subjects were included in the sample groups.

10. Old Dominion University, Virginia Commonwealth University, and Virginia Western Community College have dental hygiene programs which are rigidly guidelined.

Limitations

The validity of the results was limited by the following factors:

1. Random sampling techniques were not used, since subjects studied comprised intact groups.

2. Reliability and validity of study results were as adequate as the reliability and validity of WKOPAY (see Chapter 3, Instrument Design).

3. Strict control of environmental variables was not feasible, and environments in which subjects responded

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[19] Ibid., p. 2.

to WKOPAY differed. These conditions might have biased subjects' responses.[20]

Delimitations

1. The following were chosen as convenience samples:
   a. Dental hygiene educators employed by Old Dominion University, Norfolk, Virginia; by Virginia Commonwealth University, Richmond, Virginia; and by Virginia Western Community College, Roanoke, Virginia
   b. Dental hygiene practitioners located in the Tidewater, Virginia area as identified by the current president of the Tidewater Dental Hygienists' Association
   c. First and second year dental hygiene students enrolled at Old Dominion University, Virginia Commonwealth University, and Virginia Western Community College
   d. Aspiring dental hygiene students gathered for the April 15, 1977, administration of the Dental Hygiene Aptitude Testing Program at Old Dominion University
2. WKOPAY was the instrument of choice for measuring creativity in sample populations.
3. All respondents utilized in this research met this study's definitions of sample populations. A

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[20] Ibid.

brief questionnaire determined more definitive information (see Appendix B).

Hypotheses

The research hypotheses and statistical hypotheses tested were:

1. Is there evidence indicating that the rigid dental hygiene program tends to discourage creativity? This research question was answered by the following statistical hypotheses:

   a. There is no statistically significant difference among the WKOPAY creativity scores of aspiring, first year, and second year dental hygiene students.

      i. There is no statistically significant difference among the WKOPAY Acceptance of Authority scores of aspiring, first year, and second year dental hygiene students.

      ii. There is no statistically significant difference among the WKOPAY Disciplined Imagination scores of aspiring, first year, and second year dental hygiene students.

2. Is there a difference between the creativity of dental hygiene practitioners and dental hygiene educators? This research question was answered by the following statistical hypotheses:

a. There is no statistically significant difference between the WKOPAY creativity scores of dental hygiene practitioners and dental hygiene educators.

i. There is no statistically significant difference between the WKOPAY Acceptance of Authority scores of dental hygiene practitioners and dental hygiene educators.

ii. There is no statistically significant difference between the WKOPAY Disciplined Imagination scores of dental hygiene practitioners and dental hygiene educators.

Methodology

An ex post facto research design was utilized to determine WKOPAY creativity scores maintained by dental hygiene professionals and dental hygiene students. Data were statistically analyzed to detect significant differences between and among groups.

The non-manipulated independent variables were level of dental hygiene education (aspiring, first year, or second year dental hygiene students), and type of dental hygiene occupation (educator or practitioner).

The dependent variables, creativity and its component factors, were measured by WKOPAY creativity inventory scores.

Chapter 2

REVIEW OF THE LITERATURE

The construct, creativity, has not been studied in relationship to dental hygiene students, dental hygiene practitioners, or dental hygiene educators. A review of the literature reveals several relevant studies which have significant implications for the study of creativity in dental hygiene. Literature from the field of educational psychology was reviewed in order to establish the theoretical basis for the study of creativity in dental hygiene. The need for "creativity" research on dental hygiene populations becomes evident upon close examination of the literature.

The Construct of Creativity

Creativity is an integral part of the human personality affecting the whole individual.[1] Several leading authorities in the field of creativity research agree that all individuals possess creativity in degree, and that everyone is potentially creative.[2] Creativity has been

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[1]Roger A. Johnson, "Differential Effects of Immediate Versus Delayed Reward Instructions on the Creative Thinking of Two Economic Levels of Elementary School Children" (unpublished Ph.D. dissertation, University of Georgia, 1973), p. 1; Mary L. Marksberry, Foundation of Creativity (New York: Harper & Row, 1963), pp. 5-6; Alex F. Osborn, Applied Imagination (New York: Charles Scribner's Sons, 1953), p. 1

[2]Harold A. Rothbart, Cybernetic Creativity (New York: Robert Speller & Sons, 1972), p. 1; John W. Haefele, Creativity and Innovation (New York: Reinhold Publishing Corp., 1962), pp. 81-82.

defined in numerous ways according to person, conditions, product, and process.[3]

When creativity is determined according to person, those abilities most characteristic of creative persons are the definitive criteria. This type of definition is restricted in that

> . . .[w]hether or not the individual who has the requisite abilities will actually produce results of a creative nature will depend upon his motivational and temperamental traits. . . .[4]

Definitive characteristics attributed to creative persons are innumerable, however, according to Demos, Torrance, Gowan, Rogers, and Trend,[5] most tend toward basic traits. They assess the creative individual as (a) open to experience various ideas and concepts, (b) flexible and spontaneous, and (c) recurrently attacking problems from various angles until a solution is achieved. Furthermore, the locus of evaluation of the creative individual tends to

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[3]Torrance, Torrance Tests of Creative Thinking, p. 6.

[4]J. P. Guilford, "Creativity: Its Measurement and Development," A Source Book for Creative Thinking, eds. Sidney J. Parnes and Harold F. Harding (New York: Charles Scribner's Sons, 1962), p. 152.

[5]Carl R. Rogers, "Toward a Theory of Creativity," The Creative Encounter, eds. Rosemary Holsinger, Camille Jordan, and Leon Levenson (Glenview, Ill.: Scott, Foresman & Co., 1971), pp. 6-8; James W. Trent, "A Dialogue on Creativity," The Creative College Student: An Unmet Challenge, ed. Paul Heist (San Francisco: Jossey-Bass, Inc., 1968), pp. 4-5; George D. Demos and John C. Gowan, "Introduction," Creativity: Its Educational Implications, eds. John C. Gowan, George D. Demos, and E. Paul Torrance (New York: John Wiley and Sons, Inc., 1967), pp. 2-3.

be internal. Autonomy, independence, dominance, resourcefulness, and self-acceptance are characteristics which motivate the creative individual to value self-criticism most highly. They have typified creativity in terms of non-conforming and non-habitual rather than conforming and habitual. Interestingly, dental hygiene curricula and practice have been accused of being rigid, structured, and dehumanizing[6] and, therefore, might be hindering creative attributes.

According to Rogers, external conditions which foster creativity are psychological safety and psychological freedom.[7] Three processes establish the psychological safety which enhances creativity including (a) acceptance of the individual in his own right, (b) empathetic understanding of the individual, and (c) maintenance of a climate free of external evaluation. Rogers' psychological freedom pertains to complete freedom of expression. Similarly, freedom of expression as demonstrated by open-structured learning situations is necessary to nurture creativity, according to Torrance.[8] In contrast, the rigidly structured dehumanizing dental hygiene program[9] might tend to discourage creativity.

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[6]Karen O. Skaff, "The Humanization of Dental Hygiene Education," Journal of the American Dental Hygienists' Association, XLIX (October, 1975), 466-468.

[7]Rogers, pp. 1-12.

[8]Torrance, pp. 40-41.

[9]American Dental Association, p. 1; Skaff, pp. 466-468.

Of all creativity indicators, product is the most tangible.[10] In referring to great artists, for example, their creative products are obvious; but creative products can be the result of "many minor acts at many different levels of intelligence."[11] MacKinnon defines a creative product as a fully developed novel response or idea to a problem or situation.[12] The product, however, need only be original to the individual, as exemplified by Haefele:

> . . . Perhaps one [individual] makes the right mosaic out of all things, and he [italics in the original] makes the discovery. But others make different mosaics, and they [italics in the original] make other discoveries.[13]

Interestingly, technical training might tend to discourage creative production, because this type of education encourages immediate achievement and quick recall, rather than creative development of novel responses and ideas.[14]

The creative process, then, encompasses person, conditions, and product in that the process is the production of a novel response, resulting from a combination of

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[10]Calvin W. Taylor, Creativity: Progress and Potential (New York: McGraw-Hill, 1964), p. 8.

[11]Hugh Lytton, Creativity and Education (New York: Schocken Books, 1972), p. 2.

[12]D. MacKinnon, "The Nature and Nurture of Creative Talent," American Psychology, XVII (1962), 484-495, cited by Malcolm Robertson, A Method of Stimulating Original Thinking in College Students (Kalamazoo: Western Michigan University, 1964), p. 1.

[13]Haefele, pp. 248-249.

[14]Rothbart, pp. 8, 37-38.

individual uniqueness and encouraging events, people and circumstances.[15] The creative process might vary in depth and scope.[16] Different types of creative individuals, such as scientists and artists, must experience a similar creative process, although individual creative expression might be present to a greater or lesser degree.[17] The degree of creativity expressed by dental hygiene populations is basic to this research. The following definition by Torrance was utilized for this study: creativity is the

> . . . process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results. . . .[18]

Creativity and Dental Hygiene Education

Bronowski purports that all areas of science need creative imagination, and that the idea to the contrary is "one of the sad fallacies of our laggard education. . . ."[19] The creative abilities of science students cannot be ignored

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[15] Rogers, pp. 3-4.

[16] Ibid.

[17] Irving A Taylor, "The Nature of the Creative Process," Creativity, ed. Paul Smith (Freeport, N.Y.: Book for Libraries Press, 1959), p. 55.

[18] Torrance, p. 6.

[19] Jacob Bronowski, "The Imaginative Mind in Science," Imagination and the University, eds. Jacob Bronowski, Henry S. Commager, Gordon W. Allport, and Paul H. Buck (Canada: University of Toronto Press, 1964), p. 24.

if intellectual abilities are to be fully developed,[20] and if new discoveries in science and technology are to be made.[21] Yet much evidence exists to support the premise that creative abilities of students at institutions of science are hampered. Snyder professes that antagonism exists between the formal education of a science professional and the augmentation of creativity.[22] He further cites the investigation in which three times as many students scoring high in creativity as those scoring low in creativity were lost from a strict science curriculum.[23] Heist records a four-year study of students in a school of science in which the percentage of highly creative individuals not completing the curriculum was twice as high as that of individuals scoring low in creativity.[24]

In order to understand the antagonism between creativity and science education,[25] specifically dental hygiene education, the present dilemma of education must be considered. Present day education often relies upon such creativity inhibitors as memorization of facts, fixed answer

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[20]E. Paul Torrance, "Education and Creativity," Creativity: Progress and Potential, ed. Calvin W. Taylor (New York: McGraw-Hill, 1964), p. 51.

[21]Johnson, p. 1.

[22]Snyder, p. 39.

[23]Ibid.

[24]Paul Heist, "Creative Students: College Transients," The Creative College Student: An Unmet Challenge, ed. Paul Heist (San Francisco: Jossey-Bass, Inc., 1968), p. 39.

[25]Snyder, p. 39.

problem solving, and the acquisition of present knowledge.[26] A required curriculum, which is one characteristic of dental hygiene programs,[27] has been cited as a creativity inhibitor.[28] When a curriculum emphasizes immediate achievement, quick recall, and success on tests, creativity is hindered.[29] Marksberry professes routine as detrimental to creativity.[30] This finding should be noted when considering the many clinical sessions necessary to refine the "tasks and functions which are or might be performed by the practicing dental hygienist."[31] If individualism is necessary for creative growth,[32] then what is the effect of the mandatory dental hygiene curriculum on creativity?

Knowledge of the relationship between creativity and the dental hygiene curriculum is necessary if implications for all participants are to be realized. Johnson proposes identification of highly creative children to be a major concern of educators,[33] and stresses that:

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[26]Torrance, "Education and Creativity," p. 126.

[27]American Dental Hygienists' Association Brochure, p. 1.

[28]Torrance, "Education and Creativity," p. 126.

[29]Rothbart, pp. 37-38.

[30]Marksberry, p. 4.

[31]Irene R. Woodall, p. vii.

[32]E. Paul Torrance, Encouraging Creativity in the Classroom (Dubuque, Iowa: Wm. C. Brown Co., 1970), p. 21.

[33]Roger A. Johnson, "Teacher and Student Perception of Student Creativity," Gifted Child Quarterly, XX (Summer, 1976), 164.

> . . . once the teacher has been able to determine his or her most creative students, then greater opportunities for self-initiated learning and a more individualized curriculum can be provided. . . .[34]

Similarly, dental hygiene educators might utilize educational techniques which are more tolerant of creative abilities. According to Torrance, students would benefit with cognizance of their creative abilities, as this knowledge would serve as a motivator to fulfill all creative potentials.[35] Benefits can also be foreseen when considering the use of creativity measures as predictors, in that a

> . . . most urgent research need is for experimentation with admissions practices and selection devices that will not eliminate promising creative talent.[36]

Detecting abilities related to success in dental hygiene curricula is crucial. As difficulty exists in filling the place of a student who drops out of the sequenced dental hygiene curriculum,[37] necessity rests on the admission of capable students. Therefore, importance lies in measuring the relationship between creativity and success in the dental hygiene curriculum.

Creativity and Career Choice in Dental Hygiene

Torrance professes that creativity does influence occupation preference, and that highly creative individuals

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[34] Ibid.

[35] Ibid., citing E. Paul Torrance (1962).

[36] Torrance, "Education and Creativity," p. 128.

[37] American Dental Hygienists' Association Brochure, p. 1.

often aspire towards such careers as teaching, direct services to others, psychology, and social work.[38] Since both dental hygiene educators and practitioners are involved with teaching and direct service to others, the gap of knowledge lies in creativity's precise effects on individual career choices within the field of dental hygiene.

Insight into the relationship between creativity and dental hygiene career choice might be gained upon investigation of Tumin's criteria for job satisfaction. Tumin suggests that creativity is hindered, and thus job frustration occurs, by several conditions which include: (a) goals set by others; (b) standardized operating techniques; (c) routinized detailed operations; (d) discouragement of experimentation on the job; and (e) emphasis on quantity rather than quality.[39] Further investigation, however, into the negative and positive implications of (a) specific career conditions for creativity, and of (b) creativity for career choice is obviously in need of further research; as is the entire subject of creativity.[40] Benefits foreseen as a result of future investigations include: (a) career counseling for dental hygiene students;

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[38]Torrance, Torrance Tests of Creative Thinking, p. 29.

[39]Melvin Tumin, "Obstacles to Creativity," A Source Book for Creative Thinking, eds. Sidney J. Parnes and Harold F. Harding (New York: Charles Scribner's Sons, 1962), p. 112.

[40]Guilford, Intelligence, Creativity, and Their Educational Implications, pp. 78-79.

(b) diagnosis of dental hygiene career dissatisfactions due to repression of creativity; and (c) education of dental hygiene students with creative potentials commensurate with that compatible to the job market.

Summary

Creative thinking is an important determinant in human development. Creative individuals can be identified because they often have qualifying characteristics, are affected by certain conditions, and they develop and experience creative products and processes, respectively. The importance of creativity in science cannot be ignored; yet literature suggests evidence of an antagonism between creativity and the achievement of competency in a science-oriented profession. Because a gap of knowledge exists concerning the relationship between creativity and dental hygiene, the implications of this conflict for dental hygiene populations have not been determined. This study investigated this gap of knowledge in order to benefit all participants in dental hygiene education and practice.

Chapter 3

METHODS AND MATERIALS

The study was designed to assess creativity in dental hygiene students, educators, and practitioners as measured by Torrance's creativity inventory, What Kind of Person Are You? (WKOPAY). This research is categorized as ex post facto since education and occupation are non-manipulative variables.[1]

Sample Description

The target population of this study included all those individuals whose educational or occupational status qualified them as (a) aspiring dental hygiene student, (b) first year dental hygiene student, (c) second year dental hygiene student, (d) dental hygiene practitioner, or (e) dental hygiene educator, as defined by this research.

Homogeneity of sample groups was maintained by including only those individuals meeting this study's sample population definitions. Identifying data concerning subjects was assessed by means of a brief questionnaire administered subsequent to the WKOPAY inventory (see

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[1]Donald Ary, Lucy C. Jacobs, and Asghar Razavieh, Introduction to Research in Education (New York: Holt, Rinehart & Winston, Inc., 1972), p. 264.

Appendix B). The sample population included dental hygiene professionals and dental hygiene students.

Two categories of dental hygiene professionals were included as subjects: (a) dental hygiene educators and (b) dental hygiene practitioners. Professionals were female and ranged in age from 21 to 50. Dental hygiene educators were faculty members employed by (a) the Department of Dental Hygiene and Dental Assisting, Old Dominion University, Norfolk, Virginia; by (b) the Division of Dental Hygiene, Virginia Commonwealth University, Richmond, Virginia; and by (c) the Department of Dental Hygiene, Virginia Western Community College, Roanoke, Virginia. Dental hygiene educators employed for at least nine hours per week were included in the dental hygiene educator sample group. Ten Old Dominion faculty members, six Virginia Commonwealth University faculty members, and four Virginia Western Community College faculty members comprised the educator sample group. The dental hygiene practitioner sample group consisted of 107 dental hygienists listed as of April 1977 in the Tidewater, Virginia area by the president of the Tidewater Dental Hygienists' Association. Those who, at that time, practiced as a dental hygienist in a dental office, clinic, or dental service facility were included in the practitioner sample group.

Three categories of dental hygiene students--aspiring, first year, and second year dental hygiene students--comprised the student sample group. The first

and second year dental hygiene students sample groups were comprised of 77 and 72 first and second year dental hygiene students, respectively. These students were enrolled in a dental hygiene program in one of the following institutions: (a) Old Dominion University, Norfolk, Virginia, (b) Virginia Commonwealth University, Richmond, Virginia, and (c) Virginia Western Community College, Roanoke, Virginia. First and second year students were, in general, female (one male was enrolled in the Old Dominion University second year class) and ranged in age from 18 to 41 and 19 to 38, respectively. Seventeen individuals, two male and 15 female, responding to the April 15, 1977 Dental Hygiene Aptitude Test at Old Dominion University comprised the aspiring dental hygiene student group and ranged in age from 18 to 26.

Research Design and Statistics

An ex post facto research design (see Table 1) was employed since the independent variables were non-manipulated. The independent variables were the educational and occupational statuses maintained by the sample groups. These variables were further stratified according to the following:

1. education
    a. aspiring dental hygiene students
    b. first year dental hygiene students
    c. second year dental hygiene students

Table 1

Summary of Research Design

Groups	Independent Variables	Dependent Variables*
Group 1 (Student)	(X) (Aspiring Dental Hygiene Students)	Y
Group 2 (Student)	(X) (First Year Dental Hygiene Students)	Y
Group 3 (Student)	(X) (Second Year Dental Hygiene Students)	Y
Group 4 (Professional)	(X) (Dental Hygiene Practitioners)	Y
Group 5 (Professional)	(X) (Dental Hygiene Educators)	Y

*WKOPAY overall creativity scores, AA scores, and DI scores

2. occupation

    a. dental hygiene practitioner

    b. dental hygiene educator

The dependent variables, creativity and its component factors, were then measured in the sample groups utilizing the creativity inventory, WKOPAY.

A five group, one-way analysis of variance was employed to analyze overall creativity scores obtained from WKOPAY. As the statistical test of choice, analysis of variance (a) eliminates ambiguity involved in making more than one comparison and (b) enables the researcher to determine if any significant differences between and within groups exists.[2] The means, standard deviations, and F ratio were determined for the creativity scores of the five sample groups. A significant F ratio mandated the use of Duncan's New Multiple Range Test to locate the differences between groups. A t-ratio was utilized to examine the scores of all students and all professionals combined.

WKOPAY creativity factors were scored on various scales according to the Manual for Khatena-Torrance Creative Perception Inventory.[3] Therefore, factor scores for each group were converted to percentages. These factor percentages were analyzed by chi-square test of independence to detect differences between group scores.

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[2]Richard P. Runyon and Audrey Haber, Fundamentals of Behavioral Statistics (Reading, Mass.: Addison-Wesley Publishing Co., 1976), p. 288.

[3]Khatena and Torrance, p. 5.

Data Collection

Data was collected from the sample groups in the following manners:

(a) The dental hygiene program directors at Virginia Commonwealth University, Richmond, Virginia and Virginia Western Community College, Roanoke, Virginia were contacted. Both directors agreed to have WKOPAY administered to all faculty, first year, and second year students in their programs. Packets containing an adequate number of inventories were mailed to each program director. Each respective director was responsible for administration and prompt return of inventories.

(b) All dental hygienists in the Tidewater, Virginia area received a cover letter (see Appendix C) and inventory. The majority of inventories were individually completed and returned according to the instructions specified in the cover letter and inventory.

(c) Creativity inventories were administered to the aspiring dental hygiene students immediately following the Dental Hygiene Aptitude Testing Program at Old Dominion University, Norfolk, Virginia on April 15, 1977.

(d) Creativity inventories were administered to Old Dominion University first and second year dental hygiene students during scheduled class time.

(e) WKOPAY was distributed to Old Dominion University dental hygiene faculty via inter-departmental mail. Instructions to complete and return WKOPAY accompanied each inventory.

A questionnaire accompanied each inventory to assure that all respondents met research definitions of appropriate occupational or educational status (see Appendix B).

Instrument Design

The instrument employed to measure creativity in dental hygiene sample groups was What Kind of Person Are You? by E. Paul Torrance. WKOPAY and Something About Myself by Joe Khatena are separate measurements which comprise the Khatena-Torrance Creative Perception Inventory. WKOPAY was the measurement of choice for several reasons. This measurement is one of few instruments which yields a single index of the "Creative Personality."[4] In order to compare overall creativity among this study's sample groups, a single creative index was mandatory.

WKOPAY also yields indexes for five factors relating to creativity. These factors are summarized by Torrance:

> Acceptance of Authority relates to being obedient, courteous, and conforming and to accepting the judgments of authorities.
>
> Self-Confidence relates to being socially well-adjusted, self-confident, energetic and curious, thorough and remembering well.
>
> Inquisitiveness relates to always asking questions, being self-assertive, feeling strong emotions, being talkative and obedient.
>
> Awareness of Others relates to being courteous, socially well-adjusted, popular or well-liked and considerate of others, and preferring to work in a group.

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[4] Ibid., p. 13.

> Disciplined Imagination relates to being energetic, persistent, thorough, industrious, imaginative, adventurous, and never bored, attempting difficult tasks and preferring complex tasks.[5]

Two of these factors, Acceptance of Authority (AA) and Disciplined Imagination (DI), were specifically measured and compared among study sample groups, because AA is a creative attribute, while DI is non-creative.[6] The three factors remaining possess a mixture of creative and non-creative orientations.[7] Results of these measures were utilized in making observations concerning the sample groups.

Access to a large number of individuals for each sample group was limited, therefore it was important that the instrument was appropriate for the available populations. Since all subjects were adolescents or adults, WKOPAY offered a satisfactory mechanism for creativity measurement in all individuals within each sample group.[8]

The Manual for Khatena-Torrance Creative Perception Inventory provides information concerning validity and reliability which is supportive of WKOPAY as a measure of creative orientations.[9]

Construct validity was determined by exploration of characteristics related to creativity.[10] Scores of 101

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[5]Ibid., pp. 18-19. [6]Ibid., p. 19.

[7]Ibid. [8]Ibid., p. 1.

[9]Ibid., pp. 15-25. [10]Ibid., pp. 16-19.

students on the Runner Studies of Attitude Patterns and WKOPAY were compared.[11] These results indicated that "highly experimental" and "low need for structure" describe the highly creative individual. In 1970 Khatena explored the basis for the fifty items which comprise WKOPAY by determining the ten most and least frequently chosen creative and non-creative items, respectively.[12] Khatena's results produced a pattern which yielded a highly significant chi-square value (χ^2=968.48, df=1, p<0.01). Further evidence of construct validity was produced by comparing scores on WKOPAY with those scored on the Omnibus Personality Inventory.[13] High scores on these two measures demonstrated similar personality characteristics, adding to the construct validity of WKOPAY.

To further establish construct validity and to determine creative and non-creative components of WKOPAY,

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[11]E. Paul Torrance, "Some Validity Studies of Two Brief Screening Devices for Studying the Creative Personality," Journal of Creative Behavior, V (Second Quarter, 1971), 94-103; E. Paul Torrance and Joe Khatena, "What Kind of Person Are You?: A Brief Screening Device for Identifying Creatively Gifted Adolescents and Adults," Gifted Child Quarterly, XIV (Spring 1976), 71-75; E. Paul Torrance and Joe Khatena, "Technical-Norms Manual for What Kind of Person Are You?" (unpublished manuscript, University of Georgia, 1970), cited by Khatena and Torrance, Manual for Khatena-Torrance Creative Perception Inventory, pp. 16-17; E. Paul Torrance and J. J. Wu, "Preliminary Manual for the What Kind of Person Are You?" (unpublished manuscript, University of Minnesota, 1966), cited by Khatena and Torrance, Manual for Khatena-Torrance Creative Perception Inventory, pp. 16-17.

[12]Joe Khatena, "Creative and Non-Creative Sub-Selves" (unpublished manuscript, Marshall University, 1970), cited by Khatena and Torrance, Manual for Khatena-Torrance Creative Perception Inventory, p. 17.

[13]V. K. Philips, "Creativity: Performance, Profiles, and Perceptions," Journal of Psychology, LXXXIII (January, 1973), 25-30.

a factor analysis was employed.[14] This study, measuring the creativity of students in four states, yielded the results which were utilized to determine the five factors of WKOPAY.

A review of the Manual for Khatena-Torrance Creative Perception Inventory indicates extensive use of several personality measures to establish criterion-related validity.[15] Some, but not all, of these criteria include Sounds and Images, Onomatopoeia and Images, Imaginative Story, Something About Myself, and self ratings.[16] Comparison of scores on these measures with scores on WKOPAY offered validity coefficients ranging from .26-.75, supporting the criterion-related validity of WKOPAY.[17]

Reliability of WKOPAY, as demonstrated in the Manual for Khatena-Torrance Creative Perception Inventory,

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[14]J. C. Bledsoe and Joe Khatena, "Factor Analytic Study of the Test, What Kind of Person Are You?" Perceptual and Motor Skills, XXXIX (August, 1974), 143-146.

[15]Khatena and Torrance, Manual for Khatena-Torrance Creative Perception Inventory, pp. 20-24.

[16]Joe Khatena, "Sounds and Images: Further Evidence of Validity of a Test of Originality," Perceptual and Motor Skills, XXXII (June, 1971), 850; E. Paul Torrance, "Some Validity Studies of Two Brief Screening Devices for Studying the Creative Personality," 94-103; Joe Khatena, "Note on Reliability and Validity of Onomatopoeia and Images," Perceptual and Motor Skills, XXXI (August, 1970), 86; Torrance and Khatena, "What Kind of Person Are You?: A Brief Screening Device for Identifying Creatively Gifted Adolescents and Adults," 71-75; Torrance and Khatena, "Technical-Norms Manual for What Kind of Person Are You?"

[17]Ibid.

is adequate.[18] Internal consistency was determined using the odd-even method on fifty college students, yielding an r of .98.[19] Additional studies utilizing the test-retest method have yielded rs ranging from .71 to .97.[20]

In summary, evidence offered by past research findings lends support to the validity and reliability of WKOPAY.[21] The construct and criterion-related validity as well as the reliability of WKOPAY is adequate.[22]

Ease of administration, scoring, and interpretation are qualities that also determined WKOPAY suitable for this research.[23] Materials necessary for administration are minimal, and the test may be utilized for respondents individually or in a group. Respondents were able to complete WKOPAY within five to fifteen minutes. Response to the test required little effort, in that the subject merely indicated the one term that best described him/her on each of the fifty pairs of terms (see Appendix A). Scoring was accomplished by awarding one credit to a checked response and zero credit to a blank response for all fifty

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[18] Khatena and Torrance, Manual for Khatena-Torrance Creative Perception Inventory, p. 15.

[19] Ibid.

[20] Torrance and Khatena, "What Kind of Person Are You?: A Brief Screening Device for Identifying Creatively Gifted Adolescents and Adults", pp. 71-75; Torrance and Khatena, "Technical Norms Manual for What Kind of Person Are You?"

[21] Khatena and Torrance, Manual for Khatena-Torrance Creative Perception Inventory, pp. 15-25.

[22] Ibid. [23] Ibid., pp. 2-5.

items according to a scoring guide provided by the Manual for Khatena-Torrance Creative Perception Inventory (see Appendix D).[24]

[24]Ibid., p. 5.

Chapter 4

ANALYSIS OF DATA

Two hundred ninety-three WKOPAY creativity inventories were sent to aspiring, first year, and second year dental hygiene students and to dental hygiene practitioners and dental hygiene educators. A total of 231 inventories were returned, for a 79 percent response rate (see Table 2).

Table 2

Response Rate by Educational and Occupational Status

Groups	Number of Inventories Administered	Number of Inventories Returned	Percent Response
Educational Status:			
Aspiring Dental Hygiene Students	17	17	100
First Year Dental Hygiene Students	77	71	92
Second Year Dental Hygiene Students	72	61	85
Occupational Status:			
Dental Hygiene Practitioners	107	64	60
Dental Hygiene Educators	20	18	90
Total	293	231	79

The discrepancy between the number of responses expected and the number returned was due to incorrect mailing addresses, lack of subject response, and absenteeism of students.

Each inventory was evaluated and given one score for overall creativity and five subscores for (a) Acceptance of Authority, (b) Self-Confidence, (c) Inquisitiveness, (d) Awareness of Others, and (e) Disciplined Imagination. To ascertain if any of the five groups differed significantly in overall creativity, a five group, one-way analysis of variance was employed. A chi-square test was utilized to detect any differences among the five groups' scores on Acceptance of Authority and Disciplined Imagination.

Results

WKOPAY overall creativity scores of aspiring, first, and second year dental hygiene students, dental hygiene practitioners, and dental hygiene educators are presented in Appendix E. Means and standard deviations of the sample groups' WKOPAY overall creativity scores are included in Appendix E. Inspection of these data shows that dental hygiene educators scored somewhat higher than the remaining four sample groups. The standard deviations for all groups were approximately the same. A five group, one-way analysis of variance was used to determine if the observed mean differences were significantly different (see Table 3, page 37).

Table 3

Analysis of Variance Among Overall Creativity Scores of All Sample Groups

	Degrees of Freedom	Sum of Squares	Variance Estimate	F-Ratio	p
Between Groups	4	490.44	122.61	3.77	<0.01
Within Groups	226	7343.23	32.49		
Total	230	7833.66			

Analysis of variance revealed a statistically significant difference among the five sample groups ($F=3.77$, $df=4/226$, $p<0.01$). Duncan's New Multiple Range Test indicated that dental hygiene educators scored significantly different from the remaining four groups.

A t-test was utilized to examine the relationship between the WKOPAY creativity scores of all dental hygiene students, and all dental hygiene professionals, respectively combined (see Table 4, page 39). No statistically significant difference was detected between these two groups at the 0.05 significance level.

The five sample groups' creativity perceptions relative to the five creative factor patterns of WKOPAY are presented in Table 5, page 40. Frequencies of the five group's responses were determined for each factor by adding the factor scores of all individuals in their respective groups. However, the points possible on each of the five factors varied. Therefore, in order to compare scores among and within groups, each observed frequency of scores was divided by the frequency of scores possible. Consequently, the scores expressed as percentages were utilized for statistical analysis.

A chi-square statistical analysis was performed on the various creative orientation percentages in order to determine if there were any statistically significant differences between the various factors (see Table 5, page 40). A significant difference on both AA scores

Table 4

Between Group t-test for Overall Creativity Scores of Dental Hygiene Students and Dental Hygiene Professionals

Group	N	Mean Score	Standard Deviation	t-Value	p
Student Group*	149	23.29	5.95		
				1.13	NS
Professional Group**	82	24.34	5.60		

*includes aspiring, first year, and second year dental hygiene students

**includes dental hygiene practitioners and dental hygiene educators

Table 5

Dental Hygiene Student and Dental Hygiene Professional Perception of Creative Orientation Patterns--Chi-Square Analysis

Groups	N	AA	SC	I	AO	DI	χ^2 (df=4)	p
Students' Perception of Themselves								
1. Aspiring Students Frequency	17	60	139	50	117	69		
Percentage		50	68	49	63	45	7.15	NS
2. First Year Students Frequency	71	243	474	245	485	292		
Percentage		49	56	58	62	46	3.19	NS
3. Second Year Students Frequency	61	154	410	225	429	267		
Percentage		36	56	61	64	49	9.37	NS
χ^2 (df=2)		2.72				0.18		
p		NS				NS		

Table 5. Continued.

Groups	N	AA	SC	I	AO	DI	χ^2 (df=4)	p
Professionals' Perception of Themselves								
4. Practitioner Frequency	64	202	422	202	454	267		
Percentage		45	55	53	64	46	4.51	NS
5. Educator Frequency	18	34	119	65	130	110		
Percentage		27	55	60	66	68	19.91	<0.05
χ^2 (df=1)		4.50				4.24		
p		<0.05				<0.05		

Key: AA = Acceptance of Authority
SC = Self-Confidence
I = Inquisitiveness
AO = Awareness of Others
DI = Disciplined Imagination

(χ^2=4.50, df=1, $p<0.05$) and DI scores (χ^2=4.24, df=1, $p<0.05$) was detected between the dental hygiene educator and dental hygiene practitioner groups.

Chi-square statistical analyses were utilized to determine if the five sample groups differed internally on their five WKOPAY factor scores (see Table 5, page 40). Only the dental hygiene educators' scores differed significantly among the five WKOPAY orientations (χ^2=19.91, df=4, $p<0.05$).

Discussion

Findings from the analysis of the overall creativity scores for all five sample groups utilizing analysis of variance and Duncan's New Multiple Range Test show that only the dental hygiene educator group scored significantly different from the remaining four groups. Therefore, this study (a) rejects the null hypothesis that there is no statistically significant difference between the WKOPAY creativity scores of dental hygiene practitioners and dental hygiene educators; and (b) fails to reject the null hypothesis that there is no statistically significant difference among the WKOPAY creativity scores of aspiring, first year, and second year dental hygiene students. Referring to the creativity mean scores for all groups (see Appendix E), the mean score of the educator group is higher than that of the remaining four groups. Data tend to support the educator sample group as being more creative than the practitioner and student sample groups.

The contention that creativity tends to be discouraged by an education in a science,[1] such as dental hygiene, was not supported by this study. The results, however, might have been influenced by several factors.

The inventory could be a factor affecting the study's results. WKOPAY as a valid measure of creativity in dental hygiene populations is questionable and might be a possible determinant in the results. That WKOPAY is composed of five specific factors might have affected the results, in that another inventory possessing different factors might have produced a dissimilar outcome. The narrow range of creativity raw scores on the inventory (see Appendix E) might indicate that a more discriminate instrument is needed to measure creativity in dental hygiene populations.

Age might also have been a contributory factor in student WKOPAY results. The median ages for aspiring, first year, and second year dental hygiene students were 18, 20, and 21, respectively. Although the three groups' mean WKOPAY creativity scores did not differ significantly, student mean scores did increase slightly as mean age, and, consequently, level of dental hygiene education, increased (see Appendix E). Therefore, the increase in mean WKOPAY creativity scores corresponding with an increase of dental hygiene education might have been influenced by the ages of the sample populations. A creativity increase with age is

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[1]Snyder, p. 39.

plausible when considering Lehman's theory which purports that an individual's creativity generally increases until the early thirties and declines thereafter.[2]

The dental hygiene curricula might have affected student WKOPAY results. Snyder and Torrance purport that rigidly guidelined science curricula tend to discourage creativity.[3] Dental hygiene curricula, however, may or may not fit into the rigidly guidelined category. But evidence suggests that dental hygiene programs must follow mandatory guidelines. Assuming that dental hygiene curricula are rigid and guidelined, then dental hygiene faculties might be educating students in a manner that tolerates or even encourages creativity.

The analysis of variance between dental hygiene practitioner and dental hygiene educator creativity scores indicated a significant difference between the two groups (see Table 3, page 37). Literature reviewed in this study supports these results. Tumin suggested that (a) goals set by others, (b) standardized operating techniques, (c) routinized detailed operation, (d) discouragement of experimentation, and (e) emphasis on quantity rather than quality discourage creativity.[4] These occupational conditions better describe the practitioner, thus supporting this study's results. The

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[2]Harvey C. Lehman, Age and Achievement (New Jersey: Princeton University Press, 1953), pp. 253-265.

[3]Snyder, p. 39; Torrance, "Education and Creativity," p. 126.

[4]Tumin, p. 112.

dental hygiene practitioner is under the direct authority of the dentist,[5] probably sees many patients a day, and more than likely performs similar services for each patient. However, the dental hygiene educator usually has diverse responsibilities, might use various methods to educate a fixed number of students, and is viewed by students as an authority figure.

As with student scores, the type, validity, and sensitivity of the dental hygiene inventory utilized might have affected dental hygiene educator and dental hygiene practitioner creativity measurement. If Lehman's[6] theory is considered, age might have influenced the results. The median ages of practitioners and educators were 25 and 26.5, respectively, theoretically attributing higher creativity to educators.

An unhypothesized relationship was examined concerning the WKOPAY creativity scores of all dental hygiene student sample groups and those scores of all dental hygiene professional sample groups respectively combined. A t-test was utilized to determine if the mean scores of the two groups differed significantly (see Table 4, page 39). The findings indicated no statistically significant difference between mean scores of dental hygiene students and dental hygiene professionals. The median ages of the professionals were higher than those of the students. Therefore, the

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[5]Virginia Board of Dentistry, Rules and Regulations Governing the Practice of Dentistry and Dental Hygiene (Richmond, Va.: Virginia Board of Dentistry, 1976), Regulation 2, C, p. 3.

[6]Lehman, pp. 253-265.

theoretical increase in creativity until individuals are in their thirties[7] was not realized in the relationship between dental hygiene students and dental hygiene professionals. However, the dental hygiene professional group included 18 dental hygiene educators and 64 dental hygiene practitioners. The preponderance of dental hygiene practitioners, who scored lower in WKOPAY creativity when compared to the small number of dental hygiene educators, might have influenced study results. In fact, analysis of variance among the five groups indicates that dental hygiene educators scored significantly higher than dental hygiene practitioners and dental hygiene students (see Table 4, page 39). This evidence implies that students who graduate from dental hygiene programs and who pursue a career in dental hygiene education are more likely to experience an increase in creativity than are those who become dental hygiene practitioners.

The data employed to test the relationships between dental hygiene educational or occupational status and the two factors of WKOPAY, Acceptance of Authority and Disciplined Imagination, are represented in Table 5, page 40. Four null hypotheses were made based on the nature of the two factors, i.e., AA and DI are creative and non-creative orientations, respectively.

Using a chi-square analysis, a statistically significant difference on both AA and DI scores was found between

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[7] Lehman.

the educator and practitioner groups, while student groups did not differ on either factor. Dental hygiene educators scored higher on DI and lower on AA than did the dental hygiene practitioners, indicating a tendency toward greater creativity. These results conform to the previous findings which distinguish the educator mean creativity score as being higher and significantly different from the mean creativity scores of the remaining four groups. Therefore, the findings failed to reject the following null hypotheses:

(a) There is no statistically significant difference among the WKOPAY Acceptance of Authority scores of aspiring, first year, and second year dental hygiene students.

(b) There is no statistically significant difference among the WKOPAY Disciplined Imagination scores of aspiring, first year, and second year dental hygiene students.

The findings reject the following null hypotheses:

(a) There is no statistically significant difference between the WKOPAY Acceptance of Authority scores of dental hygiene practitioners and educators.

(b) There is no statistically significant difference between the WKOPAY Disciplined Imagination scores of dental hygiene practitioners and educators.

Additional unhypothesized relationships concerning factor scores were examined. Chi-square analyses were utilized to detect any significant differences among the five WKOPAY creativity factor scores produced within each sample group (see Table 5, page 40). A statistically

significant difference among factor scores was detected only in the dental hygiene educator group. Only the dental hygiene educators scored high enough in overall WKOPAY creativity to be significantly different from the remaining four groups. Logically then, this group produced higher scores on the creative orientation and lower scores on the non-creative factor.

Additional conditions involving the WKOPAY respondents might have affected research results in general. The principal investigator was not able to personally administer each inventory. Although each subject received the same instructions, different environments might have influenced results. Fatigue is not cited as influencing WKOPAY results; however, its possible effects should not be dismissed. The aspiring dental hygiene students, in particular, were administered WKOPAY subsequent to a fatigue-producing situation, i.e., completion of the Dental Hygiene Aptitude Testing Program. The amount of respondent effort in completing WKOPAY may have affected the results. Several subjects voluntarily stated that they felt WKOPAY items were redundant and offered characteristics between which choice was too difficult. Above all, the results were totally dependent on the sample populations selected for this study. Different sample groups might have yielded dissimilar results. Future research is needed to determine if these findings are restricted to this particular population or can be generalized.

Implications of this study's results include the following:

(a) Dental Hygiene curricula have the potential of encouraging or discouraging student creativity. Attention by administrators, faculty, and students to the methods of teaching and learning might result in the encouragement of natural creative growth within dental hygiene curricula.

(b) Dental hygiene students who pursue careers in dental hygiene education more likely experience creative growth than do those who become dental hygiene practitioners. Creative growth might be an important consideration when counseling dental hygiene students about future careers.

(c) Creativity might be more tolerated by an occupation in dental hygiene education than by a career as a dental hygiene practitioner. Knowledge and understanding of factors which affect creativity might be beneficial for dental hygiene professionals in assimilating to and/or improving their occupational conditions.

Chapter 5

SUMMARY AND CONCLUSIONS

Little research has been oriented towards the study of creativity in dental hygiene education or dental hygiene occupational settings. Creativity, as an integral component of the human personality, deserves further study if the psychological needs of dental hygiene students and professionals are to be better understood.

The purpose of this investigation was to examine creativity in dental hygiene students and professionals. Two hundred thirty-one individuals comprised five groups: (a) aspiring dental hygiene students, (b) first year dental hygiene students, (c) second year dental hygiene students, (d) dental hygiene practitioners, and (e) dental hygiene educators. An ex post facto research design was employed. The non-manipulated variables were educational and occupational status, while creativity scores comprised the dependent variables.

The instrument utilized to measure creativity was What Kind of Person Are You? by E. Paul Torrance. Printed instructions were read prior to WKOPAY administration or accompanied each inventory. Over a three-week period, inventories were administered to all subject groups.

The statistical tests, analysis of variance, and chi-square, were employed to test the hypothesized relationships between creativity and dental hygiene educational and occupational status. Results indicated that the following hypotheses were highly credible:

1. There is no statistically significant difference among the WKOPAY creativity scores of aspiring, first year, and second year dental hygiene students.

    a. There is no statistically significant difference among the WKOPAY Acceptance of Authority scores of aspiring, first year, and second year dental hygiene students.

    b. There is no statistically significant difference among the WKOPAY Disciplined Imagination scores of aspiring, first year, and second year dental hygiene students.

Statistical analyses mandated that the following hypotheses be rejected:

1. There is no statistically significant difference between the WKOPAY creativity scores of dental hygiene practitioners and dental hygiene educators.

    a. There is no statistically significant difference between the WKOPAY Acceptance of Authority scores of dental hygiene practitioners and dental hygiene educators.

    b. There is no statistically significant difference between the WKOPAY Disciplined

Imagination scores of dental hygiene practitioners and dental hygiene educators.

The unhypothesized relationship between creativity in dental hygiene students and dental hygiene professionals was examined by a t-test. No statistically significant difference between the creativity scores of the two groups was found.

Chi-square analyses were utilized to detect any statistically significant differences among the five WKOPAY creativity factor scores produced within each sample group. Only the dental hygiene educator sample group scored significantly different on the five creative orientations.

The findings suggest that: (a) an occupation in dental hygiene education might be more tolerant of individual creativity than a career in dental hygiene private practice; and (b) creativity does not significantly differ across increasing levels of undergraduate dental hygiene education. Implications of this study depend primarily on whether or not employers and educators of dental hygiene professionals and students consider individual creativity worth preserving and encouraging.

Considering the limitations and results of this study, the following recommendations for future investigations are made:

1. Administration of creativity inventories in an environment which can be controlled for possible situationally relevant variables.

2. Conduction of a longitudinal study, monitoring the creativity of students as they progress through dental hygiene school and into an occupation in order to assess the effects of the dental hygiene curriculum on the development of creativity.

3. Validation of the findings with different instruments and across various dental hygiene populations.

4. Examination of the possibility of predicting dental hygiene career choices based upon the creative orientations of the individual.

Appendix A

What Kind of Person Are You? CREATIVITY INVENTORY

Date_____ Sex_____ Age_____

WHAT KIND OF PERSON ARE YOU? by E. Paul Torrance

Below is a list of characteristics frequently used in talking about people. Indicate by placing a check mark (✓) beside a or b of your test sheet the one term of each pair that best describes you. Remember, even if neither term describes you exactly, select the one term of each pair which is nearest to being a description of yourself.

1. _____a. Likes to work alone
   _____b. Prefers to work in a group

2. _____a. Industrious
   _____b. Neat and orderly

3. _____a. Socially well-adjusted
   _____b. Occasionally regresses and is playful and childlike

4. _____a. Persistent
   _____b. Does work on time

5. _____a. Popular, well-liked
   _____b. Truthful even if it gets you into trouble

6. _____a. Considerate of others
   _____b. Courageous in convictions

7. _____a. Conforming
   _____b. Nonconforming

8. _____a. Sophisticated
   _____b. Unsophisticated

9. _____a. Sense of humor
   _____b. Talkative

10. _____a. Visionary
    _____b. Versatile

11. _____a. Adventurous
_____b. Does work on time

12. _____a. Becomes absorbed in tasks
_____b. Courteous, polite

13. _____a. Curious
_____b. Energetic

14. _____a. Attempts difficult tasks
_____b. Desires to excel

15. _____a. Disturbs existing organization and procedures
_____b. Accepts the judgments of authorities

16. _____a. A good guesser
_____b. Remembers well

17. _____a. Quiet
_____b. Obedient

18. _____a. Independent in judgment
_____b. Considerate of others

19. _____a. Critical of others
_____b. Courteous, polite

20. _____a. Feels strong emotions
_____b. Reserved

21. _____a. Emotionally sensitive
_____b. Socially well-adjusted

22. _____a. Imaginative
_____b. Critical

23. _____a. Receptive to ideas of others
_____b. Negativistic

24. _____a. Fault-finding
_____b. Popular, well-liked

25. _____a. Determined
_____b. Obedient

26. _____a. Intuitive
_____b. Thorough

27. _____a. Never bored
_____b. Refined

28. _____a. Haughty
_____b. Courteous

29. _____a. Cautious
_____b. Willing to take risks

30. _____a. Affectionate, loving
_____b. Courteous, polite

31. _____a. Always asking questions
_____b. Quiet

32. _____a. Competitive
_____b. Conforming

33. _____a. Energetic
_____b. Neat and orderly

34. _____a. Remembers well
_____b. Talkative

35. _____a. Self-assertive
_____b. Reserved

36. _____a. Sense of beauty
_____b. Socially well-adjusted

37. _____a. Self-confident
_____b. Timid

38. _____a. Versatile
_____b. Popular, well-liked

39. _____a. Self-sufficient
_____b. Curious

40. _____a. Thorough
_____b. Does work on time

41. _____a. Eccentric
_____b. Socially well-adjusted

42. _____a. Self-confident
_____b. Spirited in disagreement

43. _____a. Spirited in disagreement
_____b. Talkative

44. _____a. Prefers complex tasks
_____b. Does work on time

45. _____a. A good guesser
_____b. Receptive to ideas of others

46. _____a. Curious
_____b. Self-confident

47. _____a. A self-starter
_____b. Obedient

48. _____a. Intuitive
_____b. Remembers well

49. _____a. Unwilling to accept things on mere say so
_____b. Obedient

50. _____a. Altruistic, working for the good of others
_____b. Courteous, polite

Appendix B

QUESTIONNAIRE--IDENTIFYING FEATURES OF SAMPLE GROUPS

Please place a check mark (✓) in front of the phrase which best describes your highest standing as a student or hygienist.

_____ 1. I have not yet had any dental hygiene education.

_____ 2. I am a dental hygiene student. (If this is checked, please circle one of the following.)

a. I have had approximately one year of dental hygiene education.

b. I have had approximately two years of dental hygiene education.

_____ 3. I have graduated from a dental hygiene program. (If this is checked, please circle one or more of the following and fill in the blanks as they apply to you.)

a. I graduated from a dental hygiene program in _____ . (month) (year)

b. I practice dental hygiene (prophylaxis, patient education, etc.) in a dental office or facility for _____ hours each week. (number)

c. I am employed by an institution to teach dental hygiene at the certificate, baccalaureate, or graduate level for _____ hours each week. (number)

d. Although I am not employed now, I last worked in the field of dental hygiene doing _____ (duties) for _____ hours a week. This position (number) ended _____ . (date)

_____ 4. Other--if you feel that the previous responses do not describe your present standing as a student or hygienist, please use the following space to describe your current responsibilities.

Appendix C

COVER LETTER TO DENTAL HYGIENE PROFESSIONALS

Dear Colleague:

As a graduate student in the Department of Dental Hygiene, Old Dominion University, I am conducting research assessing personality characteristics of several dental hygiene populations. Since little research has been done in this area, your participation in this study is very important.

The enclosed questionnaire can be completed in 5 to 10 minutes. Please do so and then return all materials in the addressed, stamped envelope by May 5. You need not include your name on this questionnaire.

I will be happy to inform you of the results if requested. Thank you for your participation.

Sincerely,

F. Lynne Jarrett

F. Lynne Jarrett, R.D.H., B.S.
Graduate Student

Appendix D

What Kind of Person Are You? SCORING GUIDE[1]

A. Scoring key for total scale:

1. All items receive 1 point each for a responses except items 3, 5, 6, 7, 8, 29 and 39, which receive 1 point each for b responses.

2. All responses that do not follow these patterns or are left blank are scored 0.

3. Add all points received out of 50 to obtain a Creative Perception Index on this scale.

B. Scoring key for the five factor orientation:

1. Award 1 point to each of the items per factor using scoring key A above, and add the points to obtain a score for each of the five factors.

2. Scoring keys for each factor are as follows:

	Factor	Item
I.	Acceptance of Authority	12b, 15b, 25b, 30b, 32b, 47b, and 49b
II.	Self-Confidence	3a, 13b, 16b, 21b, 26b, 34a, 36b, 37a, 39b, 42a, 46b, and 48b
III.	Inquisitiveness	9b, 17b, 20a, 31a, 35a, and 43b
IV.	Awareness of Others	1b, 5b, 6b, 7b, 18b, 19b, 23a, 24b, 28b, 41b, and 45b
V.	Disciplined Imagination	2a, 4a, 11a, 14a, 22a, 27a, 33a, 40a, and 44a

[1]Khatena and Torrance, Manual for Khatena-Torrance Creative Perception Inventory, p. 5.

Appendix E

What Kind of Person Are You?
FREQUENCY OF OVERALL CREATIVITY RAW SCORES
FOR EACH SAMPLE GROUP

	Total Number of Subjects Achieving Each Raw Score				
	Aspiring Dental Hygiene Students N=17	First Year Dental Hygiene Students N=71	Second Year Dental Hygiene Students N=61	Dental Hygiene Practitioners N=64	Dental Hygiene Educators N=18
Possible Raw Scores on WKOPAY:					
0 to 9	0	0	0	0	0
10	1	0	0	0	0
11	0	0	3	0	0
12	0	1	0	1	0
13	0	2	0	1	0
14	1	3	0	2	0
15	0	4	2	1	0
16	1	4	1	1	0
17	0	3	4	4	0
18	1	2	0	0	0
19	0	0	3	7	1
20	0	4	5	3	0
21	2	7	1	4	0
22	2	6	4	5	0
23	2	4	4	5	0
24	1	6	3	3	2
25	1	3	3	5	3
26	2	4	3	3	4
27	1	5	6	3	1

Appendix E. Continued.

	Total Number of Subjects Achieving Each Raw Score				
	Aspiring Dental Hygiene Students N=17	First Year Dental Hygiene Students N=71	Second Year Dental Hygiene Students N=61	Dental Hygiene Practitioners N=64	Dental Hygiene Educators N=18
Possible Raw Scores on WKOPAY:					
28	0	5	3	4	2
29	0	1	2	2	0
30	0	1	4	5	1
31	1	1	0	1	1
32	1	2	3	2	0
33	0	1	2	0	0
34	0	1	2	1	1
35	0	0	1	1	0
36	0	1	1	0	0
37	0	0	1	0	0
38	0	0	0	0	0
39	0	0	0	0	2
40 to 50	0	0	0	0	0
Mean Score:					
	22.41	22.49	24.46	23.34	27.89

Appendix E. Continued.

Total Number of Subjects Achieving Each Raw Score				
Aspiring Dental Hygiene Students N=17	First Year Dental Hygiene Students N=71	Second Year Dental Hygiene Students N=61	Dental Hygiene Practitioners N=64	Dental Hygiene Educators N=18
95% Confidence Interval for Mean:				
19.50 to 25.32	21.17 to 23.82	22.84 to 26.08	22.01 to 24.68	25.34 to 30.44
Standard Deviation:				
5.66	5.59	6.32	5.34	5.13

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VITA

Name: Frances Lynne Jarrett

Personal Data:

Date of Birth:
Place of Birth:
Marital Status:

Education:

Certificate in Dental Hygiene, Old Dominion University, May, 1975

Bachelor of Science in Dental Hygiene, Old Dominion University, December, 1975

Master of Dental Hygiene, Old Dominion University (to be conferred August, 1977)

Experience:

Dental Hygienist, Dr. Rockwell Davis and Dr. Randolph Savage

Meadow Professional Center
780 Independence Boulevard
Virginia Beach, Virginia
June 1975 to December 1975
Departed to complete degree requirements

Graduate teaching assistant
Old Dominion University
August 1976 to May 1977

Honors, Awards and Prizes:

Dental Hygiene Director's Award, Academic Scholarship Award, Old Dominion University, 1973-1975

Graduated Summa Cum Laude, Old Dominion University, Norfolk, Virginia, December 1975

Teaching Interests:

A. I have had practical experience in first and second year clinical teaching as well as experience in didactic and laboratory teaching of radiology

B. My primary interests lie in didactic teaching of dental hygiene subjects, such as dental anatomy and radiology; and especially in teaching upper level dental hygiene courses, such as curriculum development and supervision

C. I am open to teaching various subjects

Membership in Professional Societies:

1973-1977 American Dental Hygienists' Association, Old Dominion University--Junior Chapter

1975-1977 American Association of Dental Schools

Professional Services:

September 1974--Virginia State Dental Hygienists' Association
Annual Session, Roanoke, Virginia
Table Clinic--"It's Teething Time"

November 1974--American Dental Hygienists' Association
Annual Session, Washington, D.C.
Table Clinic--"It's Teething Time"

Respectfully submitted,

F. Lynne Jarrett, R.D.H., B.S.