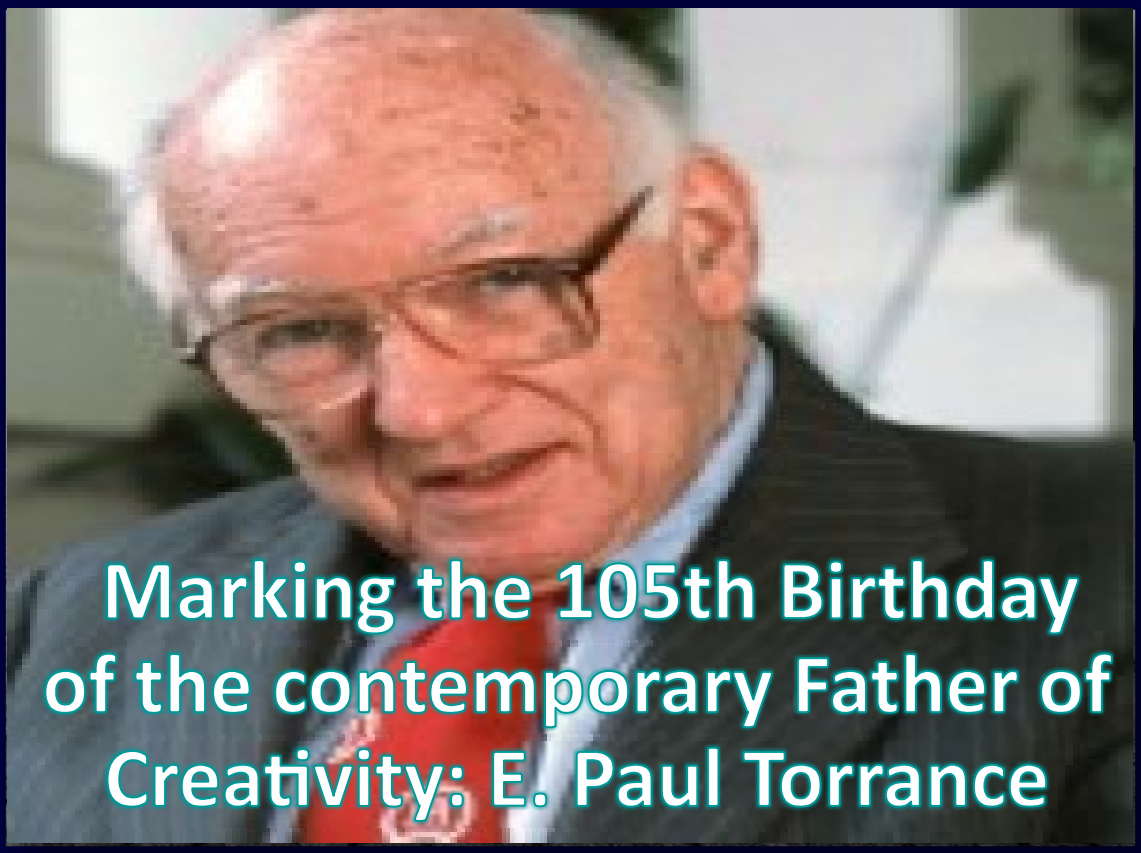


Marking the 105th Birthday of the contemporary Father of Creativity: E. Paul Torrance

edited by

Fredricka K. Reisman, PhD

Director, Drexel-Torrance Centre for Creativity and Innovation, Drexel University, USA

"I met Dr Torrance only a few times, but I was enormously impressed with the modesty he displayed, given his pre-eminence in the field."

— Robert J. Sternberg

2020 World Education Fellowship–International Conference on Knowledge, Innovation and Enterprise, 22-24 July, Madrid, Spain

Thematic Sections/Tracks:

Knowledge-Education

Including teaching & (e-)learning in primary, secondary and higher education, knowledge-education, knowledge management, comparative knowledge, indigenous knowledge, Knowledge transfer partnerships, knowledge utilisation, intellectual property, library & information, Knowledge and technology

Innovation

Including business innovation, ICT/technology innovation including big data, analytics and deep learning, and management/organisation innovation and open innovation

Creativity

Including traditional themes/concepts of creativity—process, product, personality and environment; business/organisational creativity, arts, media & digital creativity, creative industries & enterprise, digital design & architectures, craft & animation, creativity in science and technology

Entrepreneurship

Including marketing & strategy, HR, talent & development, servant/leadership in enterprise, SME business finance & accounting, business analytics, supply chain management, international business & management & family business/ethnic minority entrepreneurship

*There will be **opportunities to publish papers** in the KIE Conference publications—**2020 Creativity book and** conference edition of the **International Journal of Knowledge, Innovation and Entrepreneurship, Volume VIII 2020**—see www.ijkie.org*

Marking the 105th Birthday of the contemporary Father of Creativity: E. Paul Torrance

Editor
Fredricka Reisman, PhD

2019 KIE Conference Publications:

Marking the 105th Birthday of the contemporary Father of Creativity:
E. Paul Torrance
Research Papers on Knowledge, Innovation and Enterprise Volume VII

Produced and Published in London by KIE Conference Publications
Printed & Bound in Great Britain by Corporate Document Services, Leeds, England, United Kingdom

ISBN 978-1-85924-261-2

Suggested Citation:
Gareth, H. & Wilson, C. (2017). From transcendence to general maintenance: Exploring the creativity and wellbeing dynamic in higher education, in Reisman, F. Ed., *Creativity, Innovation and Wellbeing*. London: KIE Conference Publications. Available online at: http://www.conference.kiecon.org/publications/ [or insert your university repository url]

Marking the 105th Birthday of the contemporary Father of Creativity: E. Paul Torrance

KIE Conference Publications

Contents

Contents

Contributors

Andrew Case

Andrew Case is 2010 graduate of Temple University with a bachelor's degree in Communications. While studying at Temple University, Andrew was a walk-on member of the Varsity Football Team, where he earned a full scholarship and consistently received a spot on the prestigious Athletic Director's Honor Roll. Presently, Andrew works, full-time, at Drexel University as the Manager, Sales & Marketing, Athletics and is also enrolled at Drexel University working toward receiving an M.S. in Creativity and Innovation. Outside of the classroom, Andrew is an abstract artist showing work at Corridor Contemporary Gallery in Philadelphia.

Alan S. Kaufman

Alan Kaufman is Clinical Professor of Psychology at Yale University Child Study Center (since 1997). He is a Penn graduate who earned his PhD under Robert Thorndike at Columbia University. Alan worked closely with David Wechsler in the development of the WISC-R, and has published, with Nadeen Kaufman, numerous tests, including the KABC-II Normative Update, KTEA-3, and KBIT-2. The 1983 theory-based K-ABC, inspired by Paul Torrance's introduction of cerebral specialization theory to Alan and Nadeen, has been translated and adapted throughout the world. Alan has published widely on the clinical and neuropsychological assessment of intelligence and has greatly impacted interpretation of IQ tests, especially Wechsler's. His books include the 1979 landmark *Intelligent Testing with the WISC-R* and, more recently, *Essentials of WAIS-IV Assessment—2nd ed.* (with Elizabeth Lichtenberger; 2013) and *Intelligent Testing with the WISC-V* (with Susie Raiford & Diane Coalson; 2016). Alan and Nadeen co-edit the influential Wiley book series *Essentials of Psychological Assessment*. Alan, a Fellow of four divisions of APA and of APS, is recipient of APA Division 16's Senior Scientist Award (1997) and Division 5's Samuel J. Messick Distinguished Scientific Contributions Award (2012). Since 2012, first Fordham University, and now Gonzaga University, presents the Alan S. Kaufman Intelligent Testing Award at its annual Spring Assessment Conference. Alan's greatest achievement is being James Kaufman's father. Together they coauthored the 1995 book *The Worst Baseball Pitchers of All Time*.

David C. Sledge

David Sledge is a native of Durham, North Carolina who has worked in various architecture firms for over ten years, and taught architectural design, history, and theory courses for over ten years. Sledge is a student at Drexel University in the Doctor of Education Program in Leadership and Change with a concentration in Creativity Studies. His research focuses on multidisciplinary collaboration, dialogue, and creativity studies to restructure design education.

Sledge holds degrees from the Massachusetts Institute of Technology, Ecole d'Art Americaines, and North Carolina State University. Professor Sledge has lectured on numerous topics related to architecture such as Monumentality, Modernization of Paris, Tectonics, Louis I. Kahn, Urbanity, Architectural Representation, The Kimbell Art Museum, Modern Furniture Design, Philip Johnson's estate, the movie "Blade Runner," and Haute Couture.

Dorothy A. Sisk

Dorothy A. Sisk, PhD, is a professor at Lamar University in Beaumont, Texas, and she teaches the graduate courses in gifted education in the Teacher Education Department. She is an international consultant focusing on gifted education, leadership and creativity development, and former Director of the U. S. Office of Gifted and Talented in Washington D.C. Dr. Sisk was a co-founder and first President of the American Creativity Association, and a co-founder and President of the World Council for Gifted and Talented Children, serving as their executive administrator, and editor of *Gifted Internationa*l (1980-1990). She is author and co-author of 14 books and numerous chapters and articles, and serves on a number of national and international journals as a reviewer or editor.

Fredricka K. Reisman

Fredricka K. Reisman, PhD, is founder of Drexel's School of Education and is Emerita Professor in the School of Education. Additionally, Dr. Reisman served as Assistant Provost for Assessment and Evaluation, Interim Associate Dean for Research of the Goodwin College, and currently is Director of the Drexel/Torrance Center for Creativity and Innovation. Dr. Reisman received her Ph.D. in Mathematics Education from Syracuse University. Prior to coming to Philadelphia, Dr. Reisman served as Professor and Chair of the Division of Elementary Education at the University of Georgia and as an elementary, middle school, high school mathematics teacher in New York State, and mathematics education instructor at Syracuse University. Dr. Reisman has an impressive record of external funding from the National Science Foundation (NSF), the US Department of Education, the PA Department of Education, and foundation support such as the Wallace Funds and the Anna E. Casey Foundation, to assist pre-and in-service teachers in developing their mathematics and technology skills both in regular and charter public schools including national projects. In 1984, Dr. Reisman headed the Drexel project management team for the Computer Applications in Teaching Program which was the first major effort to integrate computing into instruction in the Philadelphia high schools.

She recently completed her fifth year as ACA President (James Kaufman was installed ACA president in November 2017). She has worked with a team of instructional designers and software developers at Drexel to create simulations for pre and in service, teachers addressing school-age violence and classroom management. Dr. Reisman was a virtual keynote speaker at

the KIE conference held in Riga, Latvia in July 22-15, 2014 (see http://www.kiecon.org/page3.html). She also presented virtually at KIE conferences in London, Istanbul, and Berlin. The recent KIE conference was at Drexel in Philadelphia with participants from the UK, Finland, and several US locations. Dr. Reisman received the 2017 National Association for Gifted Children E. Paul Torrance Award with the following statement:

Fredricka Reisman's championing of creativity—as author, educator, test developer, and advocate—is consistent with Dr. Torrance's spirit and wisdom. She has been the long-time president of the American Creativity Association. She is an active scholar who has written numerous books and articles about STEM, learning, and creativity. She has successfully obtained funding in excess of $13M over the last 15 years towards improving mathematics and science creativity in K-12 schools. Keeping up with the times, Dr. Reisman recently developed the mobile app the Reisman Diagnostic Creativity Assessment. She worked extensively with Dr. Torrance at Georgia and continues to build off of his legacy. At Drexel, she founded the Drexel/Torrance Center for Creativity and Innovation, the first Center outside of the University that had Dr. Torrance's personal permission to open.

James C. Kaufman

James C. Kaufman, PhD, is a Professor of Educational Psychology at the University of Connecticut. An internationally recognized leader in the field of creativity, he is the author/editor of more than 26 books, including Creativity 101 and the Cambridge Handbook of Creativity. Kaufman is the president of American Psychological Association's Division 10, which is devoted to creativity and aesthetics. He is the founding co-editor of Psychology of Popular Media Culture and co-founded Psychology of Aesthetics, Creativity, and the Arts, both published by APA. He has won numerous awards, including the Torrance Award from the National Association for Gifted Children, the Berlyne and Farnsworth Awards from APA, and Mensa's research award.

Joan Franklin Smutny

Founder and Director of the Center for Gifted/Midwest Torrance Center for Creativity in Illinois, Joan Franklin Smutny is a teacher, speaker, and author and co-author of many articles and 21 books for teachers and parents including the anthology, *Igniting Creativity in Gifted Learners, K-6* (2009). Her Center offers creative programming to thousands of gifted students from Pre-K to grade 12. She is also editor of *Innovate!* and *Torrance Journal for Applied Creativity*—both online magazines for teachers and parents which she helped initiate in 2016.

Kathy Goff

Kathy Goff is the President of McGoff Creativity and Chief Creative Officer/Co-founder of Vast Learning Systems, a cloud-based edtech software company that focuses on creativity assessments and brain trainings. She earned a

doctorate at the University of Georgia in Adult Learning and Creativity under Dr. E.Paul Torrance, the "Father of Creativity". Kathy served as Torrance's personal research assistant and collaborator for over 16 years. Goff and Torrance (2000) created the Abbreviated Torrance Test for Adults (ATTA), one of the first instruments to measure creativity in adults. She is an internationally recognized author, researcher, educator, patented inventor, consultant and entrepreneur with over 3 decades of experience researching the creativity of people of all ages and backgrounds.

Kobus Neethling

Kobus Neethling, PhD, is the founder of Kobus Neethling Institute Pretoria, South Africa. Dr Neethling began his walk with Paul Torrance in 1983. It is a journey they walked together from 1983-2003. Firstly, as his M.A. and then Post PhD professor at the University of Georgia. Torrance later became Dr Kobus Neethling's mentor and advisor. Full details od Dr Neethling's profile is available at the Kobus Neethling Institute's website (https:// kninstitute.com).

Kristen Betts

Kristen Betts, EdD, is a Clinical Professor in the School of Education at Drexel University. Dr. Betts has over 20 years of experience in higher education serving in key leadership positions within private, public, and for-profit institutions. Dr. Betts' expertise is in higher education, online and blended learning, curriculum development, instructional design, and faculty development. Dr. Betts publishes and presents on online and blended learning, neuroandragogy, Online Human Touch/*high touch*, transfer of learning, technology-enhanced learning, and Mind, Brain & Education science. Dr. Betts is a Quality Matters certified peer reviewer, an instructor with the Online Learning Consortium, and grant reviewer for the Hong Kong Research Grants Council. Dr. Betts has received distinguished national awards for her work in higher education and online learning. Dr. Betts has also been a keynote speaker at conferences and government-supported events in Sweden, South Korea, Canada, and across the United States.

Larry Keiser

Larry Keiser, PhD, is Clinical Assistant Professor and Executive Director of Special Projects, Communications & Administration for Drexel University's School of Education. He has been with Drexel 32 years in various positions with a focus throughout on new program development, obtaining externally funded projects, and developing partnerships with Philadelphia organizations and schools. These programs, projects and partnerships promote alternative preparation pathways of K-12, STEM teachers, provide professional development toward school leadership improvement; enhance pre-service and in-service teachers' and elementary/secondary students' mathematics and science content knowledge; better incorporate appropriate technology into the K-16

teaching and learning process; and promote creativity and innovation in schools, the workplace and in life. Larry presents nationally and internationally on the need to infuse creativity and innovation into K-16 education. He serves as adjunct instructor in the School's Creativity and Innovation Program for courses on the Foundations of Creativity.

Marilyn Fryer

Marilyn Fryer, PhD, is Chief Executive of UK registered charity, the Creativity Centre Educational Trust (CCET), which she co-founded with Caroline Fryer Bolingbroke to formalise the not for profits activities of their SME, The Creativity Centre UK Ltd. Having set up this charity they then handed it over to a Board of Trustees. Marilyn is a chartered psychologist, internationally published author and researcher specialising in creativity and human development. Before setting up the Creativity Centre UK and CCET, she was Reader in Psychology at Leeds Beckett University where she specialised in international research, course development and teaching in creativity development, developmental and cognitive psychology. Her work in the area of creativity grew out of her doctoral research into the views of 1028 UK educators on creativity, teaching and learning. This revealed highly significant intergroup differences in perceptions of creativity (between male and female teachers, those teaching different subjects, and teachers most and least oriented to creativity) which she found co-varied with preferred ways of teaching. Her findings have been published and presented internationally in various languages. This early research led her to develop a series of accredited undergraduate and post graduate awards in applied creativity which she taught for more than a decade and which were successfully accessed by several thousand students. More recently, she has been involved in examining higher degrees in creativity development for UK and Australian universities.

Her other work has included consultancy on creativity in education for the UK National Advisory Committee on Creativity & Cultural Education (NACCCE) led by Sir Ken Robinson, for the UK Qualifications & Curriculum Authority (QCA) on the creativity across the curriculum project (for the publication *Creativity: Find it, Promote it!* for all schools in England), plus consultancy on creativity development in education and in business for government departments in the UK and overseas. Marilyn has delivered various keynotes on creativity development for example in the UK, the USA (Torrance Lecture Series), Malaysia (Nobel Prize Centennial Exhibition) and Japan (Japanese Association of Educational Psychology) as well as in Eastern and Western Europe. And she played an active role in the European Year of Creativity & Innovation (EYCI).

Together with Caroline she has undertaken a number of EU- funded projects. A key aim is to contribute to the body of knowledge about creativity and its development and how this dove-tails with what is known about human development. Bringing these two fields of study together was her main motivation for co-founding the e-journal, *Creativity & Human Development*.

PREFACE

HONOURING FATHER OF CREATIVITY E. PAUL TORRANCE

> "Creativity defies precise definition. This conclusion does not bother me at all. In fact, I am quite happy with it. Creativity is almost infinite. It involves every sense – sight, smell, hearing, feeling, taste and even perhaps the extra-sensory. Much of it is unseen, nonverbal and unconscious. Therefore, even if we had a precise concept of creativity, I am certain we would have difficulty putting it into words."
> - Torrance (1998, p. 43)

In just under one year much of the global creativity and giftedness research community will mark the 70th anniversary of Joy Paul Guildford's Presidential Address to the American Psychological Association. Guildford titled his address 'creativity' and made a clarion call on psychologists to shine their touch lights on creativity (Guilford, 1950).

Guilford was known for his work on human intelligence especially his *Structure of Intellect theory* (see Guildford, 1956, 1959, 1967, 1972), his lecture at the American Psychological Association in September 1950 was not necessarily a watershed; nonetheless, it was a timely talk, coincident with other factors (Plucker, 2001) that lit the bonfire of *serious* empirical studies on creativity.

One man whose passion, interest, teaching and research on creativity towered above the rest like a colossus was no other than Ellis Paul Torrance, father of creativity, the pioneer legend to whom this year KIE Creativity book and the 5th edition of the *E. Paul Torrance International Roundtable on Creative Thinking* are dedicated.

Torrance was creativity and creativity was Torrance (see Millar, 1995, 1997). People often talked about Torrance longitudinal studies which he stated in 1958 right through to 2000, and the resulting *Torrance Tests of Creative Thinking* (Torrance, 1974; 1993), an important milestone – and year – in my view was 1951 when he completed his PhD and turbo-charged his research and writing on survival and stress and the application of creativity. This was during his sting as a director at the Air Force Survival School, now US Air Force Survival, Evasion, Resistance and Escape [SERE] School. This was also less than a year after Guilford's APA talk.

So for over fifty years, Paul Torrance rolled up his sleeves, threw himself into creativity research and never looked back.

Sixteen years after his death, almost 70 years after Guildford's talk, and after voluminous research and studies (see Welsh, 1973; Ford and Harris, 1992; Parkhurst, 1999; Joubert, 2001) creativity defies definition still.

Creativity may have defied definition as even the legend himself posited 31 years ago (Torrance, 1988), but it remains evergreen – thanks to Dr Torrance's pioneering research studies and teaching on creativity and giftedness in education generally and teaching and learning particularly (Torrance 1972, 1987).

We in the KIE family thought there is no praise-worthy way to honour Paul Torrance than to dedicate the 2019 KIE creativity book and the fifth annual edition of the *E. Paul Torrance International Roundtable on Creative Thinking* to the legend himself.

The KIE launched the T*orrance Roundtable* in Istanbul, Turkey, in 2015 on the centenary anniversary of birth of Dr Torrance. The roundtable aims 'to refresh the work and legacy of Dr Torrance internationally especially among today's crop of creativity enthusiasts, push the boundary of knowledge on creative thinking as well as increase knowledge sharing within creative thinking sub fields.' The roundtable has remained a significant feature of the KIE Conference ever since.

I cannot end this piece without acknowledging the editor of this book, Dr Fredricka Reisman, and everyone who has contributed to the book – Dr Kobus Neethling (South Africa), Dr Marilyn Fryer (UK), Dr Kathy Goff, Joan Smutny, Drs Alan and James Kaufman (USA) – and others, I say thank you.

James Ogunleye, PhD, FRSA
Chairman, 2019 KIE Conference
Convenor, E. Paul Torrance International Roundtable on Creative Thinking
Convenor, Reisman Diagnostic Creativity Assessment Special Interest Group

References

Ford, D. Y. & Harris, J. J. (1992) The Elusive Definition of Creativity, The Journal of Creative Behavior, Vol. 26, Issue 3, pp.186–198.

Guilford, J.P. (1950). Creativity, *American Psychologist*, Volume 5, Issue 9, pp. 444-454.

Guilford, J. P. (1969). Structure of Intellect Model: Its Relevance for the Teacher Preparation Curriculum. *Curriculum Theory Network,* Volume 3, pp.47-64.

Guilford, J. P. (1956). The structure of intellect. *Psychological* Bulletin, 53. pp.267-293.

Guilford, J. P. (1959). Three faces of intellect. *American Psychologist*, li. pp.469-479.

Guilford, J. P. (1967). *The nature of human intelligence*. NY: McGraw-Hill.

Guilford, J, P. (1972). Intellect and the gifted. *Gifted Child Quarterly*. Fall, 1972, Volume 16, Issue 3, pp.175-184, 239-243.

Joubert, M. M. (2001). The art of creative teaching: NACCCE and beyond, in Craft, A, Jeffrey, B and Liebling, M (eds) Creativity in education, London: Continuum.

Millar, G. W. (1995). *E. Paul Torrance – The Creativity Man*. New Jersey: Ablex Publishing.

Millar, G. W. (1997). *E. Paul Torrance: Creativity man- an authorized biography*. Bensenville, IL: Scholastics.

Parkhurst, H. B. (1999). Confusion, lack of consensus, and the definition of creativity as a construct, The Journal of Creative Behavior, 33(1), 1-21.

Plucker, J. A. (2001). Introduction to the Special Issue: Commemorating Guilford's 1950 Presidential Address, *Creativity Research Journal*, 13:34, 247, DOI:10.1207/ S1532 6934 CRJ 1334_02

Torrance, E. P. (1993). The beyonders in a thirty year longitudinal study of creative achievement. *Roeper Review, Volume 15, Issue* 3, pp. 131-135.

Torrance, E. P. (1988). "The nature of creativity as manifest in its testing", in Sternberg, R. J. (ed) *The Nature of Creativity: Contemporary Psychological Perspectives*, Cambridge University Press: Cambridge, MA (pp.43-75).

Torrance, E. P. (1987). Teaching for creativity. In S. Isaksen (Ed.). *Frontiers of creativity research* (pp. 189-215). Buffalo, NY: Bearly Limited.

Torrance, E. P. (1972). Can you teach for creativity? *Journal of Creative Behavior, Volume 6*, pp. 236-262.

Torrance, E. P. (1974). The Torrance Tests of Creative Thinking-Norms Technical Manual Research Edition-Verbal Tests, Forms A and B- Figural Tests, Forms A and B. Princeton, NJ: Personnel Press.

Welsh, S. G. (1973) Perspectives in the study of creativity. Journal of Creative Behavior, Volume 7, pp.231-246.

INTRODUCTION

FREDRICKA REISMAN

The personal interactions among this stellar father-son authorship sets the tone in Chapter One for this tribute to Dr. E. Paul Torrance's 105th birthday. In Chapter Two Betts, Keiser and Reisman discuss how ideas of Ellis Paul Torrance provide the foundation for advancements in learning and research with focus upon neuroplasticity, creativity, and entrepreneurship. Case, in Chapter Three, explores his application of creativity as a complement to conventional medicine for dealing with his diagnosis of a chronic disease, Multiple Sclerosis. He gathers strength and hope from E. Paul Torrance's Manifesto. This tribute to Dr. Torrance by Fryer in Chapter Four focused on the way in which he influenced her research, teaching and was a major influence on her choosing to investigate creativity development in UK education. Chapter Five by Sisk explores the journey E. Paul Torrance and the author traveled to build a theory of spiritual intelligence. Sledge in Chapter Six pens this dedication to Dr. Torrance as he presents the following comparison: This homage to Frank Furness is dedicated to another creative icon – E. Paul Torrance. Where Furness was an architect of the creative environment, Torrance was an architect of the creatives who live in Furness's environment. In Chapter Seven, Neethling chronicles bringing Torrance's work to South Africa. In Chapter Eight, Goff shares her pathway with Dr. Torrance from student to mentor to researcher to friend. Upon the anniversary of E. Paul Torrance's 105th birthday celebration, the Editor of this KIE 2019 Dubai Conference Book in her Afterword, revisits her fond remembrances and intimate look at Dr. Torrance.

Fredricka Reisman, Editor
Philadelphia, PA. USA

CHAPTER ONE

A FATHER AND SON REMEMBER E. PAUL TORRANCE

ALAN KAUFMAN & JAMES KAUFMAN

Alan:

I was working closely with David Wechsler in the early 1970s on the revision and re-standardization of the WISC while serving as an Assistant Director at The Psychological Corporation in New York City. In industry! As soon as the work was virtually completed, I knew that academia was calling and I wrote to Departments of Educational Psychology and Developmental Psychology and School Psychology throughout the United States, trying to get a nibble. But it was the wrong time to be trying to enter the academic world. I would get letters of rejection from chairs of departments and search committees that didn't even try to be subtle ("Ordinarily, you would be the kind of candidate we would love to hire, but we have been instructed by the powers that be that we must hire a woman or minority, preferably one who meets both criteria"). I sent literally over 100 letters of application over the course of 18 months. Only one said, "Come on down!" and that letter was from E. Paul Torrance at the University of Georgia. I knew of him from studying the *Torrance Tests of Creative Thinking* in graduate school and at Psych Corp, but I did not know that he was a great human being until Nadeen and I became part of his extended family at Georgia.

My first vivid memory of Paul Torrance was Day 2 of my interview (February 12, 1974, though no one mentioned it was Lincoln's birthday) when I gave my requisite lecture, a talk I devoted to the developmental psychology of Jean Piaget and its implications for psychometric assessment and school psychology. I peppered the talk with pre-prepared anecdotes that were guaranteed to get laughs and I had an array of bunny rabbits, beakers of water, and hunks of clay to demonstrate animism and conservation and pre-operational thinking. To my horror, every time I looked at Dr. Torrance, he appeared to be dozing. He didn't laugh at a single joke. I was overwhelmed, but tried not to show it—The chairman of the Department of Educational Psychology had fallen asleep at my lecture!! I was not going to escape the confines of a New York City Industrial prison after all!! And then I finished the talk, waiting for the first question, hoping that someone would even ask a question, when suddenly Dr. Torrance sat up straight in his chair, popped up

his hand, and in a slow Southern drawl, asked me close to a dozen questions of such depth and insight, bringing up subtle distinctions that I had made while he was apparently dozing, that I almost fell of the podium. But I didn't flinch, responded to his questions with somewhere between a B+ and A- degree of sophistication, and was subsequently offered a tenure track faculty position. Only later did I find out that Paul Torrance had to fight off several faculty members who felt that my six years in industry and 20+ publications counted for nothing toward academia. He telephoned me in early April to tell me that I was being offered the job, but not at Associate Professor, as he had wanted; would I accept it anyway? I'm on my way, I told him. No way would I pass up the opportunity to be on a faculty with E. Paul Torrance as chairman!

And it wasn't just Paul Torrance during the first few years at UGA. It was Paul and Pansy, a team, surrogate parents to Nadeen and me, as we tried to navigate the transition from urban New York to rural (to us) Georgia. Pansy, who spent Day 1 of my interview driving Nadeen around Athens and teaching her the ropes, would surprise us by showing up at our door with bags of Georgia Bell peaches, the best we've ever tasted. She was a funny woman, who would be telling a story and say, "Now that really warms the cockles of my heart. Did I just say that? Cockles of my heart? What does that possibly mean? What a dumb turn of phrase! I'll never use it again!") No question, Paul and Pansy looked after us and helped us make the transition to the South, helped us understand humanity and kindness, always mixed with a bit of creative quirkiness. And they served as parental figures to an array of foreign students from Europe to Asia to the Middle East inviting them to their house and providing emotional support to them as they tried to acclimate to the United States culture and customs.

I learned so much from E. Paul Torrance about how to be a professor and mentor. The first time I attended a final orals for a PhD student, shortly after joining the faculty, Dr. Torrance was the Major Professor. He immediately put the student at ease and asked her a question that I have used ever since for all of my students over the past 40 years: "Tell us about the *gap* in the literature that encouraged you to conduct your study. And can you tell us how the results of your study help to fill that gap?" It was such a simple statement about filling a gap in the literature, but it got to the heart of the matter of why we do research in the first place. It made an indelible impression on me. So did his treatment of the doctoral candidate from the first second of the orals until she was called back into the room to be congratulated: He was completely on her side; he was her friend, her mentor, her advocate, her colleague, but in no way her superior or her adversary. For me it was one-trial learning on how to mentor graduate students.

The highlight of the 1974-75 academic year was when David Wechsler visited Nadeen and me at Georgia, first to speak to my IQ testing class of 16 and then to address about 500 students and faculty in an auditorium. It was April 21st (my 31st birthday and daughter Jennie's 9th) and it was

lunchtime, just after my IQ testing class and before the talk to the large group. Nadeen and I, along with David and Ruth Wechsler, were invited to Paul Torrance's office for lunch, chicken salad homemade by Leatha, Torrance's kind secretary. I don't remember any particular topics of conversation, but I have a vivid memory of what went through my mind as I looked back-and-forth from Dr. Wechsler to Dr. Torrance. Don't forget this moment. It is history in the making. You are in the presence, simultaneously, of the King of IQ testing and the King of Creativity. Both wore their crowns with humility. Both were giants. Both were my mentors. The enormity of that moment has never left me.

And both Dr. Wechsler and Dr. Torrance were equally instrumental in my test development and research—with Nadeen and an amazing array of Georgia doctoral students—on the theory-based Kaufman Assessment Battery for Children (K-ABC). Working with Dr. Wechsler on the revision of the WISC, of course, was an important backdrop for constructing our first cognitive test from both psychometric and clinical perspectives. But the theoretical perspective was courtesy of Dr. Torrance. He was enamored with the cerebral specialization research and theory of Roger Sperry and Michael Gazzaniga and Joseph Bogen. He was thrilled that right hemisphere processing was front and center and entering mainstream psychology. He gave Nadeen and me books and articles to read on the topic, both layperson and from the psychobiology and neuropsychology literature. His enthusiasm was contagious and our thoughts turned almost immediately to the IQ test that Nadeen and I had been planning, but without focus or direction. Paul Torrance gave us both. He invited me to write a chapter for a University of Georgia publication he was editing, a special issue of the *Journal of Research and Development in Education*. I wrote the article for that 1979 journal, Cerebral Specialization and Intelligence Testing, which became the forerunner of the theoretical foundation of the K-ABC. Ultimately we based the K-ABC on a blend of Sperry's cerebral specialization theory, Alexander Luria's sequential-simultaneous neuropsychological theory, and cognitive psychology research in serial and parallel processing. And the second edition of the test (KABC-II) is based jointly on Luria's sequential-simultaneous-planning theory and Cattell-Horn-Carroll (CHC) psychometric theory. The distinction between right brain and left brain processing styles was in vogue in the late 1970s and early 1980s, when the original K-ABC was developed and published and *that* was our model of intelligence residing at the core of our theoretical foundation (not Luria). Paul Torrance provided the foundation for the development of our favorite instrument. The 1983 K-ABC was the first individually administered test of intelligence rooted in theory (to be followed that decade by the Stanford-Binet 4 and the Woodcock-Johnson-Revised). So Paul Torrance can legitimately be lionized as the father of *both* creativity and theory-based clinical assessment of intelligence.

I have many memories of Paul Torrance and they all add up to a kind, humane, brilliant man and professional. He gave without any expecta-

tion of receiving anything in return. When Nadeen was conducting her dissertation research in the late 1970s, she was having great difficulty finding an elementary school to cooperate and provide subjects for the study she was conducting on reversals and reading. I casually mentioned it to Dr. Torrance and the next day he gave me a phone number and suggested that Nadeen give the person a call. Nadeen collected her data at Milledgeville, Georgia Public Schools thanks to Milledgeville native Paul Torrance. A few years after we had left Georgia, Nadeen and I were interviewed by Diane Sawyer on the CBS morning Show to discuss our controversial new IQ test, the K-ABC. Within two days we received a congratulatory postcard from Paul Torrance, though we had been out of touch since we left the university.

Paul Torrance changed my life. He improved me as a person and professional, serving as the best role model, in every possible way. Imagine my thrill at learning that our son James was the 2008 recipient of the *E. Paul Torrance Award*, by the Creativity Division of the National Association for Gifted Children. It doesn't get any better!

James:

I never intended to end up studying creativity – indeed, I never particularly intended to go into psychology or academia in the first place. After two years of graduate school and discovering everything I didn't like about cognitive psychology, I stumbled into creativity research.

Under the guidance of Robert Sternberg, I finally found a topic truly that interested me. As I dove into the literature, I was only vaguely aware that the father of creativity was a friend of the family for the first five years of my life (alas, my memories of that time are a bit limited). By the end of my third year of graduate study, I had finished a guided review of the scholarship about creative writing; this paper would eventually be my first accepted solo publication. My Dad said I should send it to Paul Torrance.

I thought that was a funny idea – maybe he didn't realize just how well -known Dr. Torrance was in my field? But my Dad persisted, and I relented. I sent my paper and a note of hello. Maybe, I thought, he'd send me a few words of encouragement.

Instead, I got a full-page letter within a week that praised my paper, offered insightful critiques, and suggested publication outlets. He also asked about my plans for my dissertation. I was floored by his generosity with his time and humility. I wrote him again, outlining my (in retrospect highly implausible) ideas for my thesis. He again wrote back, including copies of several different scales he had developed on thinking styles and other individual differences measures.

A few years later, I had the chance to guest edit a special issue of *Research in the Schools*. I invited him to contribute and (again to my surprise), he agreed. He delivered a very solid paper (what would end up being one of his final ones). The reviewers wanted revisions and I was a little stymied;

how do you ask a living legend to revise? Yet he took the process seriously, adding a co-author and carefully responding to each comment.

As his health began to fail, word spread through the creativity community. I am often a procrastinator (including on my share of this paper!) yet for once I did not wait too long. I wrote him a letter telling him how much his work has meant to me professionally and personally. Shortly before he passed away, I heard that he had received and read my note. There are so many things I would still like to tell him – and ask him – but I am thrilled to have had my own Torrance stories.

In the years to come, I would meet many of his students and hundreds of people who knew him well. I heard stories of him paying his graduate students' tuition out of pocket when they were going through rough times. I heard so many positive stories about how he had encouraged this person or helped this other person. Perhaps most astoundingly, I *never* heard a single negative comment about the man. His work has been criticized – sometimes by me – but the quality of his character and humanity is second to none. I have traveled all over the world and seen the reach of his brilliance. In editing the *International Handbook of Creativity* (with Sternberg), I have seen how many countries have used Torrance as a starting point for their own studies of creativity.

As for the professional challenges to Torrance's work? Sometimes they are fair and other times not fair. Yet I believe that he would welcome the debate. He never seemed to believe that his tests were the end of the journey toward successfully assessing creativity, but rather part of a longer story. If I am even a blip in the same story that stars someone like Paul Torrance, that is more than enough for me.

CHAPTER TWO

FOSTERING A DYNAMIC RELATIONSHIP WITH E. PAUL TORRANCE THROUGH CREATIVITY & NEUROSCIENCE: APPLICATIONS FOR EDUCATION AND INDUSTRY

KRISTEN BETTS, LARRY KEISER & FREDRICKA REISMAN

ABSTRACT Selected works of Ellis Paul Torrance provide the foundation for advancements in learning and research that provide critical new insights about creativity with a focus on the brain and learning. What we know about neuroplasticity, creativity, and entrepreneurship can assist in transforming learning and careers through innovative curricula and pedagogy across all educational/training formats (face-to-face, hybrid/blended, online). This chapter will discuss the underpinnings of Dr. Ellis Paul Torrance's contributions to creativity and their dynamic relationship with neuroscience, education and industry.

Keywords: creativity, design thinking, entrepreneurship, functional fixedness, metacognition, neuroplasticity

Introduction

What we know about neuroplasticity, functional fixedness, metacognition, design thinking, and entrepreneurship can provide critical new insights in transforming how we learn and teach. When teachers are aware of their own creativity they can better understand and nurture the creativity of their students. Parallel to classroom strategies that foster and nurture creativity resulting in improved academic performance, there is evidence that establishing creative corporate environments result in improved products and retention of happier employees (Reisman & Maliko-Abraham, 2018). This chapter also discusses the neuroscience of creativity including new research on neural networks in relation to the right/left brain myth.

E. Paul Torrance Teachings: Foundation for Neuroplasticity, Functional Fixedness, Design Thinking, Entrepreneurship and Neuroscience of Creativity

E. Paul Torrance
Source: Creative Oklahoma (https://stateofcreativity.com/)

Following is an excerpt from *The College of Education Online News* from the University of Georgia upon Dr. Torrance's death:

> E. Paul Torrance dedicated his life's energies toward enhancing the recognition, acceptance, and development of the creative personality in both education and the workplace. Aside from his indefatigable effort being missed with his passing, the void of his personal warmth, authenticity, and devotion to humanity – particularly toward children and youth – makes the world a far more barren place.

E. Paul Torrance was a renowned innovative educator and an international leader in creativity research. He is best known for developing the Torrance Tests of Creative Thinking (TTCT). These tests are used in the business world and in education to assess individuals' capacity for creativity. The TTCT are the foundation for the Reisman Diagnostic Creativity Assessment

(RDCA), which is a free online self-report creativity assessment that provides immediate feedback to the user (Reisman, Keiser, & Otti, 2012). It is diagnostic, rather than predictive, with the focus on making the user aware of creative strengths and weaknesses. The RDCA assesses an individual's self-perception on 11 major creativity factors that have emerged from the creativity research; namely*, fluency, flexibility, elaboration, originality, resistance to premature closure, tolerance of ambiguity, convergent and divergent thinking, risk taking, and intrinsic and extrinsic motivation.* Some of the RDCA factors are similar to those tapped by the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1974), which in turn stems from Guilford's (1967) creativity research.

Torrance defined creativity as "the process of sensing problems or gaps in information, forming ideas or hypotheses, testing and modifying these hypotheses, and communicating results (Torrance, 1974, p. 8). In addition to developing the most widely used tests of creativity, Torrance also created the Future Problem Solving Program, and developed the Incubation Model of Teaching. He authored dozens of books and more than 2,000 published articles on creativity during the course of his career. He remained prolific after his retirement, writing several new books on creativity including the trilogy on Learning Mathematics Creatively (Torrance & Reisman, 2000a, 2000b; Reisman & Torrance, 2002). Torrance's 2002 book, *Manifesto: A Guide to Developing a Creative Career,* lays the foundation for a creative pedagogy related to Torrance's incubation model of teaching that involves design thinking and the neuroscience of creativity:

E. Paul Torrance's Manifesto

1. Don't be afraid to fall in love with something and pursue it with intensity.
2. Know, understand, take pride in, practice, develop, exploit and enjoy your greatest strengths.
3. Learn to free yourself from the expectations of others and walk away from the games they impose on you. Free yourself to play your own game.
4. Find a teacher or mentor who will help you. Learn the skills of interdependence.
5. Don't waste your time trying to be well rounded.
6. Do what you love and can do well.

Following are two anecdotal situations that reflect the essence of the Manifesto.

Source: University of Georgia, College of Education
(https://coe.uga.edu/directory/torrance-center)

Dr. Reisman, in collaboration with Dr. Torrance, administered the Torrance Tests of Creative Thinking (TTCT) to two classes of first graders in Athens, Georgia in 1970. These students had also taken the Metropolitan Readiness Test. Two little boys on the Metropolitan test scored in the mentally retarded range, but on the TTCT, their scores were in the 120's—interpreted as highly creative. Their teachers, upon receiving the TTCT results said, "But these boys are such liars." Dr. Torrance replied that lying is a creative act and that they needed to be guided to use their creativity in more socially accepted ways. Thus, these youngsters, originally slated for a mentally retarded track were now perceived positively by their teachers. The creativity results changed these children's lives.

Another anecdote involved a funded project of how 11 science and mathematics teachers in a small city south of Philadelphia upon receiving student creativity results on the TTCT changed their teaching from reading about science and mathematics to a lab-based approach. District scores on the state achievement assessment were consistently at the bottom of the state results (3rd to 17th percentiles). On the TTCT the verbal results, which tap achievement-type items, were similarly low. But the figural battery scores, which require showing one's creativity through drawings, ranged from 75th to 95th percentiles! Upon receiving these results, teachers gained insight that these tenth graders had been taught by lecture since kindergarten, and that they were spatial hands-on learners. The teachers began changing their pedagogy to hands-on, lab-based science and mathematics. The students began coming to class (attendance was a great problem) and engaging in learning. Again the essence of the manifesto was evident.

The Torrance Incubation Model of Teaching and Design Thinking

The *Incubation Model of Teaching* (Torrance, 1979; Torrance & Safter, 1990) is a three-stage model that provides opportunities for incorporating creative thinking abilities and skills into any discipline at any level from pre-school

through professional and graduate education and the elderly. The model consists of the following (Reisman & Severino, chapter seven in development):

1. **Heightening expectations and motivation.** This stage prepares the student for learning. It is the warm up that provides motivation for learning. This is critically important for all students, but specifically for adolescents.
   - Create the desire to know
   - Heighten Anticipation and Expectation
   - Get Attention
   - Arouse Curiosity
   - Tickle the Imagination
   - Give Purpose and Motivation

2. **Deepening expectations or digging deeper.** This stage expects the student to dig deeper
   - Go beyond the surface issue.
   - Requires students to listen and share and synthesize information
   - Involves deferring judgment
   - Making use of all the senses
   - Opening new doors
   - Targeting problems to be considered or solutions to try

3. **Going beyond or keeping it going.** This stage asks the learner to apply what they are learning to the real world.
   - The teacher at this stage wants to be an encourager and allow the students to figure out solutions to problems.
   - Genuinely encourage creative thinking beyond the learning environment in order for the new information or skills to be incorporated into daily lives.

Design Thinking

Design thinking consists of four activities; namely, (a) defining the *real* problem, (b) generating many alternatives solutions to consider, (c) defining and refining steps one and two, and (d) implementing and evaluating a solution. Design thinking is similar to the Heuristic Diagnostic Teaching Cycle applied by Reisman to mathematics instruction comprised of the following steps displayed in Figure 1 that shows the circularity and feedback function of Heuristic Diagnostic Teaching and its relation to the stages of Torrance's Incubation Model. First, diagnose the *real* problem, next hypothesize possible reasons for the problem, then formulate learning outcomes that will drive instruction, which will result in problem solved—or if the problem is not solved, back to the cycle again. Perhaps the *real* problem was not diagnosed or maybe the hypotheses were faulty, etc.

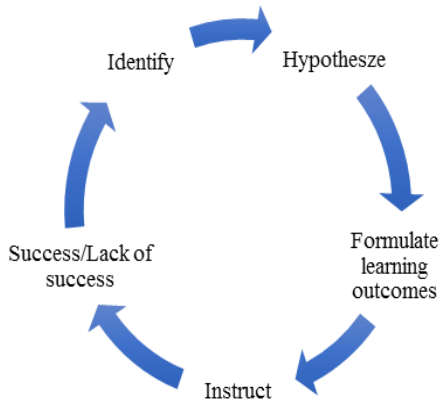


Figure 1. Heuristic Diagnostic Teaching Cycle - Ongoing Evaluation across every phase. (Source: Reisman, 2017, p.168)

The Ideal Pupil and The Neuroscience of Creativity

E. Paul Torrance (1962,1963, 1964) developed a profile of the *ideal pupil* as a checklist for teachers and parents to assess what in their opinion was the ideal pupil/child. The checklist directions included the following: What kind of person would you like the children you teach to become? Please try to describe the kind of person you would like for your pupils to become by using the checklist of characteristics. Check each of the characteristics you think is generally desirable and should be encouraged. Then double check the characteristics you consider most important and should be encouraged above all others. Draw a line through those characteristics you consider undesirable and usually discourage.

The Ideal Pupil/Child/Person Checklist taps the following 63 characteristics as shared in Table 1[1].

Table 1. The Ideal Pupil/Child/Person Checklist

1. Adventurous, testing limits
2. Affectionate, loving
3. Altruistic, working for good of others
4. Asking questioned about puzzling things
5. Attempting difficult tasks

1.Developed by E. Paul Torrance, Georgia Studies of Creative Behavior, College of Education, The University of Georgia, August 1967

6. Becoming Preoccupied with tasks
7. Conforming
8. Considerate of others
9. Courageous in convictions
10. Courteous, polite
11. Competitive, trying to win
12. Critical of others
13. Curious, searching
14. Desirous of excelling
15. Determined, unflinching
17. Disturbing procedures and organization of the group
18. Doing work on time
19. Domineering, controlling
20. Feeling emotions strongly
21. Emotionally sensitive
22. Energetic, vigorous
23. Fault-finding, objecting
24. Fearful, apprehensive
25. Guessing, hypothesizing
26. Haughty and self-satisfied
27. Healthy
28. Independent in judgment
29. Independent in thinking
30. Industrious, busy
31. Intuitive
32. Liking to work alone
33. Neat and orderly
34. Negativistic, resistant
35. Never bored, always interested

35. Obedient, submissive to authority
36. Persistent, persevering
37. Physically strong
38. Popular, well-liked
39. Preferring complex tasks.
40. Quiet, not talkative
41. Receptive of ideas to others
42. Refined, free of coarseness
43. Regressing occasionally, may be playful, childlike, etc.
44. Remembering well
45. Reserved
46. Self-assertive
47. Self-confident
48. Self-starting, initiating
49. Sense of beauty
50. Sense of humor
51. Sincere, earnest
52. Socially well-adjusted
53. Spirited in disagreement
54. Striving for distant goals
55. Stubborn, obstinate
56. Talkative
57. Truthful, even when it hurts
58. Unsophisticated, artless
59. Unwilling to accept things on mere say-so
60. Versatile, well-rounded
61. Visionary, idealistic
62. Willing to accept judgments of authorities
63. Willing to take risks

Neuroscience of Creativity

The Ideal Pupil concept relies upon observation of behaviors. The present offers technologies, which allow investigating brain activities that reveal what's going on behind these behavioral observations. Jung and Vartanian (2018) point out that these brain activities appear to involve the dynamic interplay of these large-scale networks. Large scale brain networks are collections of widespread brain regions showing functional connectivity made available via fMRI analysis. Thus, cognitive tasks are performed not by individual brain regions working in isolation, but by networks consisting of several discrete brain regions that are said to be "functionally connected".

The following three networks are considered to play important roles in creative thought:

1. **The executive attention network**: Involved when a task requires an in-depth level of concentration. For example, when concentrating on a challenging lecture, or engaging in complex problem solving and reasoning that puts heavy demands on working memory.
2. **The default or imagination network**: The default network, also referred to as the imagination network, is used to construct dynamic mental simulations. Active during bouts of daydreaming, when the brain is not focused on the outside world, the default network is implicated in functions such as collecting facts about the self, reflecting on personal emotions and remembering past events. This network also appears to be involved in social cognition and empathy; it plays a part in imagining what another individual might be thinking or what could be.
3. **The salience network**: The eyes, ears, mouth, nose and skin are constantly bombarded with sensory stimulation. The salience network helps choose which inputs to pay attention to and which to ignore. The salience network is thought to control switching between relevant networks of neurons and turning the most appropriate groups off or on depending on its assessment of a situation. The ability to switch between networks is a vital aspect of creativity.

The key to understanding the behavioral profile of students can now be unfolded due to the brain related technologies. Teachers often inhibit rather than enhance and nurture students' creativity due to a lack of a knowledge base regarding student creativity (Getzels & Jackson, 1962; Torrance, 1975; Whitelaw, 2006). If companies are to build a creative workforce, then K -12 schools and institutions of higher education need to start producing creative and innovative thinkers.

Neuroplasticity, Metacognition, and Functional Fixedness

Advancements in neuroscience and brain imagining techniques have transformed what is known about the human brain. According to the Harvard Medical School (2019), scientists previously thought neural connections in the brain developed quickly in the first few years of life and then reached a mental peak in the early 20s; however, research reveals this is simply untrue. According to Demarin, Morovic, and Béné (2014), one of the most important discoveries in neuroscience is neuroplasticity and the fact that "neural networks are not fixed but occurring and disappearing dynamically throughout our whole life, depending on experiences" (p. 209).

The brain is the most complex organ in the human body. The brain weighs roughly three pounds is made up of approximately 100 billion nerve cells called neurons and a 100 trillion neural connections (synapses) (Queensland Brain Institute, 2018). The term neuroplasticity originates from the Greek terms "neuro" which pertains to a nerve or the nervous system while "plastikós" or "plastos" means "molded, formed" (Mateos-Aparicio & Rogriguez-Moreno, 2019). According to Mateos-Aparicio and Rogriguez-Moreno (2019), "Synaptic plasticity is intrinsic to the development and function of the brain, and it is essential for learning and memory processes" (p. 3).

Recognizing that neural connections are not fixed and change through experience provides supporting research to transform approaches to education. The concept of designing educational experiences to create and strengthen neural connections can perhaps be best captured through a slight modification to the famous quote by author William Butler Yeats from "Education is not the filling of a bucket, but the lighting of a fire" to "Education is not the filling of a bucket, but *creating and strengthening of neural connections through experience*."

One of the greatest challenges and opportunities within education is the integration of Mind, Brain, and Education science into K-12 and higher education curriculum, instruction, and professional development. MBE science is a field within the learning sciences focused on the teaching-learning dynamic that intersects neuroscience, psychology, and education (Tokuhama-Espinosa, 2011). MBE science builds upon six principles (Table 2).

Having a strong understanding of the brain, brain function, and neuroscience of learning can assist teachers to strategically utilize innovative pedagogical practices for working with children and andragogical practices for working with adults. According to Dr. Judy Willis (2019):

> Teachers need to be prepared with foundational knowledge to understand, evaluate, and apply the neuroscience of learning. With this knowledge they will be able to recognize future implications from this rapidly expanding field of research to increase the effectiveness of their teaching and build and sustain students' joy of learning. (para. 1)

Table 2. Principles of Mind, Brain, and Education Science, (Tokuhama-Espinosa, 2018)

Principles of Mind, Brain, and Education Science	
Principle 1	Human brains are as unique as human faces. While the basic structure of most human brains is the same (similar parts in similar regions), no two brains are identical. The genetic makeup unique to each person combines with life experiences (and free will) to shape neural pathways.
Principle 2	Each individual's brain is differently prepared to learn different tasks. Learning capacities are shaped by the context of the learning, prior learning experiences, personal choice, an individual's biology and genetic makeup, pre- and perinatal events, and environmental exposures.
Principle 3	New learning is influenced by prior experiences. The efficiency of the brain economizes effort and energy by ensuring that external stimuli are first decoded and compared, both passively and actively, with existing memories.
Principle 4	The brain changes constantly with experience. The brain is a complex, dynamic, and integrated system that is constantly changed by individual experiences. These changes occur at a molecular level, whether simultaneously, in parallel, or even before they are visible in behavior.
Principle 5	The brain is plastic. Neuroplasticity exists throughout the life span, though there are notable developmental differences by age
Principle 6	There is no new learning without some form of memory and some form of attention. Most school learning requires well-functioning short, working, and long-term memory systems and conscious attention. However, procedural learning, habituation, sensitization, and even episodic memory can occur without conscious attention.

The integration of neuro-inspired pedagogy and andragogy (i.e., adult learning theory) into educational classrooms can empower students as lifelong learners, reflective practitioners, and creative leaders.

MBE science encourages the nurturing of self-awareness through metacognition for both teachers and students. Flavell (1976) defined metacognition as "one's knowledge concerning one's own cognitive processes and products or anything related to them, e.g. the learning-relevant properties of information or data" (p. 232). Flavell differentiated between metacognitive knowledge and metacognitive experience. According to Flavell (1979), "Metacognitive knowledge consists primarily of knowledge or beliefs about what factors or variables act and interact in what ways to affect the course

and outcome of cognitive enterprises" (p. 907). Metacognitive experiences, as shared by Flavell "can be brief or lengthy in duration, simple or complex in content" (p. 908) and "can have very important effects on cognitive goals or tasks, metacognitive knowledge, and cognitive actions or strategies" (p. 908). Yale University (2019) defines metacognition as "the process of 'thinking about thinking,' or reflecting on personal habits, knowledge, and approaches to learning" (para. 1) capturing the intersection of metacognitive knowledge and metacognitive experience.

Engaging students in metacognitive activities should be foundational in education since it increases self-awareness and can assist students in overcoming functional fixedness, a rigidity in thinking. Karl Duncker (1945) described functional fixedness as a cognitive bias based on previous experience that limits an individual from thinking of how to use an object to solve a problem in a new way. Building upon research by Duncker, Mayer (2010) shares rigidity in thinking also "occurs when a problem solver uses a well-learned procedure on a problem for which the procedure is inappropriate (p. 273). Awareness of cognitive bias is critical to overcoming functional fixedness in problem-solving. In a study conducted by McAffrey (2012) on functional fixedness in postsecondary education, he found that "By devising techniques that facilitate the noticing of obscure features in order to overcome impediments to problem solving (e.g., design fixation), researchers can systematically create a tool kit of innovation enhancing techniques" (p. 215). Through engaging students in metacognitive activities, students can learn to develop their own tool kit of innovation enhancing techniques for creative problem solving.

What students know about neuroplasticity, functional fixedness, and metacognition can transform how they perceive themselves as learners and how they perceive education. Student awareness that each brain is unique, the brain changes constantly, and new learning is influenced by prior learning can affect student mindset (i.e., growth or fixed) and creative self-efficacy. According to research conducted by Dweck (2015):

> ….. students who believed their intelligence could be developed (a growth mindset) outperformed those who believed their intelligence was fixed (a fixed mindset). And when students learned through a structured program that they could "grow their brains" and increase their intellectual abilities, they did better. (para 2.)

Creative self-efficacy is defined by Teirney and Farmer (2002) as "the belief one has the ability to produce creative outcomes" (p. 1138). Beliefs, like the brain and neural networks, are not fixed. In "The Biochemistry of Belief," beliefs are described as follows:

> Beliefs originate from what we hear - and keep on hearing from others, ever since we were children (and even before that!). The sources of beliefs include environment, events, knowledge, past experiences, visualization etc. One of the biggest misconceptions people often harbor is that belief is a static, intellectual concept. Nothing can be

> farther from truth! Beliefs are a choice. We have the power to choose our beliefs. Our beliefs become our reality. (Sathyanarayana Rao, Asha, Jagannatha Rao, 2009, p. 239).

Diagnostic tools, such as the RDCA, provide students with an opportunity to become aware of their own beliefs about creativity and explore their creative strengths and weaknesses. The RDCA also provides teachers with an opportunity to become aware of their own beliefs about creativity (Reisman, Keiser, & Otti, 2016). When teachers are aware of their own creativity they can better understand and nurture the creativity of their students.

What we know about neuroplasticity, functional fixedness, metacognition, design thinking, and entrepreneurship can provide critical new insights in transforming how we learn and teach. Parallel to classroom strategies that foster and nurture creativity resulting in improved academic performance, there also is evidence that establishing creative corporate environments result in improved products and retention of happier employees (Reisman & Maliko -Abraham, 2018).

Creativity, Innovation and Entrepreneurship

Although many use the terms interchangeably or with little thought as to the differences between them, "creativity," "innovation," and "entrepreneurship" are distinct terms with distinct definitions, functions and processes. E. Paul Torrance believed that creativity in its best form was a process used to address and/or solve a problem or issue. He once defined '*creativity'* as,

> "…the process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies...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 (Torrance, 1965)…"

…whereas '*innovation,*' is the implementation of a creative solution. Teresa Amabile (2012) believes in the importance of creativity to business success, but separates creativity from innovation, "Businesses cannot succeed without innovation and innovation depends on creativity (Amabile, 2012)." "Entrepreneurship" is the taking an innovation to the next level to systemize and create value for the solution (Keiser & Litzky, 2019).

Fredricka "Freddie" Reisman, PhD, a colleague of and co-author of several publications with Dr. Torrance and Founder of Drexel University's School of Education including its Master of Science in Creativity & Innovation degree and its Creativity & Innovation undergraduate and graduate Certificate Programs, shares a personal anecdote that highlights how 'innovation'

is often conflated with 'creativity' as one in the same while providing an "Aha" moment to the IBM and other corporation and business leaders attendees and presenters. The presenter at the workshop she was attending spoke on about the importance of innovation and the need to train employees to have an innovative mind set. Not one to remain silent for too long but understanding the need to not ruffle egos, Dr. Reisman raised her hand and quietly asked when called upon, "Without the creative idea, what is there to innovate?" thus generating a surprised and collective, "Ahhhhhh!" from the audience in attendance (Reisman, 2016).

Similarly, many conflate 'innovation' with 'entrepreneurship.' Innovations are certainly and regularly implemented. However, entrepreneurship goes beyond implementing an innovation and involves purposefully systemizing an innovation (or creative idea) creating value for the solution. Albeit related, innovators and entrepreneurs have slightly different mindsets. It is believed that innovators are typically more resistant to having an idea come to premature closure whereas entrepreneurs are believed (and trained when learning to be entrepreneurial) to be prone to smart risk taking (Keiser & Litzky, 2019).

It is currently believed by the both Drexel's School of Education and its Charles D. Close School of Entrepreneurship that the importance for Education Leaders and Business/Corporate Leaders to understand the role and value of each of these three components – creativity, innovation, entrepreneurship – that an Executive Master of Science in Education and Entrepreneurship (EDEN) is being conjointly created by the two Schools with plans to take its first cohort in Fall 2020. The two Schools are also actively engaged in research of the mindsets of Education Leaders, Business/Corporate Leaders and Entrepreneurs.

On Dr. Torrance as We Celebrate His 105th Birthday

On a personal note in 2001, I, (Larry Keiser, Assistant Clinical Professor and Program Lead for Drexel University School of Education's Creativity & Innovation MS and Certificate programs), was provided the tremendous privilege to meet, eat and talk with Dr. E. Paul Torrance, known as the Father of Creativity to his fellow researchers and the world, just a few short years before his death. Dr. Fredricka Reisman, referred to earlier in this chapter, arranged for a small group of four of her then PhD students to travel to the University of Georgia (UGA) to attend the annual Torrance Lecture Series organized by UGA's Torrance Center for Creative Studies. That was also the year Dr. Torrance personally provided Dr. Reisman permission to use his name for Drexel University School of Education's Drexel/Torrance Center for Creativity & Innovation – the only Center outside of Georgia permitted to do so at that time. The Drexel/Torrance Center at that time was the umbrella for the School's Center for the Creative Prevention of School Violence for working Philadelphia elementary/middle schools on creating school violence reduction

programs and the Drexel Diagnostic Mathematics Learning Lab (D^2ML^2) which provided both remediation in mathematics for students in need and supplemental mathematics content to gifted students.

Of course, I had known of, studied the work of and peripherally interacted with Dr. Torrance long before the naming of the Drexel/Torrance Center and our meeting at UGA. His Torrance Tests of Creative Thinking (TTCT) were used with several hundreds of teachers through a variety of externally funded teacher professional development programs obtained by Dr. Reisman and I for Drexel's School of Education. [As also shared earlier, it was the TTCT that inspired the development of the Reisman Diagnostic Creativity Assessment (RDCA) instrument and its related phone app.] I was witness to Drs. Reisman and Torrance coordinating their creation of a tribology of publications designed for teaching mathematics creatively, and I was part of Dr. Reisman's first cohort of Drexel School of Education PhD students and her weekly PhD seminar whereby Dr. Torrance served as one my fellow cohort member's dissertation committee members. To share that meeting Dr. Torrance face-to-face was totally AWESOME!!... doesn't begin to express the excitement and awe that I and my fellow student travelers experienced over that day and a half. In addition to sitting at his table during the Torrance Lecture presentations, dinner and awards – in which the four students took round robin turns to sit and chat individually with Dr. Torrance, Dr. Reisman arranged for a private lunch with Dr. Torrance that included her, Dr. Louise McBee (then State Representative representing Athens in the Georgia legislature and Vice President of Academic Affairs Emerita at UGA) and we four PhD students. It was an afternoon of questions, ideas and gentle responses, reflection and guidance.

Following that afternoon, I, like my three fellow students, knew that creativity would be front and center in our dissertations. Dr. Rebecca Weidensaul looked at creativity through the lens of how Drexel athletes handle the simultaneously dual role of athlete/scholar; Dr. Louise Whitelaw examined how teachers' understanding of their own creative strengths and weaknesses could use that information to better recognize creative strengths of their students toward improving the students' academic performance; and Dr. Charlene Nessler studied how creativity might impact doctoral students' persistence in degree completion. My own dissertation examined the similarities and differences of the creative mindsets of Education Leaders and Business/ Corporate Leaders.

To the world, E. Paul Torrance was known as a someone whose professional achievements, research and theories of creativity have positively impacted and influenced innumerable children and adult lives. Dr. Torrance's biographers share that he had a way of making everyone feel important, valued and special. I cannot be more grateful that this gentle giant in the field of creativity, of which I could not be any prouder to be a member, took the time those two days long ago to do just that.

Figure 2. Drs. Torrance and Reisman lunching at Georgia Botanical Gardens in Athens with Drexel graduate students and Dr. Keiser who took this picture.

References

Amabile, T. (2012, October 24). Creativity & innovation with Teresa Amabile [Video file]. Retrieved from https://youtu.be/XVTSmCIf2Xc.

Cross, N. (1990). The nature and nurture of design ability, *Design Studies*, *11*. 127–140.

Demarin, V., Morovic, S. & Béné, R. (2014). Neuroplasticity. *Periodicum Biologorum*, *116*, 209-211.

Duncker, K. (1945). On problem-solving (L. S. Lees, Trans.). *Psychological Monographs, 58*(5), i-113. http://dx.doi.org/10.1037/h0093599

Dweck, C. (2015, September 22). Carol Dweck revisits the "growth mindset." Education Week. Retrieved from https://www.edweek.org/ew/articles/2015/09/23/carol-dweck-revisits-the-growth-mindset.html

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231-235). Hillsdale, NJ: Lawrence Erlbaum.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist, 34*(10), 906-911. doi:10.1037/0003-066X.34.10.906

Getzels, J.W. & Jackson, P.W. (1962). Creativity and intelligence: Explorations with gifted students. New York: John Wiley & Sons.

Harvard College of Medicine. (2019). How memory and thinking ability change with age. Harvard Health Publishing. Retrieved from https://www.health.harvard.edu/mind-and-mood/how-memory-and-thinking-ability-change-with-age.

Keiser, L. & Litzky, B. (in press). A master of science degree in education and entrepreneurship (EDEN) proposal. Drexel University, Philadelphia, PA.

McCaffrey, T. (2012). Innovation Relies on the Obscure: A Key to Overcoming the Classic Problem of Functional Fixedness. *Psychological Science*, *23*(3), 215–218. https://doi.org/10.1177/0956797611429580

Mateos-Aparicio P and Rodríguez-Moreno A (2019) The Impact of Studying Brain Plasticity. *Frontiers in Cellular Neuroscience, 13(*66). doi:10.3389/fncel.2019.00066

Mayer, R.E. (2010). Problem solving and reasoning. *In* P. Peterson, E. Baker, & B. McGaw (Eds.). International encyclopedia of education (3rd ed.), (pp. 273-278). Amsterdam, Netherlands: Elsevier Science. https://doi.org/10.1016/B978-0-08-044894-7.00487-5

Queensland Brain Institute (2018). What is a neuron. The University of Queensland. Retrieved from https://qbi.uq.edu.au/brain/brain-anatomy/what-neuron

Reisman, F.K. (2014). Creativity Embedded into K-12 Teacher Preparation and Beyond. In *Nurturing Creativity in the Classroom*. (Eds. Kaufman, J.C. & Beghetto, R. A.) New York: Cambridge University Press.

Reisman, F.K. & Keiser, L. (2016, October 5). *Drexel University's Creativity & Innovation Program.* Lecture presented to first term PhD students regarding research in Creativity & Innovation, Drexel University, Philadelphia, PA.

Reisman, F.K. & Severino, L. *Drawing Upon Creativity to Enhance Learning for Students with Dyslexia, Dysgraphia, Dyscalculia, Co-morbidity & Twice Exceptional.* Chapter seven in development. Manuscript in preparation.

Reisman, F.K. and Torrance, E.P. (2002). *Learning and using primes, fractions and decimals creatively.* Bensenville, IL: Scholastic Testing Service.

Reisman, F., Keiser, L., & Otti, O. (2016). Development, use and implications of diagnostic creativity assessment app, RDCA - reisman diagnostic creativity assessment. Creativity Research Journal, 28(2), 177 -187. doi:10.1080/10400419.2016.1162643

Reisman, F.K. & Maliko-Abraham, H. (2018). Generating a culture for creativity and innovation: Coaching approaches that drive talent management processes. *Talent management handbook. 3nd Edition.* Edited by Lance A. Berger & Dorothy R. Berger. NY: McGraw Hill.

Sathyanarayana Rao, T. S., Asha, M. R., Jagannatha Rao, K. S., & Vasudevaraju, P. (2009). The biochemistry of belief. Indian Journal of Psychiatry, 51(4), 239-241. doi:10.4103/0019-5545.58285

Tierney, P., & Farmer, S. (2002). Creative Self-Efficacy: Its Potential Antecedents and Relationship to Creative Performance. *The Academy of Management Journal, 45*(6), 1137-1148. Retrieved from http://www.jstor.org.ezproxy2.library.drexel.edu/stable/3069429

Tokuhama-Espinosa, T. (2011). *Mind, Brain, and Education Science: The new brain-based education*. New York: W.W. Norton.

Torrance, E.P. (1965). Scientific views of creativity and factors affecting its growth. Daedalus, Vol. 94, No. 3, Creativity and Learning (Summer). The MIT Press on behalf of the American Academy of Arts & Sciences. Retrieved from http://www.jstor.org/stable/20026936.

Torrance, E.P. (2002). *The Manifesto: A Guide to Developing a Creative Career.* Westport, CT: Ablex Publishing.

Torrance, E.P. and Reisman, F.K. (2000a). *Learning to use place value creatively*. Bensenville, IL: Scholastic Testing Service.

Torrance, E.P. and Reisman, F.K. (2000b). *Learning to solve mathematics word problems creatively.* Bensenville, IL: Scholastic Testing Service.

Torrance, E. P., & Safter, T. (1990). *The incubation model of teaching: Getting beyond the aha.* Buffalo, NY: Bearly Limited.

Torrance, E.P. (1993). Understanding Creativity: Where to Start? *Psychological Inquiry, (4)*3, pp. 232-234.

Torrance, E. P. (1979). *The Search for Satori and Creativity*. New York: Creative Education Foundation.

Torrance, E. P. (1975). *Sociodrama as a Creative Problem-Solving Approach to Studying the Future.* https://doi.org/10.1002/j.2162-6057.1975.tb00998.

Torrance, E. P. (1974). Norms-technical manual: Torrance Tests of Creative Thinking.

Lexington, MA: Ginn and Company.

Whitelaw, L. (2006). An evaluative study of teacher creativity, use of the heuristic diagnostic teaching process and student mathematics performance. Ph.D. degree. Drexel University.

Willis, J. (2019, January). Why Teacher Education Should Include Neuroscience. TeachThought. Retrieved from https://www.teachthought.com/pedagogy/why-teacher-education-should-include-neuroscience/

Wilson, D., & Conyers, M. (2018, February 21). Building a metacognitive classroom. Edutopia. Retrieved from https://www.edutopia.org/article/building-metacognitive-classroom

Yale University. (2019). Encouraging metacognition in the classroom. Yale Poorvu Center for Teaching and Learning. Retrieved from https://poorvucenter.yale.edu/MetacognitioninClassrooms

CHAPTER THREE

CREATIVITY AND COPING WITH CHRONIC DISEASE: ACHIEVING SELF-AWARENESS AFTER DIAGNOSIS

ANDREW CASE

ABSTRACT This qualitative study explores the importance of creative coping methods to regain the ability to define a new role identity due to aspects of self that are lost when diagnosed with long-term disease. Creativity, when used as a complement to conventional medicine for patients dealing with chronic illness, has the potential to bring mindfulness to a patient who is defining their livelihood on the medical condition they face. The diagnosis of a chronic disease, Multiple Sclerosis, led the researcher to this inspired discovery. The self-expression that creating art has given the researcher aims to be the foundation to inspire creative mediums that can be practiced as an auxiliary means of overcoming illness. The identity loss experienced from diagnosis directed time of reflection to identify new ways to rediscover their voice through artwork. The findings prove to be a testament to when creativity is applied as a supplementary technique to remedying illness.

Keywords: chronic disease, creativity, identity loss, art, coping methods

Introduction

The purpose of this case study was to explore how an individual using creativity to cope with chronic illness can effectively achieve new perceptions of self-identity after learning the disease prognosis. This study sets its sights on educating readers that artistic mediums that can be utilized, not only as therapy, but also as supplementary remedies that will lead to overall positive changes in lifestyle when an individual is learning to overcome unforeseen long-term health obstacles due to chronic disease. Physical and mental challenges of chronic illness can lead to biographical disruption, so it is vital to pay attention to new ways of discovering how to regain partial identity loss after diagnosis (Asbring, 2001). The researcher will demonstrate how Mihaly Csikszentmihalyi's Systems Model of Creativity, Avi Kaplan's Complex Dynamic Systems Perspective on Identity and its Development, and Torrance's Manifesto became an integrated creativity guide to rediscover an individual's identity when they are faced with a life course after diagnosis that demands a new understanding of themselves. The approach of the researcher to apply

these creativity models are founded on the basis that if an individual sustains partial or full identity loss, they are no longer able to create original or novel ideas to influence society until they are redefined. Firsthand experience has given the researcher complete perspective of how the diagnosed individual will only be influenced by society's insights on other's situations leading to a further loss of self, needing to be redefined.

Background

When learning about a life-altering illness the researcher only knew as much as the ensuing interpersonal relationships would allow for the shallow depth of knowledge and insight on how to begin living life with a disease. There were treatment options given by doctors to begin with physical recovery. There were discussions about medication side-effects and new risks to consider when choosing which decision would fit their personal and social lifestyle. There were one-on-one conversations with medical specialists that demanded answers from a newly diagnosed patient who knew very little about the illness that would change their self-identity in only ways influenced by literature, relationships, and clinicians. The word "coping" was never brought up in conversation. A brief mention about seeing a social worker was abruptly rolled over by more talk of health insurance, and copays, but nobody ever decided that it would be a good idea to engage in dialog about how understanding, accepting, and coping with the news of a chronic disease would lead to better choices of a new creative existence. The medical team focused on the prognosis, family focused on debating the authenticity of the diagnosis and possible alternatives, and the identity of the patient became about the disease and no longer about the human being affected.

The researcher blends the idea that if an individual is diagnosed with a chronic illness than they must regain their creative identity role by learning the basics of creativity in Csikszentmihalyi's Systems Model of Creativity. In 1988, Mihaly Csikszentmihalyi, an American-Hungarian psychologist developed his theory for what necessary elements need to be present for creativity to occur. Csikszentmihalyi states, "for creativity to occur, a set of rules and practices must be transmitted from the domain to the individual. The individual must then produce a novel variation in the content of the domain. The variation then must be selected by the field for inclusion in the domain" (Csikszentmihalyi, 1999). But how can an individual create anything worthy of being titled original and unique if they have lost their identity when the dynamics of this system model relies on the circular structure of the three main systems – person, field and domain – affects the others and is affected by them in turn? (Csikszentmihalyi, 1988). One place an individual can begin is with researching Avi Kaplan and Joanna Garner's Complex Dynamic Systems Model in order to bridge the gap of ontological and epistemological beliefs, purpose and goals, self-perceptions and self-definitions, and perceived action possibilities in the role of coping with chronic illness (Kaplan,

& Garner, 2017). Through the researcher's personal observations in dealing with partial identity loss due to chronic illness and a thorough understanding of Stein's universally accepted definition of creativity, the Dynamic Systems Model of Role Identity, and Csikszentmihalyi's Systems Model of Creativity, they have found that creativity can be used to cope with chronic illness and appropriately influence society. When the diagnosed patient accepts their diagnosis of chronic disease and begins to creatively cope with their illness, it allows the patient an opportunity to positively influence the domain they live within by fundamentally changing how society views the creative spirit needed to achieve a new self-identity. Kaplan and Garner state, their model "provides a conceptual framework that integrates insights from several contemporary identity perspectives that commonly are considered to uphold incompatible ontological and epistemological assumptions about identity and its development" (Kaplan & Garner, 2017). This allows the patient the chance to no longer live as their diagnosis, but rather with the diagnosis by understanding the influences affecting their stability and change to manifest an identity.

Concepts of Creativity

In understanding the challenges to recognize the parallels between creative outputs across different contexts, it is important to define the components of creativity within both scientific and artistic domains that will help to identify what the loss of identity in an individual means when learning how to cope (Abraham, 2018). The differing views on the definition of creativity allows for continuous transformation in both where and how a creative idea becomes creativity. Howard Gardner states, "people are creative when they can solve problems, create products, or raise issues in a domain in a way that is initially novel but is eventually accepted in one or more cultural settings" (Gardner, 1999). When the inventiveness of a novel idea allows the diagnosed individual to arrive at an appropriate solution when coping with a chronic disease it can be original to the individual and unique to others and there in fact influence the growing population of society that are also dealing with learning how to cope with chronic illness.

The immediate and, otherwise, lingering feeling that a person can only be influenced by the ideation that everyone diagnosed with a chronic illness will have the same outcome in life needs to be met with the realization that genetic potentials are influenced by personal experiences. The skills or behaviors that are developed influence the individual's potential by enhancing self-awareness, encouraging positivity, and maximizing the impact uncovered through using creativity to cope. The flexibility of human behaviors allows for a range in techniques used for problem solving and the "openness to experience is predictive to creative achievement in the arts" (Kaufman et al., 2016). Imaginative coping methods can be regarded as workable solutions that have the ability to impact a large portion of the culture based on a 2002

medical study, which states, "One hundred million persons in the United States have at least 1 chronic illness. Eighty-eight percent of people aged 65 years or older have one or more chronic illnesses, and one quarter of these have 4 of more conditions" (Bodenheimer, Wagner, & Grumbach, 2002). When conceptualizing this growing population of individuals that are facing various pressures in each individual's place, situation, and environment, it is important to understand the "specifications of the creative situation, the life circumstance, or the social, cultural, and work milieu which facilitate and encourage the appearance of creative thought and action" (MacKinnon, 1970) that are influencing the abundance or lack of creative coping procedures. If a newly diagnosed patient does not accept their situation and decides to become recluse and not educate themselves on how to use creativity to cope with chronic illness then they may feel as though their future is no longer in their hands, but only being controlled by their disease.

The researcher points out that the use of ingenuity of coping methods "demonstrate the brilliance of creative minds during problem solving in applied domain…often, the end products of creative minds are not things that we can all consciously perceive using our senses of touch, sound, taste, or smell" (Abraham, 2018, p. 2). This shows it is important to note that inspired motivation to create due to the onset of illness can stimulate an individual to express feelings and emotion through various outlets to achieve creativity dependent upon the domain. "Furthermore, risk taking may be an attribute that affects creativity" (Charyton & Snelbecker, 2007). There are coherent risks being taking by an individual formulating notion in moments of negative reflection of self when battling the "realization that earlier competence and self-confidence are demolished at illness-onset" (Asbring, 2001). No matter the domain, either artistic or scientific, the individual must reestablish their self-identity to create "a process that results in novelty which is accepted as useful, tenable, or satisfying by a significant group of others at some point in time" (Stein, 1953).

Chronic Disease Research

Now that the researcher has provided an introduction with a few exemplars about domain influences, self-identity, the use of creativity when coping, let us begin to dissect what happens when an individual is diagnosed with chronic illness. Pia Asbring, a Registered Nurse from the Centre for Development of Health Services, researched the effects of identity loss due to the diagnosis of Chronic Fatigue Syndrome. The research consisted of twenty-eight female participants ranging in age, from thirty-two to sixty-five years old, in two Swedish hospitals. Asbring's study included interview contributors on various themes, such as, history of the illness, ideas about the illness, consequences of the illness and strategies for coping with daily life (Asbring, 2001). Her systematic qualitative approach was inspired by the grounded

theory covered previously in, The Discovery of Grounded Theory (Glaser & Strauss, 1967). Instead of developing an entirely new theory, earlier developed theoretical concepts and thoughts were used in relation to the empirical data (Strauss & Corbin, 1990). This technique means that theoretical concepts have not been imposed on the data. On the contrary, only theoretical concepts that coincide with the data have been used. Asbring states, "Chronic illnesses may have significance for the individual's identity and life course. Therefore, the illness and its consequences for identity need significantly more attention" (Asbring, 2001). Through the act of self-reflection and heightened expansion of the diagnosed individual's conceptualizations and prior knowledge of self, this leads to rediscovering which aspects of the identity have been lost, which aspects remain and which new aspects have been added, resulting in redefining one's identity, or some aspects of it, and creating a partly new identity based on the new situation (Asbring, 2001). The researcher notes Asbring's research on patients diagnosed with Chronic Fatigue Syndrome and reflects the way these personal stories of coping can inspire individuals to regain their identity. This identity referenced, although new or reformed, can lead to novel and suitable ideas that can appropriately influence society through a new use of creativity.

Integrating Systems Models into Coping Methods

As we move on with an understanding that diagnosed individuals deal with self-rediscovery, we can begin to discuss Avi Kaplan and Joanna K. Garner's Complex Dynamic Systems Perspective on Identity and Its Development: The Dynamic Systems Model of Role Identity (2017). The inventors of this model state, "Identity development involves the formation and restructuring of relations within and among role identities through intra- and inter-personal processes, which are mediated by sociocognitive and cultural means, and framed by the context, as well as, by individual dispositions" (Kaplan & Garner, 2017). Although the research taking place for this model is framed by the relationship of an actor and a new role, the researcher sees similarities that are significant to the intra-personal processes that need to take place in a diagnosed individual that are the foundation that builds a strong sense of self, establishes identity, and evaluates the ability to communicate what they are feeling inside to others. The intra-personal process needs to take place before an individual can reestablish themselves in society to create inter-personal connections with others about their experiences that can lead to creativity. The inter-personal communication validates the critical role of communication skills in interpersonal situations, especially in problem-solving, conflict resolution, and human development contexts (Adigwe, 2016). The integration of the Dynamic Systems Model of Role Identity is important because it is viewed as a model that provides theoretical perspective on the integrative nature of identity and its developmental mechanisms, and if, as an individual diagnosed with a chronic illness, we choose to begin to cope and not just ex-

press auxiliary methods of achieving self-medicating through creativity, we must remember that the domain influences the individual and the individual influences society (Kaplan & Garner, 2017). This tells us if we cannot identify who we are anymore after illness we can no longer influence others and will remain only influenced by others and coping merely in a limited space with little to no impact on society or the domain we live within.

The status of the domain and openness to experiences will play a significant role in the discovery of coping methods used by an individual to overcome partial loss of identity and adjust their lifestyles while navigating through this transitional period (Kaufman, 2015). "Individuals differ in their adjustment to both acute and chronic illness, however. Coping efforts have been proposed as one means of accounting for these differences in adaptation, and numerous studies have documented the importance of individual coping efforts in helping ill adults maintain reasonable levels of emotional well-being" (Moos, 1984). The domain in which these individuals living with chronic illness reside within will impact their overall mood, emotions, and ability to sustain meaningful inter-personal relationships. It is important that the diagnosed individual goes through the necessary stages of grieving and begin their journey of self-awareness on their own in order to learn how creativity will work for them to cope after accepting their diagnosis. In 1969, A Swiss psychiatrist, Elisabeth Kübler-Ross asserted her model of the five stages of grief in her book *On Death and Dying*. The Kubler-Ross model has been used in many different forms from beginning to end to completion and in non-linear manners because the uniqueness of every situation that involves grieving relies on the individual's ability to no longer deny their reason to grieve and accept how life may be altered due to illness.

Contributions to Knowledge

The researcher's first-person views throughout this paper can be labeled as a form of humanistic educational research when acknowledging the integration of the Dynamic Systems Model of Role Identity as the unit-of-analysis when a chronically ill individual is facing a form of identity loss. This personalized perspective is prominent due to the way that the model examines and addresses the erroneous assumption of ergodicity in prevalent social science research—that processes within the person are identical to processes between people (Hamaker, 2012). Humanistic educational research, described by Russo as a holistic, humanistic perspective, leads one to social concern and commitment as acts of optimal well-being and the use of creative potential of others allowing them to adapt and cope (Thornton & McEntee, 1998). There is a need to examine a total person and not simply as a matter of the application of knowledge and reason in the critical humanistic approach that has been used in previous studies that discuss how ecological structure is shaped. When an individual is diagnosed with a chronic disease, there are various physical and mental factors that will change how that person views their own

capabilities upon hearing the prognosis. This process of prognosis for the researcher led to separation from others socially and they began self-labeling themselves as unrelatable and different.

At the time of diagnosis, the researcher was an otherwise healthy twenty-seven-year-old male who understood his own physical and mental capabilities. Without forewarning, these known abilities were disrupted by the sudden diagnosis of a chronic, progressive neurological disorder called Multiple Sclerosis, also known as, MS. MS, is a chronic disease that affects more than 2 million people worldwide and is currently incurable (Reich, Lucchinetti & Calabresi, 2018). With no known cure, the disease becomes a lifetime of unknowns with sudden and abrupt onsets of symptoms that can occur without warning. The transition from knowing one's body to then learning from society about what can potentially be a new reality can alter the thoughts and actions of a person. They no longer really know who they are or what is possible. A part of themselves is lost and replaced with the knowledge of others' ill-fated lives as they hear stories about how people try to overcome their own illnesses. Right away, this diagnosis was met with the feeling of denial, a temporary defense mechanism brought on by the refusal to accept a new reality (Lim, 2013). There were moments of confusion, anger and hopelessness, and this was followed by depression. The situation was not going away, and it was necessary for the researcher to try to reconnect with society after staying away and removing themselves from friends and family until they no longer felt like a burden of concern. Emotions expressed towards the diagnosed individual, no matter how genuine, came off overly sympathetic. It was easier to stay clear of social interaction than to face the reality of their situation. This time alone away from societal impacts rooted moments of self-reflection. There was a new role that needed to be created to get back on track in order to attain the ability to think creatively. Coping was required.

When you take the individual out of their domain a researcher can no longer study and capture the holistic and rich content, structure, and process of identity and its formation within social-cultural contexts to assess the conceptual principles of the identity (Kaplan & Garner, 2017). The researcher believes that the same principles remain if you seek to identify the social science of a domain but fail to study the individuals living with chronic illness within society and how they are creatively influencing the population that can relate. When a diagnosed individual begins to understand that a chronic illness brings with it the influx of lifelong unknowns, they can begin to accept this information and work towards regaining their existence. When a cure for one's illness is out of one's hands, there needs to be an awareness built within oneself that a universal cure is not up to oneself. The person is not responsible for defeating the disease but is able to manage the way in which the illness does not overshadow one's domain. The researcher thinks back about the amount of time it took them to become ready to creatively find ways to cope. Heidi Beckman, Senior Clinical Psychologist in the Department of

Health Psychology at UW Health, states in her presentation of Creative Coping with Chronic Illness how people that are diagnosed with illness will probably never return to the way they lived before the onset of their medical condition. The acknowledgement of interpersonal relationships with others will influence resolutions and allow the space needed to reconstruct an authentic sense of self (Beckman, 2015). Coping should not be a chore, but a process of valued discovery. Creative coping methods positively impact the individual's newly recognized capabilities and previous characteristics that arise over time as time passes.

So how does someone know if their procedures of coping are reaching the degree of creativity that is considered original and novel when compared to ideas that have been encountered by others to be once thought of as rare or infrequent? The domain in which individual lives within and the field that they influence with their creations need to be tested with artistic and expressive actions until an idea is to be deemed appropriate within a particular context (Runco & Jaeger, 2012). The researcher points out that, when beginning to accept their illness and developing knowledge by reading literature and attending seminars that taught them about the coping experiences of others, it became apparent that everybody was solving a problem that fit the personal needs of their given situation and accomplished a recognizable goal (Abraham, 2018). It was through the ability to begin creating a new voice through the arts that allowed the researcher to express emotion by painting with a self-defined interpretive abstract technique that conveyed adequately a mood or particular theme (MacKinnon, 1978).

Self Reflection

The unexpected intrinsic motivation to express built up emotion through the use of artistic means became an extension of self that was thought to be lost during the diagnosis. This was a time when the words wouldn't come to mind, the situation didn't make sense, and identity felt lost. Coping wasn't yet met with the artist, holistic, or spiritual ideas and the days and nights were spent mostly alone in moments that could have turned into anxiety and depression. Painting was a surprising element and key factor in determining that personal creativity was still to be defined as creativity. Margaret Boden, a Research Professor of Cognitive Science at Sussex University, describes creativity as when an idea is experienced as being new and valuable to the person generating the idea. (P-creativity) is when the novel idea is original regardless of how many others have generated the idea before (Boden, 2004). The idea that creativity needs to showcase genius and change a domain on a lasting scale can begin with the most basic level of mini-c creativity where the idea reflects "personally meaningful interpretations of experiences, actions and events" (Abraham, 2018; Kaufman & Beghetto, 2009). Creative coping methods do not have to showcase anything more than useful ways to develop

a fresh understanding of how to retrieve parts of a role identity that began to diminish.

My Final Thoughts

When creativity is applied through means of coping to combat chronic disease as a supplementary technique to remedying illness, auxiliary techniques can be discovered that will bring mindfulness and new meaning to life after diagnosis. The application and integration of System Models relating to creativity can help guide a patient to managing intrapersonal and interpersonal relationships that develop over time. There is no specific timeline for individuals handling illness to go through the stages of grief that lead to acceptance. As much as the diagnosed individual seeks to learn about the disease, they should also look to learn about themselves. The unique and novel ideas that someone may go through when coping and reconstructing identity may seem insignificant at the time, but artistic discovery can lead to finding a new self-identity. That new self-identity can lead to writing a paper that may influence society resulting in an original way that a creative field thinks about coping with chronic illness. If ever found in the situation of being diagnosed with a chronic illness, take a step back from the doctors' visits and health literature to give yourself a moment to self-reflect, and find a method to express yourself creatively so that you can begin to cope with your situation and start creating that new identity.

Finally, I gather strength and hope from E. Paul Torrance's Manifesto that drew upon his findings to develop a Manifesto to help children and adults to live more creatively. Torrance wrote, "I drew these guidelines from my longitudinal studies in which I had encountered some creatively gifted children with learning disabilities, but I now realize that I was writing them for myself" (*The Manifesto: A Guide To Developing a Creative Career*, p. 93):

E. Paul Torrance's Manifesto

Don't be afraid to fall in love with something and pursue it with intensity.
Know, understand, take pride in, practice, develop, exploit, and enjoy your greatest strengths.
Learn to free yourself from the expectations of others and walk away from the games they impose on you. Free yourself to play your own game.
Find a great teacher or mentor who will help you.
Don't waste energy trying to be well-rounded.
Do what you love and can do well.
Learn the skills of interdependence.

Thank you, Dr. Torrance!

Correspondence
Andrew Case
Manager, Sales & Marketing – Athletics, Recreation
Drexel University, Philadelphia, USA
Email: anc68@drexel.edu

References

Abraham, A. (2018). *The neuroscience of creativity*. Cambridge, United Kingdom: Cambridge University Press

Asbring, P. (2001). Chronic illness – a disruption in life: identity-transformation among women with chronic fatigue syndrome and fibromyalgia. Retrieved from https://onlinelibrary-wiley-com.ezproxy2.library.drexel.edu/doi/full/10.1046/j.1365-2648.2001.01767.x?sid=nlm%3Apubmed

Boden, M. (2004). *The creative mind: Myths and mechanisms* (2nd edn.) London: Routledge.

Bodenheimer, T.S., Wagner, E.H., & Grumbach, K. (2002). Improving primary care for patients with chronic illness: the chronic care model, Part 2. Retrieved from https://www.scirp.org/journal/PaperInformation.aspx?PaperID=55952

Charyton, C & Snelbecker, G. (2007). General, Artistic and Scientific Creativity Attributes of Engineering and Music Students. *Creativity Research Journal.* 2007, Vol. 19, Nos. 2–3, 213–225

Conner, T. S. (Eds.). Handbook of *Research Methods for Studying Daily Life*, 43-61, New York, NY: Guilford

Csikszentmihalyi, M., & Csikszentmihalyi, I. (Eds.). (1988). *Optimal experience*. Cambridge: Cambridge University Press

Csikszentmihalyi, M. (1999). A systems perspective on creativity. Edited Extract. In R. Steinberg (ed.) *Handbook of Creativity* (pp. 313-325). Cambridge: Cambridge University Press.

Gardner, Howard (1999) Intelligence Reframed. *Multiple intelligences for the 21st century*. New York: Basic Books.

Glaser, B., and Strauss, A. (1967). *The Discovery of Grounded Theory*. Chicago: Aldine

Hamaker, E. L. (2012). Why researchers should think "within-person": A paradigmatic rationale. In M. R. Mehl &

Kaufman, J.C., & Beghetto, R. A. (2009). Beyond big and little: The four C model of creativity. Retrieved from https://s3.amazonaws.com/jck_articles/Kaufman%2C+Beghetto+-+2009+-+Beyond+big+and+little+The+four+c+model+of+creativity.pdf

Kaplan, A. & Garner, J. (2017). A Complex Dynamic Systems Perspective on Identity and Its Development: The Dynamic Systems Model of Role Identity. *Developmental Psychology*. 53. Retrieved from https://psycnet.apa.org/doiLanding?doi=10.1037%2Fdev0000339

Kaufman, S., Weiss, B., Miller, J. & Campbell, W. Keith. (2018). Clinical Correlates of Vulnerable and Grandiose

Narcissism: A personality perspective. *Journal of Personality Disorders.*

Kaufman, S. B, Quilty L. C., Grazioplene R. G., Hirsh J. B., Gray J. R., Peterson J. B., & DeYoung C. G. Openness to Experience and Intellect Differentially Predict Creative Achievement in the Arts and Sciences. J Pers. 2016 Apr;84(2):248-58. Retrieved from https://www.researchgate.net/publication/269286890_Openness_to_Experience_and_Intellect_Differentially_Predict_Creative_Achievement_in_the_Arts_and_Sciences_Openness_Intellect_and_Creativity

Kubler-Ross, E., 1969. *On Death and Dying.* 1st Edn., Macmillan, New York, pp: 260.

Lim. W.M. (2013). Revisting Kubler-Ross' Five Stages of Grief: some comments on the iphone 5. *Journal of Social Sciences*. 9. 11-13. 10.3844/jssp.2013.11.13. Retrieved from https://thescipub.com/PDF/jssp.2013.11.13.pdf

Moos R.H., & Schaefer J.A. (1984) The Crisis of Physical Illness. In: Moos R.H. (eds) *Coping with Physical Illness*. Springer, Boston, MA

Reich, D., Lucchinetti, C., & Calabresi, P. (2018). Multiple Sclerosis. *The New England Journal of Medicine*. Retrieved from https://www.nejm.org/doi/full/10.1056/NEJMra1401483

Stein, M. I. (1953) Creativity and Culture. *The Journal of Psychology*. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/00223980.1953.9712897

Strauss, A. & Corbin, L (1990). *Basics of Grounded Theory Methods*. Beverly Hills, CA.: Sage

Thornton, L. J., & McEntee., M. E. (1998). Staff Development as Self-Development: Extension and Application of Russo's Humanistic-Critical Theory Approach for Humanistic Education and Social Action Integration. *Journal of Humanistic education and development*, 36(3). 143-159. Retrieved from https://epdf.pub/reinforced-concrete-and-the-modernization-of-american-building-1900-1930-johns-h.html

Torrance, E.P. (2002). *The manifesto: a guide to developing a creative career*. Westport, CT: Greenwood Publishing Group.

Uchenna. U., & Adigwe. O. (2016). Cultural norms and cultural agents in buyer–seller negotiation processes and outcomes. *Journal of Personal Selling & Sales Management*. Retrieved from https://www.researchgate.net/publication/303596671_Cultural_norms_and_cultural_agents_in_buyer-seller_negotiation_processes_and_outcomes

CHAPTER FOUR

PAUL TORRANCE AND THE RELEVANCE OF HIS WORK TODAY

MARILYN FRYER

Introduction

I first had the opportunity to write a tribute to Dr. E. Paul Torrance when the *Creativity Research Journal* published a special issue devoted to him (Fryer, 2006). It is with great pleasure that I take the opportunity to do so again. My first tribute to him focused on the way in which he influenced my research, teaching and later work. Indeed, he was a major influence on my choosing to investigate creativity development in UK education.

This time, I also want to especially focus on the relevance of his work to the significant challenges we face throughout the world today and why creativity development needs to be seen as of paramount importance in both formal and informal education. I also want to share my personal impressions of Paul Torrance when he invited me to contribute to the Torrance Lecture series in Athens, Georgia – though I did not quite realise that's what he was doing until I got there, when he asked me to come to Georgia and just 'talk to a few people'.

The Relevance of Creativity Education

The human race has always had to contend with significant challenges – poverty, hunger, inequality, injustice, the threat or reality of war, ignorance and prejudice to name but a few. But just about all of us are now aware that perhaps the most pressing challenge is the avoidance of a global catastrophe as a result of climate change. The naturalist, Sir David Attenborough, speaking at the opening ceremony of United Nations-sponsored climate talks in 2018 in Katowice in the heart of Poland's coal industry stressed that:

> 'Right now, we are facing a man-made disaster of global scale. The greatest threat in thousands of years: climate change. If we don't take action the collapse of our civilisations and the extinctions of much of the natural world is on the horizon.'

We are told that unless we make significant changes to our way of life within the next ten years then we will reach a tipping point when irreparable damage

will have been done. The planet will no doubt survive but life on it will be very different! Everyone will be involved. *But what has this to do with Paul Torrance?*

Paul was a visionary who realised very early on that, because of the accelerating rate of change, people need to be equipped with the capacity to solve problems that they cannot yet imagine. In other words, we need to be able to think creatively, confident in our own abilities and unafraid to be in 'a minority of one'. The fact that we tend to be unaware of what lies ahead was graphically illustrated by astronaut, Edgar Mitchell. Speaking at the Creative Education Foundation's President's Convocation in 1993, he argued that, because of the exponential way in which major global change is occurring, it is possible to be quite oblivious to what is happening to our planet until it is virtually too late to do anything about it. To illustrate this point, he employed the analogy of weed covering a pond (Mitchell 1993; Fryer 1996). He demonstrated that the weed problem does not become really obvious until the 28th day – *only two days before the pond becomes entirely smothered.* By the time we become aware of the problem, there is very little time to act and almost no margin for error. So to cope with the demands of the future, we need to be quick thinking, flexible and skilled in producing effective solutions to unfamiliar problems in unclear situations; in other words, we need to be creative.

Importantly, Paul Torrance realised that the way forward was to start with the children so that they would be ready both to cope with and to create a very different future. Indeed, his future problem solving program was designed with this in mind and since he started it, it has grown immensely. But this is just one of his many achievements in his mission to enable creative education to become mainstream; indeed, he devoted his life to creative education.

Torrance saw the goal of education as producing people who can make new scientific discoveries, find better solutions to urgent world problems, who are impervious to brain-washing, can adapt to change and remain sane at a time of accelerating change. To achieve this, he believed that the focus of education should be not so much on what children learn as on *what they can do with their learning.*

He argued that children need to be able to see clear links between school learning and their current and future lives outside school. This is something we really need to focus on more closely - certainly in the UK. It is a particular issue in high school education in the UK where many young people are switched off and bored with areas of learning they used to love in primary school. Torrance saw the school's role as enabling children to enlarge, enrich and make more accurate images of the future. He envisaged creativity as having relevance across the curriculum. He was particularly concerned to address all aspects of children's cognitive development, especially their capacity to think, and to have happier children - able not only to 'fulfil their potential, but to go beyond what is normally accepted' (Torrance & Safter,1999).

During his life, as well as authoring over 50 books and 1500 papers, he produced a range of psychological measures of which the best known are the Torrance Tests of Creative Thinking (TTCT). His work includes his famous longitudinal study of children who, forty years ago, were identified as highly creative, even though many of them did not feel particularly clever in a school environment which did not cater to their needs (Millar, 2002). Early on, Torrance recognised the need to provide mentoring support for highly creative children who tend to be 'too full of ideas'; he both set up and evaluated such schemes (Torrance, 1994). He also took a particular interest in disruptive and disaffected pupils, many of whom turned out to be highly creative and went on to undertake impressive careers (Torrance, 1994).

Very early on in my own research into creativity education in the UK, I realised that a great strength of Paul Torrance's work was the way in which he showed teachers how to incorporate the development of children's creativity seamlessly into everyday learning in the classroom (Torrance, 1962, 1965; Torrance and Myers, 1970). Whilst offering many suggestions and recommendations, he avoided being prescriptive. Instead he stressed that teachers needed to work out for themselves their preferred styles and methods of teaching, as opposed to attempting to copy other teachers they think are creative (Torrance and Myers, 1970). In this way, creative education becomes a natural, cumulative process like learning a language.

In 2002, I was asked by a UK government education department to evaluate creativity development programmes internationally and this highlighted for me the fact that Paul Torrance's approach was so much more comprehensive than most other creativity programmes and indeed cannot really be described as 'a programme'. The impact of Torrance's work on education has been enormous, especially in the United States. At one point he had to change his job because he could not cope with the demand. As well as the establishment of Torrance Centers (such as at the University of Georgia, Drexel University in Philadelphia and in Portugal) the Future Problem Solving Programme has spread throughout America and beyond (Fryer, 2003). Yet, despite Paul's undoubted success, there is still much work to be done internationally since education programmes in many countries (including my own to a large extent) still tend to deliver curricula which is too heavily focused on received wisdom from the past instead of adequate preparation for the future.

Torrance's Contribution to the Psychology of Creativity

During WW2 Torrance had investigated how people coped with extreme, often dangerous situations, and found that what played a key role in their survival was creativity. It was this interest which led him into a lifetime of creativity research (Millar, 1995). From this time, he has made many important contributions to the psychology of creativity. Here I would like to draw attention to just a few of them. Firstly, he was willing to recognise and investigate

the complex mix of variables involved in creativity. This has provided us with numerous insights into the needs of highly creative children and young people, the nature of creative education, the role of the teacher in this process and the value of mentoring (Torrance, 1984). Secondly he realised the value of an accessible body of knowledge as a springboard for creativity research; the Torrance Archive is just such a resource.

The many psychological tests and measures he has developed include ingenious devices for achieving insights into children's perceptions of their creative ability and their circumstances - via the medium of story-telling for example (Torrance, 1995). Although he is perhaps best known for creating the Torrance Tests of Creative Thinking, one of his greatest achievements as a psychologist has been his 40-year longitudinal study of a cohort he identified as highly creative. Collecting longitudinal data is notoriously difficult and this becomes increasingly difficult over time. To the best of my knowledge, there is no equivalent database.

Criticisms have been levelled at the Torrance Tests for not addressing every aspect of human behaviour involved in creativity. Torrance has answered these himself (see for instance Torrance, 1995). However, it is equally relevant to point out that a psychological test needs to be judged in terms of what it is intended to assess. It is important for non-psychologists to understand how psychological measures are constructed and that they are not just 'dreamt up'. Secondly, it is necessary to be aware that, even though a well-constructed scale may look deceptively simple or contain surprising items, this is normally because a great deal of groundwork has been done to ensure that it is valid and reliable and that it includes only those items which best fulfil its purpose.

It is also essential to be aware of what a psychological measure has been designed to do and what it cannot do. Yet, I have witnessed perfectly sound psychological measures of creativity being rejected in favour of more spurious means of assessment a) because the valid and reliable measures looked too simple or unusual or b) because they have been subjected to invalid criticism for not fulfilling roles for which they were not designed. This is the kind of unfair criticism with which Paul Torrance has had to contend - rather ironic in view of his rejection of simplistic explanations of creativity and formulaic creative education programmes, and the fact that he devoted his life to identifying and investigating the many different variables involved in creative education.

The value of psychological findings is in their implementation. In a communication to me not long before his death, Paul Torrance expressed his sadness that what he considered to be one of the most important and powerful findings had not been implemented. He wrote:

> … in most of my own studies, the high creativity/not-so-high IQ group achieved better than any other group. Thus, we should make

one of our missions that of getting research findings into practice. (Torrance, 2002).

My Early Interest in Paul's Work

I first got interested in Paul Torrance's research in the 1980s. As a psychologist I was very aware that UK education wasn't addressing all aspects of child development and what was being neglected was young people's capacity to be creative. I wanted to do something about that. At that time, the political climate in the United Kingdom was not at all favourable to creativity. I have learned over the years that right leaning governments show little interest in creativity education, whilst left leaning ones tend to champion it.

Because of my awareness that teachers have a profound influence on education, I wanted to find out what British teachers thought about creativity and how this impacted on their preferred ways of teaching. Paul Torrance's work was amongst the first I encountered. As far as his work is concerned, I began with Guiding Creative Talent (Torrance, 1962) and Rewarding Creative Behavior (Torrance, 1965) before progressing to an extensive and in-depth literature search into creativity and its development. This early work of his was a great inspiration for me as a new researcher in this field. Even though my own experience of teaching and learning had made me acutely aware of the need for creative education, it was Paul Torrance's work which showed me how this need could be met. His deep understanding of human behaviour and his concern for the creative development of young people were equally evident in his work.

So, in 1985 I began an investigation of the views of UK teachers of 5-18 year olds on creativity, teaching and learning. As a researcher, I felt as if I was swimming against the tide of UK education policy. Nevertheless, I began to explore the attitudes and beliefs of UK teachers by means of a qualitative and quantitative investigation. The teachers in my sample (N=1028) worked in a wide variety of schools – large and small, old and new, urban and rural. They included teachers working with pupils of all ages and who taught every imaginable subject. It was Paul Torrance who was the catalyst for my choosing a sample of over a thousand teachers. In effect he was my 'competence model' (Bruner, 1966). I was aware that Torrance's 1965 survey of teachers' attitudes to pupils' creative behaviour (by means of his popular Ideal Pupil Checklist) involved a thousand teachers. This spurred me on to attempt an investigation of the same magnitude - which is not a very scientific reason for sample selection! Fortunately, my sample was large and broad -based, and it did satisfy the necessary criteria. It was only when I'd finished collecting this enormous amount of data, that I realised he'd had help with his data collection!

As well as including the Ideal Pupil Checklist (IPC) in the main survey questionnaire (to find out how keen the UK teachers were to support pupils' creative behaviour) I also included the Torrance Personality Checklist

(included in the same manual, Torrance 1975, and whose items are virtually identical to those in the IPC) because I was interested in comparing how the UK teachers saw themselves with the characteristics they wanted to encourage/discourage in their pupils. As far as I am aware, this kind of comparison had never been done before. The teachers who took part in the survey suggested yet another way in which the Torrance Personality Checklist could be used, which was for their colleagues to complete it on their behalf – so that they could see how their self-perceptions matched the way in which they were perceived by their colleagues.

The findings of my investigation into UK teachers' views on creativity, teaching and learning (including the IPC results) have been reported elsewhere (Fryer, 1989; Fryer & Collings, 1991a; Fryer & Collings, 1991b; Fryer, 1996), so here I only intend to highlight some of the more surprising ones. Perhaps the most unexpected one was that male and female teachers had quite different perceptions of creativity. Differences in the way in which those teaching different subjects envisaged creativity were also revealed (for the first time as far as I am aware) and these remained evident when the findings were controlled for the sex of the teachers. Furthermore, how the teachers perceived creativity appeared to be linked to their preferred way of teaching, something which did not appear to have been reported previously, for example, those who saw creativity in very personal terms were more willing to take pupils' learning needs into account and to see themselves as facilitators of the learning process. Those who saw creativity more impersonally tended to see the teacher as an expert imparting knowledge. These patterns were evident throughout the data and seemed to be linked to an underlying value system linked to person orientation – something which was confirmed by a later study (Fryer, 1996). These statistically significant group findings suggest that we cannot assume that everyone involved in discussing, developing or assessing creativity shares a common understanding of what is involved. In addition, the evidence strongly suggests that views about creativity and preferred ways of teaching co-vary. Paul acted as the catalyst for me to undertake this study – if his early writings had not fired my imagination, I would never have entered this field nor would I have uncovered these intergroup differences in teachers' views.

Typical of Paul, not only did he give me permission to include his measures in my research but he also sent me copies of them. This first communication with him was the beginning of a correspondence between us which lasted for the rest of his life and which I really valued. During this time, he continued to regularly send me copies of his publications both for me and my students and asked for mine for his library. I still have his letters which I treasure. I understand from Garnet Millar that creating and maintaining an international network of creativity researchers was really important to Paul – and rightly so. At our Creativity Centre in the UK we do our best to help continue this through our international e-journal, Creativity & Human Development (www.creativityjournal.net).

Finally Meeting Paul Torrance in Athens

In 2001 I received an invitation from Paul to go to Athens to the Torrance Lecture Series and 'just talk to a few people'. For some reason I'd envisaged simply meeting others at the Lecture Series as opposed to being one of the speakers – that only dawned on me during the event!

It was such a pleasure to meet Paul during my stay in Athens. The day before the Torrance Lectures, he invited me and Garnet Millar to his home to talk with him. It was very special to finally meet this great yet unassuming and humble man as he sat with his cat on his lap and talked with us. Although I had already built up quite an accurate picture of Paul, when I actually met him, I was struck by his humility and gentleness, his indifference to any physical afflictions or illness and his quiet determination to carry on with all he wanted to do. Equally striking was his tolerance of the situations in which he found himself, and his generosity to others.

During my stay in Athens, I was heartened to hear that Paul had been a rather gauche young man (something with which I can identify as a left-handed person with few spatial skills trying to cope with a largely right-handed world). He could not, for example, plough a straight furrow, so his father, a farmer, had told him to get a different job – he became a teacher – something for which we should always be thankful!

I also remember odd things like visiting his favourite café and noting that the Lecture Series' lunch included Celestial Chicken – a favourite of Paul's as I recall. I was also able to visit the Torrance Center at the University of Georgia and meet the staff there. However, I was surprised to find that not everyone I met at the university was aware of his work or the great contribution he has made. There is a saying that 'you cannot be a prophet in your own land' which seemed to ring true but hopefully his contribution is now properly recognised across the university.

Whilst I was in Athens, Paul invited me and Garnet to go with him to the Georgia Military College at Milledgeville where he was to receive the Alumni Achievement Award and make a keynote address. Whilst we were there, we toured the college and I took photos of him at the lectern where he used to teach, before going to the marquee for lunch and the presentation to him. Typically, when presented with a gift by the General, Paul had one for him in return.

During this trip Paul said he predicted that the arts would become increasingly important in people's lives in the 21st century which is certainly increasingly the case here in the UK. However, in the UK as creativity researchers and facilitators we have always struggled to challenge the national mindset which is that creativity is synonymous with 'the arts'.

Back Home in the UK

After 15 years of undertaking research and teaching into creativity and human development at my university I decided to resign my post as Reader in Psychology to set up an independent centre, The Creativity Centre, with my eldest daughter Caroline. The transition was gradual, as I continued to do some university teaching, PhD supervision and research. We wanted to create a Centre where people working in schools, businesses and the community could develop a good understanding of creativity and also learn more about developing their own and others' creative abilities. We wanted to provide a resource which, if you like, attempts to tell the whole story – providing a comprehensive map of what's involved in creativity and showing where the various research contributions and formal creativity development programmes fit.

This Centre includes a registered charity, The Creativity Centre Educational Trust, which runs our international e-journal as well as various community projects. Paul Torrance was the first honorary member of this charity. So his influence has spanned all of my career right up to the present day.

Concluding Remarks

Whilst writing this chapter I've been thinking about when a legacy, such as Paul Torrance's, can be regarded as having ended and I've come to the conclusion that there isn't in fact—an end. Instead I'm convinced that what he started will go on having an influence for years to come. Whilst there is much work to be done to ensure that education systems properly address young people's need to develop their own creativity, I believe that Paul Torrance has provided a firm foundation on which we can build. This is important both for individual well-being and also to ensure that young people have the skills to tackle the very challenging problems we all face internationally, not least climate change. If you are reading this, then I assume that you are either actively working in the field of creativity or have an interest in this field. I think, therefore, that it's up to us all to do what we can to ensure that educational provision does in fact address creativity development so that what Paul Torrance and other pioneers began will truly have a positive effect on all our futures.

References

Attenborough, D. F., (2018). www.bbc.co.uk/news/science-environment-46398057 accessed 10 June 2019.

Bruner, J. S. (1966). The will to learn. In J. M. Whitehead [Ed.] (1975) *Personality and Learning. Vol. 1.* London: Hodder & Stoughton & Open University.

Fryer, M. (2006). Making a difference: a tribute to Paul Torrance from the United Kingdom. *Creativity Research Journal*. Vol. 18. No. 6. Pp. 121 – 128.

Fryer, M. (2003). Creativity across the Curriculum: A Review and Analysis of Programmes Designed to Develop Creativity. www.ncaction.org.uk/creativity/resources.htm London: Qualifications & Curriculum Authority.

Fryer, M. (1989). Teachers Views on Creativity. PhD thesis, Leeds Metropolitan University.

Fryer, M. (1996). *Creative Teaching and Learning*. London: Sage/Paul Chapman Publishing.

Fryer, M. and Collings, J. A. (1991a). Teachers' views about creativity. *British Journal of Educational Psychology*, 61, 207-19.

Fryer, M. and Collings, J. A. (1991b). British teachers' views of creativity. *The Journal of Creative Behavior*, 25, 1, 75-81.

Millar, G. W. (2002). *The Torrance Kids at Mid-life*. Westport, CT: Ablex.

Millar, G. W. (1995). E *Paul Torrance: The Creativity Man.* New Jersey: Ablex.

Mitchell, E. (1993) Keynote Presentation to the President's Convocation. Buffalo, N. Y. Creative Education Foundation.

Torrance, E. P. (2002). Personal communication.

Torrance, E. P. (1995). *Why Fly?* New Jersey: Ablex.

Torrance, E. P. (1994). *Creativity: Just Wanting to Know*. Pretoria, South Africa: Benedic Books.

Torrance, E. P. (1984). *Mentor Relationships: How They Aid Creative Achievement, Endure, Change, and Die.* Buffalo, NY: Bearly.

Torrance, E. P. (1975). *Preliminary Manual Ideal Child Checklist*. Georgia Studies of Creative Behavior.

Torrance, E. P. (1965). *Rewarding Creative Behavior*. Englewood Cliffs, New Jersey: Prentice-Hall.

Torrance, E. P. (1962). *Guiding Creative Talent*. Englewood Cliffs, New Jersey: Prentice-Hall.

Torrance, E. P. and Myers, R. E. (1970). *Creative Learning and Teaching*. New York: Harper & Row.

Torrance, E. P. and Safter, H. T. (1999). *Making the Creative Leap Beyond…* Buffalo, NY: The Creative Education Foundation Press.

CHAPTER FIVE

TOWARD A THEORY OF SPIRITUAL INTELLIGENCE: DEVELOPING HIGHER CONSCIOUSNESS

DOROTHY A. SISK

ABSTRACT A Chinese proverb says, "When the pupil is ready, the teacher will come." People everywhere are becoming more and more aware of the need to nurture and develop the untapped potential of the mind and consciousness. The emphasis on materialism and individualism in Western culture has resulted in an empty space in the lives of many people and there is a growing need for spirituality (Sisk, 2005). This chapter explores the journey E. Paul Torrance and I traveled to build a theory of spiritual intelligence. Our first step was to build a foundation for the concept of spiritual intelligence by examining Psychology, Science, Ancient Wisdom and Eastern mysticism, and the Wisdom of Native American and Indigenous People. This chapter will highlight the foundation, and include spiritual intelligence pathfinders, and the likely traits of spiritual intelligence with ways of meeting the needs of students with spiritual intelligence.

Keywords: spirituality, spiritual intelligence, mindfulness, potential, gifted, higher consciousness

Exploring Spiritual Intelligence (SQ)

When Paul and I shared our proposed exploration to develop a theory of spiritual intelligence with our colleagues, their responses were varied; many quickly reminded us that there has always been a definite division between education and religion, and they said, "Don't go there." To these colleagues, we reassured them that our proposed exploration of developing a theory of spiritual intelligence did not include examining the concept through the lens of religion. One very positive response came from Abe Tannenbaum from Teachers College at Columbia University who exclaimed when we shared our intention to embark on a spiritual intelligence quest, "That is the book I have always wanted to write" and he repeated that response at a conference of the Texas Association for the Gifted with over a thousand educators. Still another positive comment came from our colleague Stanley Krippner with whom Paul and I participated in numerous Creative Problem-Solving Institutes in Buffalo, N.Y. Krippner said the time has come for this type of exploration,

and we asked him to write a foreword to our book on spiritual intelligence when it was completed.

The individual who has been most negative and vocal about the existence of a concept of spiritual intelligence is Howard Gardner, and I asked Paul how do we report his views, and Paul wisely said, "Use his own words and his views will be transparent." Interestingly enough, Gardner's (1983) introduction of multiple intelligences did provide an important acknowledgment that other intelligences might exist. He originally identified seven intelligences: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and later added naturalist, suggesting that each intelligence functions separately as an independent system, and could be qualified as an intelligence if it met the following criteria:

1) An identifiable and consistent set of operations
2) An evolutionary advantage of potential
3) A characteristic pattern of development
4) Potential isolation by brain damage
5) Case studies of exceptional humans with or without the intelligence system
6) Potential to encode in a symbol system
7) Support from experimental psychological experiments
8) Support from psychometric findings (Gardner, 1983, 62-65)

Gardner (2000) stated there was insufficient evidence to support a concept of Spiritual Intelligence (SQ). Gardner (2003) described the criteria for separate intelligences as judgmental and not fixed, and he viewed the concept of intelligence from a reductionist lens; whereas, other researchers such as Emmons (2000) viewed intelligence from a holistic lens. Emmons (2000) maintained that SQ facilitates an individual taking action in the world using skills to solve problems in a spiritually adaptive way. Zohar and Marshall (2000) agreed with Emmons and described SQ as the capacity to solve problems through value, vision and meaning. Wilber (2000) described SQ as "literacy in the practice of transformation" and he further pointed out that SQ is fast becoming a leadership imperative (p. 95). Vaughn (2002) extended the definition of SQ as a "capacity for a deep understanding of existential questions and insight into multiple levels of consciousness" (p. 10).

Gardner (1999) used two classical senses of knowing: *knowing how* and *knowing that* to decide if there was a SQ. He identified skills manifested in SQ as meditating, achieving trance states, envisioning the transcendent, or being in touch with psychic, spiritual or noetic phenomena, which Paul and I agreed were characteristics of SQ. Gardner considered the term moral intelligence rather than SQ; yet, he said, "I do not find the term moral intelligence acceptable as long as it connotes the adoption of a specific moral code" (Gardner, 1999, p. 75) Later he wrote an article titled "The case against spiritual intelligence" (Gardner, 2000).

When Gardner examined the content of SQ, and *content* represents one criteria he used to identify an intelligence, he described the content of SQ as a concern for the cosmos, the mystery of our own existence, addressing the ultimate questions, mysteries and meaning of life, such as Who are we? Gardner's concern with this content was that it was problematic and controversial. He said, "Having read numerous accounts of the spiritual realm, I am tempted to conclude that it refers to everything, mind, body, self, nature, and the supernatural—and sometimes even to nothing!" He called this a *conceptual sprawl* contrasting sharply with the domains of Science and Math, which are relatively delimited and uncontroversial (Gardner, 1999, p. 53), Gardner referred to believers or spokespersons for spirituality claiming that spiritual concerns lead to an encounter with a deeper or higher truth as a *slippery slope* (Gardner, 1999, p.56).

Gardner considered existential intelligence and concluded, "Despite the attractiveness of a ninth intelligence, I am not adding existential intelligence to the list, I find the phenomena perplexing enough and the distance from the other intelligences vast enough to dictate prudence—at least for now." (Gardner,1999, p. 66). Paul's suggestion of using Gardner's own words to ensure that his ideas would be put forward for discussion proved to be a fine example of Paul's quiet and thorough insightfulness.

Building a Foundation for Spiritual Intelligence (SQ)

After numerous conversations and debates with colleagues on the existence of spiritual intelligence, Paul Torrance and I decided to embark on an intellectual quest or journey to establish and build a foundation for SQ. We set about to identify SQ components including: Core Capacities, Core Values, and Core Experiences that represent components Gardner considered for his intelligences. To establish a foundation for SQ, we explored the fields of Psychology, Science, Ancient Wisdom and Eastern Mysticism, and Wisdom of Native American and indigenous people. The first field we examined was that of Psychology.

Foundation of Psychology

When Paul and I considered which psychologists had made a contribution toward a concept of spiritual intelligence, Carl Gustav Jung immediately came to mind. In his book *Memories, Dreams and Reflections* (Jung, 1963), he recalled reading a book on spiritual phenomenon and reflecting on the tales his mother had read to him as a child. He noted the similarity of the various tales and myths from throughout the world and noted many connections in them. Myths to Jung represented that which is believed always, everywhere, by everybody; and he was quoted as saying that anyone who thinks he can live without myth or outside it, is an exception. Jung said living without myth is like being uprooted, having no true link either with the past, or with

the ancestral life which continues within you, or with contemporary human society (Campbell, 1971).

Four Functions of Consciousness

Jung (1963) formulated four functions of consciousness including: *Thinking* as a guide to judgment; *Feeling; Sensing* in which you experience both the world and individuals through impressions made directly on the senses; and *Intuiting* of potentialities, hidden relationships, intentions and possible sources. Jung said *Sensing* and *Intuition* represent the two functions by which facts and the fact world are apprehended; whereas, *Feeling and Thinking* are involved in judging and evaluation. Jung said that only one of the four functions take the lead in a person's life and this primary function is seconded by only one function from the other dyad. Jung identified *Sensing* supported by *Thinking* as characteristic of the Western World and that *Feeling* and *Intuiting* are often disregarded, under-developed or even repressed (Jung, 1963).

Synchronicity

Paul and I agreed that Jung's theory of synchronicity was most relevant to a concept of spiritual intelligence. Synchronicity takes place when your inner psychic condition and an external event come together in a way that is perceived as having a meaningful coincidence. Jung said these meaningful coincidences demonstrate a previously unrecognized dimension of human experience, and one can become more sensitive to the occurrence of coincidences and use them in daily life.

Albert Einstein was a frequent visitor with Jung and they held long discussions. Paul and I openly admitted we would have liked to be involved in those discussions. Einstein's theory of relativity became the motivation for Jung's thinking about a wider relevance for his theory of synchronicity as an equivalent of the relativity theory with the added dimension of the psyche (Jung, 1959).

Jung sought to resolve the question of how the physical and psychical are connected. He surmised that when the psychic and physical are no longer differentiated from one another, a continuum can be established in which synchronistic events can come to pass. Jung said the physical world has given its order and patterning by means of mathematics, while the comparable structure of the work of the psyche is brought about by the archetypes (Jung, 1969, p.231).

Dabrowski's Theory of Disintegration

Another psychologist who has a great deal to contribute to a concept of spiritual intelligence is Kazimierz Dabrowski (1967). His theory of disintegra-

tion is divided into two parts, the Overexcitabilities and the five Levels of Development. Dabrowski identified five Overexcitabilities (Oes) including: psychomotor, sensual, imaginational, intellectual and emotional. Overexcitability translated from Polish is *superstimulatability* that enables one to have an unusual capacity to care, an insatiable love of learning, a vivid imagination and endless energy. The capacity to care, endless energy and imagination to view the world as it ought to be rather than how it is representing an important contribution to the concept of spiritual intelligence as *moral* and involving problem solving.

The five levels of development include primary integration, unilevel disintegration, spontaneous multilevel disintegration, organized multilevel disintegration, and secondary integration. Dabrowski (1967) described people at level I as lacking empathy and self-examination and when things go amiss, they blame others. They can also be ruthless in their desire for power. Level II people follow the crowd with no clear set of self-determined values. Level III individuals have set goals and feel depressed in that they are not reaching those goals. They feel anxious and depressed and feel inferior to others. Level IV individuals are well on the way to self-actualization, and they have figured out how to achieve their goals. They make good leaders and are responsible, reflective and authentic. They are also autonomous in thought and action. Level IV is similar to Maslow's theory of self-actualization. Level V represents the attainment of one's goals and the individual resonate to the universal values and has a high degree of empathy and searches for harmony. Level V individuals have resolved their inner conflicts and operate with spiritual concerns, and live in service to others, according to the universal principles of love and compassion.

Phenomenological and Humanistic Psychologists

Two more psychologists that Paul and I examined were Carl Rogers and Abraham Maslow, and their theories provide considerable insight toward a concept of spiritual intelligence. Phenomenological theorists are concerned with the *now* of experience and focus on the present situation and its meanings. Maslow (1971) developed a model of motivation and behavior that incorporated his concept of self-actualization. He called lower needs deficit (D) values and higher needs (B) values of being. Among the (B) values are wholeness, perfection, justice, beauty, uniqueness, creativity and truth. The (B) values represent important aspects of spiritual behavior. Maslow said if we want to know the possibilities for spiritual growth or moral development, we need to study our most moral, ethical or saintly people (Maslow, 197l, p. 7). B values are associated with spontaneity and peak experiences which are similar to the spiritual experience of being one with the subject. The subject and observer are one. Maslow described peak experiences as moving toward perfect values, and he studied individuals who he thought demonstrated these

values in their lives and he called them self-actualized. In his book *The farther reaches of human nature* he discussed spiritual growth:

> If we want to know the possibilities of spiritual growth or moral development in human beings, then I maintain that we can learn most by studying our most moral, ethical and saintly people (Maslow, 1971, p. 7)

Rogers (1980) said people have an internal biological driving force to develop their capacities and talents to the fullest which he called an actualizing tendency. He developed a list of twelve qualities in his list of the *Person of Tomorrow* which is depicted in Table 1. These twelve qualities overlap with many of the characteristics that we proposed as SQ characteristics (Sisk & Torrance, 2001). For example – 1) Openness to new experience and ways of seeing and being, moving away from the sensual mode to the intuitive mode of being; 3) living in harmony with nature; 4) The desire for wholeness of life, recognizing the unity of the mind, body and spirit; 5) The wish for community and intimacy; 6) Awareness that life is constantly in flow and change; 7) Eagerness to help and serve, the nonjudgmental nature; 8) Symbiotic attitude with nature and alliance with nature: and 12) The yearning for the spiritual and wish to find meaning and purpose in life that is greater than the individual.

Table 1: Qualities of the Person of Tomorrow

QUALITIES OF THE PERSON OF TOMORROW
1. Openness (open to new experience and ways of seeing and being).
2. Desire for authenticity (value of open communication)
3. Skepticism regarding science and technology (distrust of science used to conquer nature and people; sees science used to enhance self-awareness)
4. Desire for wholeness of life, body, mind and spirit
5. Wish for intimacy, new forms of communication and closeness
6. Process person (aware that life is change, welcomes risk-taking and the change process)
7. Caring (eager to help, nonjudgmental, caring)
8. Symbiotic attitude toward nature (ecologically minded, feels alliance with nature)
9. Anti-institutional (antipathy for highly structured, bureaucratic institutions)
10. Authority within (trusts own experiences and moral judgments)
11. Unimportance of material things (money and material status symbols are not the main goal)
12. Yearning for the spiritual (wish to find meaning and purpose in life that is greater than the individual) Rogers (1980, p. 350-351)

From this brief examination of theorists in psychology, we built a Foundation of Psychology in which several ideas were identified that strengthened a concept of spiritual intelligence. People who manifest SQ are open to a multisensory way of knowing proposed by Jung in which the psychic and physical are no longer separate and differentiated, but they are united and continuous. Individuals who manifest SQ are self-actualized individuals as described by Maslow, and by Rogers in the *Person of Tomorrow.* Dabrowski's Level V in which individuals live a life in service to humanity and according to the highest universal principles of love, compassion, and worth of others represent core behaviors of spiritual intelligence, as well as *Super-stimulatability,* the capacity to care and insatiable love.

Paul and I developed a working strategy that provided opportunity for reflection and refinement of ideas. We met in Athens, Georgia, Paul's home town and read the chapters aloud to one another. It was not uncommon for Paul to jump up and go to his vast home library to find just the right source or quote. This interaction was invigorating and truly allowed the theory to be in the process of becoming, using Carl Rogers' language. We were not surprised at the rich content we found in exploring psychology to build a foundation for SQ, but we were truly amazed at how relevant the field of science was in strengthening that foundation.

Foundation of Science

I had the pleasure of attending a workshop with neuroscientist Candace Pert and shared her statement of science being at its core a spiritual endeavor with Paul. . Pert said the body and the mind are actually part of a linked system called the *body mind*. She described the role of neuropeptides as being responsible for our emotions; not only the emotions of anger, fear, sadness, joy, contentment and courage, but also responsible for spiritual inspiration, awe, bliss and other states of consciousness. (Pert, 1997). Pert stressed that some of her best insights came through what she called a mystical process. She said as scientists, we must come to trust our inner voice and speak our truth. She concluded there is a higher intelligence that comes to us via our very molecules. It results from our participation in a system far greater than the world we receive from our five senses alone." (Goldman, 1998, pp. 21-25 and pp. 49-55.)

Physics and our Picture of the Universe

Niels Bohr (1999), a Danish physicist and pioneer of quantum theory introduced the concept of complementarity into quantum physics. He found that wave models and particle models of light are complementary rather than contradictory, in that each represents certain observable aspects of the mystery of light. A thought experiment devised by three physicists and referred to as the "Einstein-Podolsky-Rosen paradox" verified the ideas of Niels Bohr in the

lab that is if two particles have been intimately associated and are then separated in space, they are connected, nonetheless. If one is perturbed in a certain way, the other one is affected instantaneously.

Fritoj Capra (1991) said, “In physics, the image of the universe as a machine has been replaced by that of an interconnected, dynamic whole whose parts are essentially interdependent and have to be understood as patterns of a cosmic process" (p. 30). In addition, Capra stressed Werner Heisenberg’s introduction of the importance of the scientists as an observer. He said that we can never speak about nature without, at the same time, speaking about ourselves, and that different observers may do so in different ways. The movement, flow and change of the world will reflect the observations. He said if the perception is ordinary, then the reality will be ordinary, and conversely if the perception is non-ordinary then the reality is non-ordinary.

Paul and I had many long conversations on the need for people to see themselves embedded in a reality where mind, body, planet Earth and the cosmos are all expressions of the same consciousness. This notion is shared by Ervin Laszlo (2017) in his book *The Intelligence of the Cosmos* and these thoughts led us to the work of Greg Braden and his concept that changes in the Earth affect our body.

Geology

Greg Braden (1997) a geologist and computer systems designer has been researching geophysical cycles, and he said evidence is accumulating from diverse sources that the Earth‘s body affects our bodies. The recently discovered magnetite, a specialized brain cell found in the brains of mammals, including humans and birds, allows us to tune in and respond to the Earth’s magnetic field. In *Awakening to Zero* Point, Braden (1997) described the Earth’s background base frequency as a pulse or heartbeat, and he suggested that Earth’s vibration rate affects our own heartbeat.

Braden said that the Earth’s magnetic field strength is declining and has lost up to half of its intensity in the last 4,000 years. He talks about Chaco canyon in New Mexico, and Paul and I both visited the Anasazi Native American kivas that were built to elicit altered states of consciousness. The kiva represents a resonant cavity or hollow space, with dimensions having a naturally occurring frequency that sets up a resonance or harmonic feedback loop and tunes with the frequency of the human brain. According to Braden, all life within the Earth’s vibratory influence is attempting to match the frequencies with the Earth, and the net result of this process is that each cell of our body is seeking to match the rhythmic heart beat or reference frequency of the Earth. The ancient traditions used meditation to bypass the logical mind before entering the kiva to consciously experience these vibrations.

Consciousness in the Brain

Rodolfo Llinas (1987) and colleagues at the New York University School of Medicine conducted research on consciousness in the brain, and their research indicated that 40Hz oscillations are present in the brain during fully waking alertness and in dream and in REM (rapid eye movement). They concluded that consciousness or mind is a state of the brain that is intrinsic, rather than merely the result of sensory experience. Zohar and Marshall (2000) added that across the brain oscillatory activity makes possible both the temporal bindings and the content of cognitive experience, or in other words the functioning of the conscious mind, and the brain appears to be designed to be conscious and to have a transcendent dimension.

Zohar and Marshall (2000b) said the brain synthesizes individual perceptual and cognitive events into a larger more meaningful whole, and that the brain is capable of unitive thinking, which is creative, insightful and intuitive. They stressed that language is learned with serial and associate thinking, but language was invented with *unitive* thinking.

Transcranial Magnetic Stimulation

Canadian neuropsychologist Michael Persinger (1996) in one of his experiments placed a transcranial magnetic stimulator on his own head, and this device beams a powerful and rapidly fluctuating magnetic field to selected parts of the brain. He stimulated his temporal lobes and reported experiencing a profound religious experience or presence. Persinger said he experienced God for the first time in his life. This profound experience resulted in him leaving his university. Paul and I reflected on this result and recalled Stephen Hawking candidly stating that in his research in which he was exploring why it is that we and the universe exist, Hawkins said, "If we find the answer to that, it would be the ultimate triumph of human reason, for then we would know the mind of God." (Hawkins, 1988, p. 56)

Another researcher in brain and cognitive research is Ramachandran at the University of California San Diego Center for Brain and Cognitive Research. Ramachandran and his associates are working to discover how and why religious sentiments originate in the brain. Ramachandran has received numerous awards including the Ariens-Kappers medal from the Netherlands, and he was named by *Newsweek* as one of the most important people to watch in the 21st century. He hypothesized that there is a permanent facilitation of connectedness between the temporal lobe and the amygdala which causes one to see deep cosmic significance in everything (Ramachandran and Blakeslee, 1998).

In his book *Tales of the 'Tell-Tale Brain'* (2011) Ramachandran explored the mysterious connection between brain, mind, and body. I was able to visit the Center, and his graduate student researchers summarized a recent study of epileptics with religious experiences as a result of seizures,

and they concluded that seizure activity may have produced selective changes in connectivity between the temporal lobe and the limbic system that altered the emotional landscape. Ramachandran describes his lab behavior as navigating gaps with intuitive hunches which is similar to many Nobel prize scientists who say they use their intuition to hypothesize and then spend years using logical scientific processes to substantiate their intuition (Nobility, Monterrey Media).

Limbic Provides Affectional Intelligence

Elaine de Beauport (1996) has conducted numerous brain institutes in Caracas and New York City, and she has spent over 36 years studying the way we think and applying the findings of brain research. She calls the limbic or paleomammalian brain a provider of mood intelligence or ways to manage rage, fear and anxiety. The limbic also provides affectional intelligence, the ability to feel love, and motivational intelligence, inspiration and help in decision making of important lifestyle choices.

Beauport said:

> I think we can teach people how to remove the weight of worry and desperation and to find happiness in the moment. We can reach out for joy, no matter how awful our circumstances. The Brain is either a crown of thorns or an enchanted loom, depending on how you use it You decide which one it's going to be, you choose what lens you want to use to look at life. (p. 47).

Unitive Thinking

Zohar and Marshall (2000a) identified unitive thinking as the neurological basis that allows us to do creative, insightful, rule-making, rule breaking thinking and allows us to have the ability to reframe and transform our thinking. They say this process gives us our spiritual intelligence.

Measuring the Brain

Over the past several decades, neuroscientists have developed tools for looking at the activity levels in the brain. These tools include functional imaging which usually uses magnetic resonance imaging (MRI), positron emission tomography (PET), or single-photon emission computed tomography (SPECT) and all involve ways of studying the spiritual brain.

Brain Research

Richard Davidson, the director of the Center for Investigating Healthy Minds reported that practicing meditation and mindfulness increased blood flow to the brain and created a thickening of the cerebral cortex in areas associated

with attention and emotional integration (Davidson, Kabat-Zinn, Schumacher, Rosenknrantz, Muller & Santorelli, 2003). Zeidan, Johnson, Diamond, David & Goolkasian (2010) found that meditation and mindfulness practices positively transformed the architecture and operation of the brain, and improved sustained attention, visual-spatial memory, working memory, and concentration. In addition, research on the use of mindfulness practices showed a reduction in gray matter density in the amygdala, and a decrease in stress and anxiety (Holzel, Carmody, Vangel, Congleton, Yerramsetti, Gard & Lasar, 2011).

Paul and I became fascinated with mindfulness as a component of spiritual intelligence and we outlined a series of areas that needed to be explored to fully understand mindfulness. This outline became the 2018 book *Planting Seeds of Mindfulness* with co-authors Dorothy Sisk and Michelle Kane with a dedication of the book to Paul.

From an examination of scientists in physics (Capra, 1991; Bohr, 1999), there emerged a concept of a conscious universe in which we interact as part of a continuous connected process of unity. Braden (1997) suggested that the Earth has a heartbeat and mammals including humans, and some birds try to match the rhythmic vibration to their heart beat, which is another example of connectedness. The brain research of Michael Persinger (1996) Rodolfo Llinas and Ribary Urst (1993), and Vilayanur Ramachandran (2011) proposed the notion that there may be an intrinsic area of the brain, the temporal lobe that can be considered as a brain state of spiritual intelligence. All of these scientists were engaged in asking the important questions of why nature is the way it is, and where the cosmos comes from, and that there may be a planetary consciousness. Their work represents the classical role of science, the *search for truth* and their research helped us to build a scientific foundation for spiritual intelligence.

Exploring Ancient Wisdom and Eastern Mysticism and the Wisdom and traditions of Native American and Indigenous People

One of the first areas of ancient wisdom that Paul and I explored was the *Hermetica* and its profound effect on thought over the ages.

Hermetica

The *Hermetica* is a collection of writings attributed to Thoth. In the introduction of *The Hermetica: The Lost Wisdom of the Pharaohs,* Freke & Gandy (1999) said Thoth revealed knowledge of astronomy, architecture, geometry, medicine and religion to the Egyptians, and that the ancient Greeks thought Thoth was the architect of the pyramids. The Greeks gave Thoth the name of Hermes and the collection of books attributed to Hermes became known as the *Hermetica*. One central idea of the *Hermetica* is the importance of meditation and contemplation. Hermes taught that an enlightened being belongs to

Nature and feels *unity* with everything. He said we must accept the inevitable transitory nature of all physical things and everything is in a process of being born and then dying. This common notion of the idea of *change* is reflected in many Eastern mystical traditions.

The Hermetica were collated in the city of Alexandria, Egypt during the second or third century. With the rise of the Roman Empire, the Alexandrian library was destroyed, and its wealth of knowledge was lost or dispersed along with the scholars. As the scholars fled Alexandria, many of them relocated in the newly emerging Arab nations, taking with them the Hermetic texts. Two hundred years later, the Muslims created an empire with considerable learning and scientific achievement, including the University of Baghdad known as the *House of Wisdom.* As the Arab empire became more intolerant, the scholars and the Hermetica books were taken to the city-state of Florence. In Florence they came to the attention of Cosimo de Medici who had established a new Platonic Academy. There a group of scholars were inspired by the Hermetica.

Paul and I sat on his porch in Athens and read the various books aloud to one another, with Princess his beautiful white cat curled up in Paul's lap. One of
our favourites was Book XIX in which the importance of mediation and contemplation was stressed. Both Paul and I are believers and practioners of meditation and contemplation and we were amazed at how timely this writing from the *Hermetica* was to the needs of today's world.

Freke & Gandy (1999) translated the following:

> Only if you contemplate
> All that I have said
> Will you know it to be true?
> If you do not --
> You will not believe me,
> For belief grows from contemplation,
> and disbelief from lack of thought,
> Speech alone cannot convey the Truth,
> But the power of mind is extraordinary,
> and when it has been led by speech
> To think things through thoroughly,
> It can find the peace of true beliefs,
> Only if grasped by thought, in this way
> will my teachings be understood? (p. 145)

Another central idea in the Hermetic teaching was the idea of expanding one's consciousness by embracing all opposites, ceasing to be enslaved by the body and the importance of developing inner vision. Hermes taught that we must accept the inevitable transitory nature of all physical things, and

that everything is in a process of being born and then dying. The mystical philosophy of the Hermetic texts added considerable information toward core behaviors of SQ and a foundation for the concept of spiritual intelligence.

Essenes

Another ancient brotherhood was the Essenes who chose to separate themselves from the masses of their time to live in harmony with nature and to preserve the purity of their traditions. *The Essene Gospel of Peace*, Book four was edited and translated by Edmond Bordeaux Szekeley from a third century Aramaic manuscript and old Slavic texts. They said emotion was located in the body and the feeling that creates the greatest energy is *love*. They practiced communions with the first one practiced in the morning in which a positive thought would be held in the mind all day and open the mind to harmonious energy. Evening *communions* were performed before sleep to influence the subconscious mind and put the subconscious into contact with the storehouse of information. Problems could be solved during sleep. Szekeley (1937) said the Essenes had a profound knowledge of the body and the mind and knew the two could not be separated which is similar to Pert's ideas discussed in the section on science. They believed that thought is under individual control, that we can think about what we wish and control our feelings by thought.

Another mystical group that emphasizes the power of love is the mystical core of Islam dating back to the ninth century AD., approximately 200 years after the birth of Islam.

The Sufi tradition

Frager (1999) in *Heart, Self and Soul* said there are three central concepts in the Sufi tradition, the heart, the self, and the soul. Heart refers to the spiritual heart and according to Sufi tradition, the heart contains our deep intelligence and wisdom. It is the place of spiritual knowledge. The Sufi ideal is to develop a compassionate heart and will. Love is another basic Sufi spiritual discipline and
the heart is the home of love. Sufism is a spiritual path that leads from wherever you are to a union with the infinite. There are at least five paths, including the heart, head, community, service and remembrance. Sufis keep a daily journal to practice self-observation and self-awareness.

As Paul and I studied and discussed the *Hermetica*, the Essene traditions and Sufi traditions, I shared that I had two graduate students who were from India who practiced Hinduism, and they were keen on making sure we examined the *Vedas*. One of the students' parents sent us copies of ancient texts and we were able to read and discuss them with the young men when Paul came to Lamar University. From our interaction in walks and discus-

sions around campus, the importance of *unity* and *harmony* were identified as key ideas in Hinduism.

Hinduism

The spiritual source of Hinduism is the *Vedas*, a collection of ancient scriptures written by sages or Vedic seers. The major truths in Hinduism include the search for *Enlightenment* and the importance of *Self Harmony*. Everything is viewed as dynamically connected with everything else in the universe. All actions take place in time through the interweaving of the forces of nature and phenomenon perceived by the senses as part of the reality that includes the self as *Brahman*. To become liberated, to experience *Moksha* or liberation, one must recognize that everything is connected and see the unity and harmony of all nature including ourselves and act accordingly.

Paul and I both explored Buddhism at annual Creative Problem - Solving Institutes in Buffalo, NY, discussing the four Noble Truths, particularly the eightfold path and its application to understanding the flow of life and the positive nature of change. Some of the basic ideas of Buddhism are in harmony with other ancient traditions, notably the emphasis on meditation and embracing the oneness of life.

Buddhism

Two pillars of thought support Buddhism, *Prajan* representing transcendental wisdom or intuitive intelligence and *Karuna* representing love or compassion. Love and compassion are essential parts of wisdom. There are four Noble Truths in Buddhism. The First Noble Truth deals with the suffering or frustration that comes from resisting the flow of life and change. This concept of impermanence means that the notion of being separate individuals is an illusion, and there is no ego or self. The Second Noble Truth deals with clinging and grasping, trying to hold on to things that we see as permanent which are constantly changing in the never- ending chain of cause and effect. The Third Noble Truth states that suffering can be ended by embracing the oneness of life, and then the idea of a separate self disappears. The Fourth Noble Truth includes an Eightfold path to end suffering: Right Seeing and Right Knowing are the first two paths, Right Action includes four paths and, Right Awareness and Right Meditation are the last two paths. The eightfold path includes Right Belief, Resolve, Speech, Right Conduct, Daily Occupation, Effort, Alertness and finally the ecstasy of Selfless Meditation (Burtt, 1955).

Paul has spent considerable time in Japan and was keen on examining Zen for building a foundation, and he given several presentations on Satori at national and international conferences. Paul invited one of his colleagues from Japan who had translated several books and articles for us to come and serve tea in a traditional manner which set our mindset for exploring Zen.

Zen

Suzuki (1969) in *Zen and Japanese Culture* said the goal of Zen is enlightenment called *Satori*. When Satori is attained, there is an experience of the wonder and mystery of life in every single act. Zen stresses naturalness and spontaneity to focus on the process of Enlightenment, which is to realize that we become what we already are from the beginning. Zen has influenced all aspects of the traditional Japanese way of life from serving tea to the martial arts. These activities represent a *Tao* or way toward Enlightenment.

The last tradition that we explored was Confucianism and Taoism and we leaned on our Chinese colleagues from the World Council for Gifted and Talented to help us find the resources to explore for our foundation for SQ.

Confucianism and Taoism

Confucianism comes from Kung Fu Tzu or Confucius, a teacher whose teachings are based on six classical books of philosophical thought and include a philosophy of social organization, common sense and practical knowledge. Lao Tzu is the founder of Taoism that is concerned with observing nature and discovering the way or *Tao*. Human happiness in Taoism is achieved by following the natural order, acting spontaneously and trusting intuitive knowledge. Taoism focuses on an ultimate reality that underlines and unifies multiple things and events. Three words describe this ultimate reality, complete, all embracing, and the whole (Needham, 1956). Reality is called the Tao which is a cosmic process in which all things are involved, and the world is viewed as being in continuous flow and change. Taoism is concerned with intuitive wisdom, rather than rational knowledge and represents a way of liberating oneself from the world. Confucianism is rational, masculine, active and dominating; whereas, Taoism emphasizes the intuitive, feminine, mystical and yielding. The contrast of yin and yang is reflected in these two dominant trends of thought (Needham, 1956).

Our colleague Abe Tannenbaum who was a rabbi and so enthusiastic about our book suggested that we secure Adolphe Franck's book as a beginning point to understand the Kabbalah. Again, we were struck by the similarity of many of the ancient traditions.

The Mystical Kabbalah

The principal book of the Kabbalah is the *Sefer Yetzirah* which dates the origin of the Kabbalah as 2000 years before the birth of Christ and. as Abe Tannenbaum suggested *The Kabbalah: The Religious Philosophy of the Hebrews* was rich resource. Franck (1995) said the Kabbalah is a sophisticated and enlightened philosophy that stresses the important distinction between knowledge and wisdom. The Kabbalah teaches that the human being consists

of a spirit that represents the highest degree of existence, a soul which is the seat of good and evil moral attributes, and a coarser spirit of life of the senses closely related to the body, including actions and instincts of life. The ancient wisdom of the Kabbalah stresses the contemplative life of spirituality, the importance of reflection and intuition and the unity of man with the creator. Like many of the ancient mystical traditions it downplays the importance of the senses (Franke, 1995).

Native American Wisdom

Native American wisdom is earth-centered, and the creator is manifested in every bush and tree, in the gifts of food and shelter, in nurturing, and in the fulfilment of everyday needs. In the Native American traditions, there is a commitment to passing on native wisdom. Knowledge is considered the past; whereas, wisdom is viewed as dealing with the future. The importance of wisdom being passed on to others is expressed by Fools Crow, a Native American leader of the Sioux:

> "The survival of the world depends upon our sharing what we have and working together; if we don't the whole world will die, first the planet, and next the people" (Mails, 1995, p. 18).

Reverence for Nature

The Native American reverence for nature and the importance they placed on observing and learning from nature is similar to the Essenes, the Buddhist, Tao and Zen traditions. Speaking of this reverence, Fools Crow said:

> Our eyes enable us to touch nature, and to learn from it, as we watch the seasons, the different skies, the winds, the grass, the stream and lakes. We observe that a big lake is never still, while a little one serves as a mirror. Clouds are different shapes that resemble many things and they are always changing. Our ancestors saw their first "tipi" in a cottonwood tree leaf. We apply these lessons to people and how we should understand all things. (Mails, 1995, p. 79)

Another essential belief of the Native American is belief in the intuitive way of knowing and preference for innermost thoughts above learning through the senses. Fools Crow expresses the tradition of thoughts, feelings and emotions similar to the Essenes.

> Over the years, I have learned to see with my brain
> by understanding my innermost thoughts about Wakan-Tanka

and people, then to feel with my eyes and finally to let my heart tells me how to be fair, and which pathway to follow. (Mails, 1995, p. 81)

The Native American and many first Nations people's way of life is primarily an earth-centered spirituality in which people learn to revere them surroundings by being in a constant state of gratitude. Ecological awareness and preservation are promoted by spending time in the solitude of nature. They also stress living by example similar to the traditions in Hinduism, Zen, Buddhism and Confucianism, and letting the young people see adults acting in the way of Wakan Tanka.

The ancient Wisdom and Eastern Mystical traditions discussed in this chapter differ in many specific details, but there is one important common strand; they are all based on mystical experience. Another similarity is the concept of *unity* and *connectedness* of all things and events; with all things viewed as interdependent and inseparable from the cosmic whole, the creator and creative force. Ultimate reality is called Brahman in Hinduism, Dharmakaya in Buddhism, Tao in Taosim and the way of Wakan-Tanka, the source and essence of creation by Native Americans.

Definition of Spiritual Intelligence

From an examination of Psychology, Science, Ancient Wisdom and traditions of Eastern Mysticism, and the Wisdom of Native American traditions and indigenous people, a foundation was formed for a theory of Spiritual Intelligence and the following definition of SQ was proposed:

Spiritual Intelligence is the capacity to use a multi-sensory approach including intuition, meditation, and visualization to tap inner knowledge to solve problems of a global nature.

The spiritual Intelligence Components, the Core Capacities, Core Values, and Core Experiences are depicted in Table 2, along with the Key Virtues, the Symbolic System and Brain States.

Table 2: Spiritual Intelligence Components

SPIRITUAL INTELLIGENCE COMPONENTS
1. Core Capacities: Concern with cosmic/existential issues and the skills of meditating, intuition, and visualization.
2. Core Values: Connectedness, unity of all, compassion, a sense of balance, responsibility, and service.
3. Core Experiences: Awareness of ultimate values and their meaning, peak experiences, feelings of transcendence, and heightened awareness.
4. Key Virtues: Truth, justice, compassion, and caring.
5. Symbolic System: Poetry, music, dance, metaphor, and stories.
6. Brain States: Rapture as described by Persinger (1996) and Ramachandran and Blakeslee (1998).

Spiritual Pathfinders

Once the spiritual intelligence components were identified, Paul and I selected individuals whose lives were representative of spiritual pathfinders. They include: Mother Teresa, Nelson Mandela, Mohandas Gandhi, Franklin Delano Roosevelt, Emily Dickinson, Nikola Tesla, Hildegarde de Bingen, Martin Luther King, Helen Keller, and Albert Einstein. Three of these individuals are discussed in this chapter, Hildegarde de Bingen, Nikola Tesla and Albert Einstein.

Hildegarde de Bingen

Hildegarde de Bingen was a 11th century nun who was tithed to the church at age eight by her family who described her as unmarriageable because of her visons and prophetic nature. She was placed with Jutta Von Spanheim in a monastic cell with one opening for listening to the monks chanting and another for food and waste. She was instructed in Latin and in the Benedictine way of life (work, silence and devotion to God) so Hildegarde developed inner strength and an inner world which was enriched by her visions. She shared her visions and revelations with Volmar, a monk who transcribed her work. Hildegarde was able to tap into the knowledge of the Noosphere as proposed by Teilhard de Chardin.

When Jutta died in 1136, Hildegarde became the Abbess. She encouraged her nuns to drink wine and beer and said it was good for rosy cheeks and putting on weight. At that time this was a clever decision as the water was brackish and contaminated. She showed a remarkable knowledge of engineering, providing running water and even constructing a sewage system in the nunnery. During that period, she wrote many hymns, and medical and scientific books. In her writings on the universe, she called it a symphony with the earth, the universe and humanity all in harmony.

At age 65, Hildegarde had an overwhelming vision that caused her body to break down in illness. She described a voice saying, 'Write down what I tell you' and she wrote *The Book of Divine Works*. She also wrote a book on natural history and one on medicine. In addition, Hildegarde was a noted musician and wrote 700 chants, 77 liturgical songs and a musical play (*Play of Virtues*). As a Benedictine, she reminds us to listen with the ears of the heart, to go beyond
the gathering of facts, information, programs, and the resulting activities. She said each personal decision affects all of us and our decisions can contribute either to the healing of the Earth or to a further shriveling up in separation, hopelessness, fear, and pollution Sisk & Torrance, 2001).

Nikola Tesla

As a child Tesla experienced blinding flashes of lights and images of things that were happening in distant places. Even as a young student, he knew he wanted to be an inventor and eventually while at Technical University, he invented an induction motor. In 1884, he came to New York with four pennies in his pocket, but he was able to capture the attention of scientists like Edison with his ideas about the potential of energy. Tesla soon had over 700 patents, and he came up with the idea of a radio and logic circuits that are currently used in robotics. His *Tesla coil* is used in radio, television and wireless communication.

Tesla loved America and became a citizen in 1891. His dream was to make energy free to all people. This placed him in cross ways with businessmen, and his idea of DC current, with Edison who was working on AC. Tesla's mind was his laboratory and he would actually plan and carry out designs, create prototypes and test them, all in his mind. Then when he actually carried out an experiment, it was always successful. Tesla described his own individual thinking as a 5th dimension of thinking, in which he moved within ideas and contacted higher levels of thought. Tesla kept a detailed daily diary of his discoveries of new understandings, and he experimented with the principle of resonance. He believed in scientific humanism and the stimulus for his work was the collective needs of humanity.

Leichtman (1980) in his book *Tesla Returns* described Tesla's ability to move from concrete observable facts to a more generic level of thinking, in which he dealt with the archetypal essence of the phenomena. The patterns of thought, the principles, the generalities are examples of his giving the word *genius* a new depth of meaning. As Tesla made theoretical breakthroughs, he demonstrated spiritual intelligence conceptualizing our relationship to the universe and to the Creator as a beautiful mathematical creation with harmonies and rhythms that permeate all of creation (Sisk &Torrance, 2001).

Albert Einstein

At age four, Albert Einstein's father gave him a compass and told him the needle always points to the north because the earth has a magnet in the north and the needle is attracted to the to the earth's magnet in the north. Young Einstein was fascinated with the compass and it made a profound impression on him. His mother enrolled him in a Catholic school, even though he was Jewish, because the school was closer to their home. He did not get along with the other students since he would not play their war games, and they called him Father Bore because he talked about things profusely that they were not interested in or understood. His teachers did not understand him, and they disliked his questioning attitude. They told the young Einstein's parents that he was

developmentally delayed. School was a dreadful place for him, but his home life was stimulating and motivating. His mother was an accomplished pianist and introduced Albert to the violin and his father was very interested in German philosophy and would discuss Goethe and Schiller with him and their names and ideas were highlighted in their father/son interaction (Sisk & Torrance, 2001).

At each thirteen, he discovered Mozart, mathematics and science, but school was still a dismal place with the rote teaching. However, his uncle introduced him to algebra, and he became fascinated with mathematics and it became his passion for life. School continued to be a disaster and when his family moved to Italy, leaving him with friends so he could continue his schooling, he resisted conformity and the school expelled him. Eventually he was able to enroll in the Polytechnic in Zurich and began studying physics which he excelled in. At the school he met another student studying physics Mileva Maric who became his wife later on. They had two sons, Hans who became an agricultural soil chemist and Eduard the second son became a musician.

Einstein admired Gandhi and was a devoted humanitarian and pacifist. He embraced a humility to the laws of the universe and said:

> A spirit is manifest in the laws of the universe in the face of which we, with our modest powers must feel humble. Out yonder there is this huge world, which exists independently of us human beings and which stands before us like a great, eternal riddle, at least partially accessible to our inspection and thinking. (Schilpp, 1951)

In 1905 he worked in a patent office in Bern and published several papers that were considered shocking as he challenged the thinking about the universe. In the first paper he described light as waves and a stream of particles called photons or quanta and this duality became the basis for quantum physics.

The second paper talked about atoms and molecules and statistically showed how their random collisions could explain the jerky movement of tiny particles of water. In his third paper he pondered what would a wave of light look like if you could travel at the speed of light. His conclusion became the special theory of relativity which transformed space from a passive background in which events took place to one of active participation in the dynamics of the cosmos. This was based on thought problems and the use of visualization. He said that energy and matter were merely different faces of the same thing and described their relationship as E=mc2 or energy equals mass multiplied by the speed of light squared. His theory of relativity was published in 1916. He won the Nobel prize in 1921 for his work carried out in 1905. (Sisk & Torrance, 2001)

Einstein had a deep moral sense and at the height of World War I he signed an anti-war petition risking the wrath of the Kaiser. He was one of four scientists to sign the petition. He became a Zionist and when the Nazis came into power, he was forced to leave Germany and he renounced his citizenship. Mileva and he were separated by ideas and commitment and they divorced, and Einstein joined Princeton University where he spent 22 years at the Institute for Advanced Study.

He continued to help Jewish individuals to escape Germany and when the new state of Israel was founded, he was asked to become the first president of Israel. He declined and continued to work as a symbol of the desire to know the truth and the capacity to know the truth. Einstein was deeply concerned about the moral issues of bigotry and racism in the United States. He wrote:

> There is a somber point in the social outlook of Americans
> Their sense of equality and human dignity is mainly limited
> to men of white skins. Even among these there are
> Prejudices of which I as a Jew am clearly conscious; but
> They are unimportant in comparison with the attitude
> Of the "whites" toward their fellow citizens of darker
> Complexion, particularly toward Negroes. The more
> I feel an American the more this situation pains me.
> I can only escape the complicity of it by speaking out.

He ends this statement with:

> What can a man of goodwill do to combat this deeply
> rooted prejudice? He must have the courage to set an
> example by word and deed, and watch lest his
> children become influenced by this racial bias.
> There is no greater satisfaction for a just and well
> Meaning person than the knowledge that he has
> devoted his best energies to the service of the good
> cause. (Schilpp, 1951)

Later Einstein assisted the United States in developing the atomic bomb. He was devastated by the bombing of Nagasaki and Hiroshima and became an outspoken advocate for anti-war efforts. He urged the Allies to set up a world government to control the use of atomic bombs, and campaigned against nuclear weaponry.

In his later years, Einstein was not well and his second wife, his cousin Elsa took care of his many requests for information and speaking engagements. He was plagued by his involvement in developing the atomic bomb and wrote in his book *Out of my last years* about his responsibility:

We scientists, whose tragic destination has been to help in making the weapons of annihilation more gruesome and more effective must consid-

er it our solemn and transcendent duty to do all in our power in preventing these weapons from being used (Einstein, 1950).

Einstein's spiritual intelligence is noted in his compassion for his fellowman and his feeling of connectedness with people of all races, ethnicity and color. His work for the common good and service to humanity characterize the spiritual individual.

Likely Traits of Spiritual Intelligence

Paul and I decided to identify strategies that could address the likely traits of SQ to enable parents and teachers to nurture and develop SQ. Our list of likely traits of individuals with spiritual intelligence was gleaned from our examination of Psychology, Science and Ancient Wisdom and traditions of Eastern Mysticism, and the Wisdom of Native American and indigenous people, as well as from the lives of the ten pathfinders of Spiritual Intelligence. We were passionate about educating spiritual intelligence and higher consciousness represents a hope and goal to provide opportunities for students to develop and use their SQ, and to discover what is essential in life particularly in their own lives. Defining spiritual intelligence as the ability to access inner knowledge, the Likely Traits of Spiritual Intelligence and Ways to strengthen them for Learning are illustrated in Table 3.

Table 3: Likely Traits and Ways to Strengthen for Learning

LIKELY TRAITS	WAYS TO STRENGTHEN FOR LEARNING
• Uses inner knowing • Seeks to understand self • Uses metaphor and parables to communicate • Uses intuition • Sensitive to social problems • Sensitive to their purpose in life • Concerned about inequity and injustice • Enjoys big questions • Sense of Gestalt (the big picture) • Wants to make a difference • Capacity to care • Curious about how the world works/functions • Values love, compassion, concern for others • Close to nature • Reflective, self-observing and self-aware • Seeks balance • Concerned about right conduct • Seeks to understand self • Feels connected with others, the earth, and the universe • Wants to make a difference • Peacemaker • Concerned with human suffering	• Provide time for reflective thinking • Use journal writing • Study lives/works of Spiritual Pathfinders • Use Problem solving • Conduct service learning projects • Use personal growth activities • Use problem-based learning on real problems • Provide time for open-ended discussion • Use mapping to integrate studies/ themes • Develop personal growth activities • Service learning projects • Integrate Science/Social Science • Use affirmations/think-about-thinking • Employ eco-environmental approach • Read stories and myths • Use role playing/sociodrama • Discussion of goal setting activities • Process discussions • Trust intuition and inner voice • Stress unity in studies • Use What, So What, Now What model • Use Negotiation-Conflict Sessions • Study lives of eminent people

Many of the traits of spiritual intelligence are traits and characteristics of gifted children and youth as defined in the literature (Sisk, 2009.Clark, 2014). Consequently, it is not unseemly to think that many gifted students already have developed spiritual intelligence, but they could profit from strategies and activities that address their SQ in the classroom to lessen their feelings of being out of sync.

There are a number of ways to develop or strengthen SQ, including an emphasis on the *Core Values* of connectedness, unity of all, compassion, a sense of balance, responsibility and service. To develop these *Core Values*, a multi-sensory approach to problem-solving and life including visualization, meditation and deep intuition is needed**.** With this basic premise, the following seven ways were identified to raise or develop SQ. They are depicted in Table 4.

Table 4: Seven Ways to Raise or Develop Spiritual Intelligence

Seven Ways to Raise or Develop Spiritual Intelligence
1. Think about your goals, desires, and wants in order to bring your life into perspective and balance, and identify your values; 2. Access your inner processes and use your vision to see your goals, desires, wants fulfilled, and experience the emotion connected with this fulfillment; 3. Integrate your personal and universal vision, and recognize your connectedness; 4. Take responsibility for your goals, desires and wants; 5. Develop a sense of community by inviting more people into your life; 6. Focus on love and compassion; and 7. When *chance kn*ocks at your door, invite it in and take advantage of coincidences.

As Paul and I interacted with students and colleagues we developed an Action Plan that individuals could use to identify activities to encourage spiritual intelligence to emerge. We identified seven characteristics of individuals who demonstrate spiritual intelligence as discussion points that could be used to craft an action plan to become more spiritually oriented. For example, individuals who are demonstrating spiritual intelligence need to have periods of silence for them to be able to reflect and to meditate. They trust their emotions and feelings to gauge their behaviour and action. In many ways individuals who have spiritual intelligence appear childlike and playful. This could be noted in Albert Einstein's behaviour when he looked into the camera and stuck out his tongue like a naughty child. In addition, they are self-referring relying on their inner knowledge for decision making and they

report a feeling of being centered and focused. They love nature and plan ways to be able to spend time in nature and most important, they have an open and flexible point of view. We suggested that someone who was trying to further develop their spiritual intelligence list the 7 characteristics and jot down ways they could be actively seeking SQ.

Table 5: Action Plan

Include activities to encourage Spiritual Intelligence to emerge	
Silence: Trust Emotions/Feelings: Childlike: Self-referring: Experience/Love Nature: Open/Flexible Point of View:	

Spiritual intelligence or the spiritual mind is not limited in ways that we might expect the mind to be limited. Access to it, and indeed identification with the inner knowing of spiritual intelligence can be facilitated to an extent that is ultimately unlimited, as reiterated in the words of Arnold Toynbee, "The ultimate work of civilization is the unfolding of ever deeper spiritual understanding." (Toynbee, 1934).

Zohar (2005a) said spiritual intelligence is the ultimate intelligence of the visionary leader, and SQ underpins IQ and EQ of Goleman (2005). Wigglesworth (2012) provided a behavioral definition of SQ as the "ability to behave with wisdom and compassion, while maintaining inner and outer peace, regardless of the situation" (p. 8). Sisk (2016a) maintained that SQ integrates all of the intelligences to solve problems of a global nature.

Therefore, educating for spiritual intelligence and higher consciousness has within it the hope and goal of developing children and youth who can use their spiritual intelligence to discover what is essential in life, particularly in their own lives and what they can bring to nourish the world. Paul and I were convinced that our problems are man-made and therefore can be solved by men and women using their Spiritual Intelligence to solve these seemingly unsolvable problems.

Our hope is in the youth who are the next generation of leaders such as Greta Thunberg who went on strike for the planet. She spoke to the 150 members and advisers in the U. K. Houses of Parliament, and said she was there to talk about climate; a catastrophe that is looming. She also addressed the U. N Climate Change Conference in Poland. Her London speech was the last stop of a tour that included meeting the Pope. He told her to continue to work and go along, go ahead. Greta said that she promised herself that she was going to do everything she could do to make a difference. She was inspired by the survivors of the February 2018 school shooting in Parkland,

Florida, and began a weekly schoolwork strike every Friday, turning to social media to implore politicians to support and take steps toward halting carbon emissions. The world is listening and on March l5, 2019 l.6 million people in 133 countries participated in a climate strike inspired by Thunberg's solo action. Her experiences were reported by *Time* magazine May 31, 2019. I know that Paul would agree with me that the hope for the future is in students like Greta who displays many of the likely traits of spiritual intelligence. She wants to make a difference, feels connected with others, the earth, and the universe, and concerned with human suffering. I would like to close with one of Paul's favorite Native American elders Fools Crow. He said:

> The survival of the world depends on our sharing what we have
> and working together; if we don't the whole world will die,
> first the planet, then the people. (Mails, 1991, p. 18)

As our young people develop and nurture their spiritual intelligence, they will step forward with our help to work together to solve the ills of the planet by sharing knowledge and resources to become the trail blazers that can shape the world for the benefit of all.

References

Beauport, E .(1996.*The three faces of mind*. Wheaton, IL: Philosophical Publications.

Bohr, N. (1999). *Complementarity beyond Physics.* North Holland/Elsevier.

Braden, G. l997). *Awakening to zero point*. Bellevue, Washington: Radio Bookstore Press.

Burtt, E.A. (1955). *Teachings of the compassionate Buddha*. New York: N.Y. New American Library.

Campbell, J. (1971). *The portable young*. New York, NY: Penguin.

Capra, F. (1991). *The Tao of physics*. Boston: Shambahla Press.

Clark, B. (2014). *Growing up gifted.* Princeton, NJ: Merrill. Dabrowski, K. (1967). *Personality shaping through positive disintegration*. Boston: Little & Brown.

Davidson, R..Kabat-Zinn. J., Schmacher, J., Rosenkranz, M., Muller, D., & Santorelli, S. (2003). *Alteration in the brain and immune function produced by mindfulness*
meditation. Psychosomatic Medicine, 65(4), 564-570

Einstein, E. (1950). *Out of my later years*. New York, NY: New York Philosophic Library.

Emmons, R. A. (2000). Is spirituality an intelligence? Motivation, cognition and the
psychology of ultimate concern. *The International Journal for the Psychology of*
Religion, 10(1), 3–26.

Frager, R. (1999). *Heart, self and soul*. Wheaton, Illinois: Quest Books.

Franck A. (1995). *The Kabbalah: The religious philosophy of the Hebrews*. New York,NY: Citadel Press.

Freke, T. & Gandy, P. (1999) *The Hermetica: The lost wisdom of the pharaohs*. New York, NY: Tarcher.

Gardner, H. (1983). *Frames of mind*. NY: Basic Books.

Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st century*. NY Basic Books.

Gardner, H. (2000). A case against spiritual intelligence. *The International Journal for the Psychology of Religion*, 10(1), 17-34. Gardner, H. (2003). *Multiple intelligences after twenty years*. Paper presented at the American Educational Research Association, Chicago, Illinois, April 21, 2003.

Goleman, D. (2005). *Emotional intelligence: Why it can matter*. New York, NY:
Bantam Books.

Jung, C. (1963). *Memories, Dreams and Reflection*. New York, NY: Pantheon Books.

Jung, C. (1969). *Collected works*. Translated by R. F. C. Huyll, Bolligen Series XX.
Princeton, NJ: Princeton Univ. Press.

Goldman, C. (1998). Molecules in motion: A conversation with Candace Pert. *Intuition*, #22, pp. 21-25, p.49-55.

Hawking, S. (1988). *A brief history of time*. New York, NY: Bantam Books.

Holzel, B. K., Carmody, J., Vangel, M., Congledton, C., Yerramsett, S., Gard, T., & Lasar, S. (2011). Mindfulness Practice leads to increases regional brain grey matter density. *Psychiatry Research: Neuroimaging*. 191 (1):36-43.

Laszlo, E. (2017). *Intelligence of the Cosmos.* Rochester, Vermont: InnerTraditions.

Leichman, R. (1980). *Nikola Tesla returns*: Columbus, OH: Ariel press.

Llinas, R. (1987). *Mindfulness as a functional state of Brain*. In Colin Blakemore and Susan Greenfield (Ed.). Mindwaves, Basil. Lakewell. Oxford, Llinas, R. & Urst, R. (1993). Coherent 40-Hz characterizes dream state in humans.
Proceedings from the National Academy of Sciences. USA. Volume 90 2078-2081.

Mails, T. (1991). *Fools Crow*. Tulsa, OK: Counsel Oaks Books.

Maslow, A. (1968). *Toward a psychology of being*. Princeton, NJ: Van Nostrand.

Maslow, A. (1971). *The farther reaches of Human Nature*. New York, NY: Viking Press.

Needham, J (1956). *Science and civilization in China:* Cambridge, England: Cambridge Press.

Persinger, M. (1996). Feelings of past lives as expected perturbations within neurocognitive processes that generate the sense of self: Contributions from limbic lability and vectoral hemisphericity . *Perceptual and Motor Skills*. (3)1107-
21.

Pert, C. (1997). *Molecules of Emotion*. New York, NY: Scribner.

Ramachandran, V. & Blakeslee, S. (1998). *Phantoms in the brain*. NY: William Morrow.

Ramachandran, V. (2011). *Tales of the 'Tell-Tale Brain'*. Norton & Co.

Rogers, C. (1980). *A way of being*. Boston, MA: Houghton Mifflin.

Suzuki (1969). *Zen and Japanese Culture*. New York, NY: Bollingen.

Sisk, D. & Torrance, E. P. (2001). *Spiritual Intelligence: Developing Higher Consciousness.* Buffalo, NY: Creative Ed. Press.

Sisk, D. (2009). *Making great kids greater.* Thousand Oaks, CA: Corwin Press.

Sisk, D. & Kane, M. (2016). *Planting the seeds of mindfulness*. Unionville, NY: Royal Fireworks Press.

Sisk, D. A. (2016a). Spiritual Intelligence Developing Higher Consciousness Revisited *Gifted Education International*, 32(3), 194-209.

Sisk, D. A. (2016b). Spiritual Intelligence: Developing Higher Consciousness. *Torrance Journal for Applied Creativity*. Vol. 1, 150-166.

Szekeley, E. B. (1937) (Ed.) Translation of *The Essene Gospel of Peace*. British Colombia, Canada: International Matsqui.

Toynbee, A. (1934). *A Study of History*. UK. Oxford University Press.

Vaughan, F. (2002). What is stual intelligence? *Journal of Humanistic Psychology*, 42(16), 16-33.

Wigglesworth, C. (2012). *SQ21: The twenty-one skills of spiritual intelligence.* New
York: Selectbooks, Inc.

Wilber, K. (2006). *Integral Spirituality*. Boulder, CO: Shambhala Publications..

Zeidan, F., Johnson, S., Diamond, B., David, Z., & Goolkasan, P. (2010) Mindful meditation improves cognition: Evidence of Brief mental training. *Conscious and Cognition*, 19(2), 596-605.

Zohar, D. & Marshall, I. (2000a*). SQ: Connecting with our Spiritual Intelligence*. New York, NY: Bloomsbury Publishing.

Zohar, D. & Marshall, I. (2000b). *SQ: Spiritual Intelligence, the Ultimate Intelligence*. New York, NY: Bloomsbury Publishing.

Zohar, D. (2005). *Spiritually intelligent leadership. Leader to Leader*, (38), 45-51.

CHAPTER SIX

THE CREATIVITY AND INNOVATION OF FRANK FURNESS

DAVID C. SLEDGE

Dedication

This homage to Frank Furness is dedicated to another creative icon – E. Paul Torrance. Where Furness was an architect of the creative environment, Torrance was an architect of the creatives who live in Furness's environment.

ABSTRACT Born shortly before the Civil War, Frank Furness was the first creative genius of Philadelphia architecture. The tension of the impending war, transformations from the Industrial Revolution, the strong influence of his father, and Richard Morris Hunt's tutelage, all converged to shape the exceptional creativity of Frank Furness. Philadelphia was his lifelong home, but Furness built with a local yet original sensibility that was beyond style and classification. Frank Furness never received any formal university education, yet he possessed a remarkably intuitive, unhampered, unconventional, free yet skillful, architectural expression that was ahead of his time. Therefore, creativity is a framework through which Furness's development and achievements can be understood and illustrate how he possessed the traits conducive to innovation. This paper examines how Furness received encouragement, training, and opportunity to develop his creative potential and possess the motivation to realize unparalleled achievement in his zeitgeist.

Keywords: creativity, innovation, architecture, Furness, Philadelphia, zeitgeist

Introduction

Frank Heyling Furness was born in 1839 in Philadelphia, Pennsylvania just 56 years after the end of the Revolutionary War, and 22 years before the Civil War. Philadelphia was founded by the English Quaker, William Penn on October 27, 1682, and located between the Delaware and Schuylkill rivers. Although originally inhabited by the *Delaware Indians*, Penn founded his new city on religious freedom, tolerance, mutual respect, direct speech, and plain appearance (Lewis, 2001, p. 7). The city of Philadelphia was an original creation- it was the first in the United States actually designed- a coherent

urban design plan based on a grid intentionally interrupted by five squares. This egalitarian city plan symbolized a break from the authoritarian dominance of English monarchs. "Penn viewed his colony as a holy experiment, to be founded on principles of tolerance and justice. He offered religious and personal freedoms that were radical innovations in the 17th century. These included the freedom of worship for all people and the right to trial by jury in an open court" (Gallery, 2016, p. 10). Philadelphia was the site of the First and Second Continental Congress during the American Revolution, the temporary capital of the nation, and the birthplace of a new architecture via Frank Furness.

The grid plan of the city of Philadelphia could symbolically be extended to infinity, and so could the imagination of creative thinkers like Furness. He discovered that he possessed the character traits of creativity that would allow him to shape the city of Philadelphia. From his mentors, Furness learned that "originality must be a core value in creativity….[and] the standard definition is bipartite: creativity requires both originality and effectiveness…. usefulness, fit, or appropriateness" (Runco, 2012, p. 92). Furness learned to value originality plus effectiveness in architecture, and how to capture the imagination of his clients *and* solve functional problems. Furness had the architectural skill and creativity to make Philadelphia, *his* tabula rasa.

The Zeitgeist of Frank Furness

The American Commonwealth of Pennsylvania was founded as a safe place for Quakers and other religious minorities. Also known as the Religious Society of Friends, the Quakers believed in simplicity in daily life, personal appearance, speech, and worship. The Furness family was Unitarian, a Christian faith similar to the Quakers, and they joined many causes advocating for the promises made by America's Founding Fathers. Both Quakers and Unitarians played a significant role in Philadelphia's cultural development: the abolition of slavery, equal rights for women during the Suffragette Movement, protection for religious minorities, and rights for laborers exploited in the Industrial Revolution.

The Civil War-era served as an opportunity for the city to reinvent itself and catch up with the influence of New York and the District of Columbia. Philadelphia was the "City of Brotherly Love [and Sisterly Affection]" but needed to embrace American capitalism to grow. "Because they had avoided the new materialism that preoccupied the upwardly mobile society of industrial America, Philadelphians became a laughing stock nationally- and internationally" (Thomas, Cohen, & Lewis, 1996, p. 16). For two decades after the Civil War, Philadelphia tried to shed its plain image to regain the glory it had before the war. The architecture of Frank Furness helped achieve that goal by attracting attention and investment, back to Philadelphia.

Although Philadelphia's history has been well documented, what has not been understood is the *significant impact Philadelphia made on* Frank

Furness, and conversely, the *significant impact he made on the city*. Furness and Philadelphia were symbiotically intertwined, and his architecture both matched and marked the city's narrative of originality and greatness. "In the 75 years after William Penn left Philadelphia [in 1701], the city grew from a modest village to the most important city in the colonies, and the second largest in the English-speaking world" (Gallery, 2016, p. 13). Born towards the end of the First Industrial Revolution in America, Frank Furness helped Philadelphia survive through the Civil War and later thrive. Indeed, a defining event of his zeitgeist was the Civil War, and like many Philadelphians, Frank Furness fought to end injustice and preserve the nation. After fighting for three and a half years, the Civil War ended, and Furness returned to civilian life. He received the Congressional Medal of Honor for bravery in combat-the highest military award, as the only architect *of note* to receive that honor (O'Gorman, 1973). Frank Furness returned home as a war hero, to Philadelphia.

The remarkable period of the Industrial Revolution in Philadelphia's history was marked by rapid population growth and economic development, fostered by democracy, countless innovations, and creative inventions. "At the time of the Civil War [in 1861], Philadelphia was in the forefront of the Industrial Revolution in the United States,…. [it] was the first large city north of the Mason-Dixon Line, and a center of culture, commerce, and manufacturing. It was a time of optimism and prosperity" (Gallery, 2016, p. 50). Culturally, politically, economically, and architecturally, America needed to rebuild what it had torn apart from fighting against itself during the Civil War.

This period of war-violence and change also provided an opportunity for Philadelphia to reinvent itself. As the first state above the Mason Dixon-Line, Pennsylvania was tense with uncertainty, civil unrest, and nervous energy, coupled with great optimism for new ideas. According to Runco (2014), "Civil unrest… supposedly allowed information to flow within the society and is generally a more flexible zeitgeist. There is more sharing, which can be conducive to creative work. Individuals are not afraid to express themselves" (p. 224). This theory may explain why there were so many creative achievements immediately after the war. Innovations such as the steam engine, the telegraph, dynamite, photographs, typewriters, electric generators, power looms, the Bessemer process, interchangeable machine parts, sewing machines, modern manufacturing, locomotives, and the Pennsylvania Railroad, made Philadelphia a fertile environment for creative thinkers like Furness.

There were no architecture schools in America at the time, and an aspiring architect after the war needed opportunity, inventiveness, resolute optimism, and apprenticeship to become a successful professional. Since the age of 16, Frank had hoped to study under Richard Morris Hunt as an apprentice. Hunt lived in New York as the most wealthy, famous, and best-educated architect in America after graduating from the Ecole des Beaux-Arts in Paris.

Sadly, the Civil War ended Frank's dream of attaining an architecture degree and interrupted his eventual apprenticeship in Hunt's office as well. Frank studied under Hunt until breaking his training to fight in the war. Like so many men of his day, Furness returned home from the war with training, but still no *formal* education. To mark a new beginning in civilian life and triumphant return as a war hero in Philadelphia, Frank Heyling Furness dropped his middle name, created his logo, and changed his style of dress to become flamboyant, unconventional, *and noticeable.* He also picked up a few vices such as tobacco, brandy, temper tantrums, and a propensity for *creative profanity* that was original *and* effective, if not appropriate (Runco, 2012), that gave him notoriety in Quaker Philadelphia. By the time he retired, Frank Furness was so well-known that he was simply called *Furness* -an original. By the time he died at age 73 in 1912 with over 600 projects, "Furness" had moved Philadelphia beyond slavish reproduction of 19th century styles, towards *his* original sensibility of the 20th century.

Early Development of Frank Furness

From the very beginning, young Frank Furness was expected to chart his path and cultivate his artistic vision. Frank's father was a nonconformist, Unitarian minister who was well-educated in religion, the arts, and science. Reverend and Mrs. Furness encouraged all their children to achieve artistic refinement and success. "The strong sense of… achievement, of determination, of creative imagination that marked the Furness family…. characterized Frank in particular. Perhaps his position as the youngest of four children in a closely knit, highly accomplished family made him try harder" (O'Gorman, 1973, p. 16). Frank was reared in an upper-middle-class brick rowhouse in the Rittenhouse Square District of Philadelphia (Figure 1). The Furness family balanced a commitment to their church, involvement with Philadelphia's intellectual society, and cultivation of creative pursuits such as literature, poetry, and painting. The Furness children flourished artistically, likely inherited from Dr. Furness, who had noted drawing talent. Runco (2014) found that "individuals in large families seemed to have high creative potential…. [and] unlike academic success, creativity seemed to flourish in larger families" (p. 51). Therefore, his family's emphasis on education and culture in the urban context of Philadelphia helped shape the thinking of Frank Furness. From his father, the youngest Furness cultivated an appreciation for independent thinking:

> Frank's father, Reverend William Henry Furness [a native Bostonian], graduated from Harvard with his life-long friend Ralph Waldo Emerson, whom he knew from earliest childhood. Reverend Furness was an impassioned art critic, and the family dinner table resounded with artistic judgments as blunt as his pronouncements over slavery. (Lewis, 2001, p. 12)

Frank's father was a connoisseur of the arts and instilled a love for creativity in all his children. Runco (2014) states that parental creativity can be predictive of children with high divergent thinking skills and creative ability. Perhaps it was not a surprise when the highly-creative young Frank did not apply himself to his schoolwork like his older siblings. Frank seemed uninterested in the standard curriculum of his teachers, difficult to control, very strong-willed about what *he wanted* to study, and distant. Because it was an education of "dictation and recitation,…. [Frank] was surly and truculent and showed no desire to apply himself to the college regimen" (Lewis, 2001, p. 13). Moreover, the young Frank Furness had learned well from his father, *perhaps too well*, how to face adversity and stand by his principles. As a result, the character trait of resoluteness- so crucial for creative development, was misdiagnosed in Frank as listlessness and melancholy.

Frank's family worried about the emotional and mental well-being of its youngest family member and even discussed possible treatments for his cure (Lewis, 2001). This health concern was not uncommon for the era. However, Frank Furness simply had an independent, contrarian personality, common among highly-creative individuals. Runco (2006) states, "often creative people seek opposition; that is, they decide to think in ways that countervail how others think" (P. 89). The effects of war, his father's strong influence, and his disinterest in standard education also shaped Frank into an independent thinker. He was a contrarian from the beginning, and Frank's teachers nor family knew how to relate to his eccentricities. Frank was also naturally open -minded, especially for his zeitgeist, as evidenced by his friendship with the homosexual Walt Whitman, and a Black man who was his frequent horse-riding companion. Runco (2014) states that tolerance is among the essential character traits for "creative people [who] are often unconventional, and sometimes downright eccentric or nonconformist…" (p. 256). From the start, Furness was always a nonconformist and ahead of his time. Thankfully, however, the Furness family was friends with other creative, unconventional thinkers such as Whitman and Emerson, who helped shape Frank's thinking and avoid medical treatment!

It was Emerson who introduced the sixteen-year-old Frank Furness to the wonder of architecture with a gift of a stereo-viewer containing three-dimensional images of buildings. This novel invention of the Industrial Revolution awakened an interest in the building-boom happening all around Frank in Philadelphia at the time. The gift of a stereo-viewer from Ralph Waldo Emerson also proved to be a *crystallizing experience*- a specific experience that had a significant influence on developing interests, motivations, and decisions (Runco, 2014, p. 50). The gadget held the inquisitive young Furness enraptured for months. It gave him the ability to study images of far-away buildings, introduced him to details selected from classical precedents, helped him learn, at his own pace, about a subject that interested him, and inspired Frank to become an architect. After searching for a career that suited him the

way ministry matched his father's commitment to God, it appeared that Frank Furness had found *his* religion.

Combined with the religious influence of the Quakers, and the escalating violence just below the Mason-Dixon Line over slavery, Philadelphia was full of ominous portents leading up to the Civil War during young Frank's life. The tension between The South's stranglehold on slavery and Philadelphia's uncertain future must have affected the young Frank Furness as he contemplated what to do with his life. Runco (2014), notes that religion and war are great influencers on creativity within a zeitgeist. As the son of the well-known Reverend Furness, young Frank must have realized that a war over slavery was coming soon. The Civil War-era forced individuals to make decisions about what they stood for, and where they would make their stand. Perhaps it was even an omen, that Frank was born the same year his father preached his first abolitionist sermon, forever linking the two life-changing events together, in the Furness family's mind and history. "[Frank's father] faced down murderous mobs, and once he stood shoulder to shoulder with Frederick Douglass in New York, defiantly protecting him in the face of a looming riot. From such deeds, young Frank learned that principle might collide with public opinion" (Lewis, 2001, p. 12). Frank thus learned to hold his ground and advocate for his principles, including originality and independent thinking. Self-reliance served Frank Furness well over the coming years, as his unique buildings were ridiculed by elitist critics, who tried to control the purview of taste as a reflection of their vaunted status.

Figure 1. Frank Furness was born November 12, 1839, on 1426 Pine Street in Philadelphia.

The Furness family lived in this quintessentially Quaker-Style Philadelphia rowhouse: narrow width, operable shutters, red brick, flat façade, stone base, and projecting steps over a basement.

Creative Development of Frank Furness

Except for his service in the Civil War, Frank Furness was consumed with an uncanny, natural talent for architectural design unlike anyone in Philadelphia. Frank's father, Dr. Furness, not only advocated for the abolition of slavery but new ideas in architecture as well. Dr. Furness was a graduate of Harvard University, well read on many subjects, and sent his two oldest sons [women were not admitted] to Harvard (O'Gorman, 1973). Reverend Furness was familiar with the greatest thinkers in European and American culture and helped instill a love for creativity in his youngest son, whom he hoped would attend Harvard also. Reverend Furness revealed sensitivity to new ideas in his address to the American Institute of Architects on November 9, 1870, when he said:

> With all our freedom, we do not tolerate oddness. We insist …. upon everything's being cut to one pattern…. It is an adventurous thing… to set before us anything of which we cannot at once tell what to think. We resent it… and take satisfaction- the law of taste- into our own hands, and condemn it. (O'Gorman, 1973, p. 15)

It was abundantly clear to the youngest Furness that if he was going to be an architect, his father expected him to look to the future instead of copying the past. Philadelphia was in a state of flux from construction projects rising all over the city, and the energy directed towards buildings inspired young Frank to one day build as well.

Instead of extending his schooling in Philadelphia or following in his father's footsteps at Harvard, Frank decided at age 16 that he would become an architect. Frank already knew what he wanted to do in life, and the creative fire that Emerson ignited in him would not be extinguished by anything else. Frank's father secured an apprenticeship for him in 1855 with John Fraser, a local architect, by paying him to train his son. Fraser taught Frank Furness how to draft, make tracings, write specifications, copy letters, apply the classical orders, the rules of composition, and how to cull ornament and façade designs from pattern books popular at the time (Lewis, 2001, p. 16). At this time in Philadelphia, Victorian Baroque was the architectural style of the day; it was what Fraser advocated, and therefore what Furness learned. Frank's creative development might have withered and died under the formulaic Fraser, if not for Richard Morris Hunt, the country's best-educated architect. Frank's oldest brother Willy met Hunt at Harvard and implored him to meet Frank, who was interested in architecture. The next time Hunt was in Philadelphia, he stopped by the Furness home on Pine Street for a social visit. It was there in a modest, Philadelphia rowhouse that Richard Morris Hunt saw promise, passion, and potential in the young Frank Furness. The extreme-

ly wealthy, and dapper Hunt professed architecture was a higher calling, and the impressionable young Frank was enthralled. Frank soon left the office of John Fraser in 1858 and joined Hunt's atelier in New York.

Frank Furness learned architecture and the design fundamentals of composition from Hunt. Under the tutelage of the Ecole des Beaux-Arts-trained Richard Morris Hunt, the creativity of Furness was encouraged and developed. "Though the focus of the atelier was on *independent thinking* [emphasis added], Hunt actively encouraged professional association" (Thomas et al., 1996, p.22). Hunt did not dictate solutions or styles from pattern books in his atelier but taught the critical thinking skills, drawing, building details, precedents, and concepts needed for each of his apprentices to express their individuality. Pupils were sent out into the libraries and streets of New York to study buildings and sketch what they observed with minimal supervision. Students were expected to develop an increasingly trained eye for proportion, light, composition, detail, geometry, and color, then apply it to their design creations.

This was not the rote training that Furness rebelled against in Philadelphia, but an education centered around critical thinking and creative expression. It was precisely the type of education that Furness needed: rigorous yet open-ended, disciplined yet free-thinking, classical yet innovative, technical, and conceptual. Richard Hunt believed that he must "teach a method of design that could be applied to any style" (Lewis, 2001, p. 22). After catching Furness making caricatures unawares at the blackboard, Hunt adapted his lesson plans. One of the most unusual assignments given to Furness by Hunt became the routine practice of caricature- exaggerating and distorting features of real people to highlight unique aspects of their character. This was a skill Furness would later incorporate into his buildings. Frank received a studied, rigorous, and disciplined instruction built upon the acquisition of knowledge and skill development with the Classic Orders of architecture Afterwards, Frank was expected to move beyond the precedents to invent his individual creations. Frank Furness recalled in his memoir the speech that Richard Morris Hunt gave to all incoming students:

> I am willing to give you all I know. If choose to loaf and throw away the opportunity of getting all that you might out of me, why, that is your lookout, it isn't mine. You will never, by word, look, or action, on my part, know that I do not think you are doing *exactly* right. In short, I am here to teach you, if you want to be taught. I am not here to force you in the smallest degree to learn. (Lewis, 2001, p. 22)

Although Richard Hunt exuded an aura of authority, he showed a willingness to let each student progress at his own pace through a well-crafted program of study developed in Paris at Ecole des Beaux-Arts. Until the Massachusetts Institute of Technology formed the first school of architecture in America in 1865, the content and duration of an apprenticeship were up to the mentor's interpretation, and limit of the *paying* intern's finances. Yet the in-

dependently-wealthy Richard Hunt took the mentorship of pupils seriously and often brought his books, folios of drawings, journal articles, paintings, elite friends, visiting artists, and architects into the atelier to vary his teaching methods and hold the students' interest. Hunt sent students into art galleries, parks, and plazas around New York to learn the city armed with sketchbooks that he routinely critiqued with comments, but no grades. Moreover, Hunt shared his drawings, paintings, and design work with his students, and gave updates on projects in New York so that pupils could visit construction sites at opportune times. The advanced students were given opportunities to apply what they had learned on the few, but real, projects Richard Hunt brought into his atelier.

Hunt's students met with him once per day at most, but they worked in the same studio together in the open, learning from and supporting each other with their teacher acting as a coach. Perhaps as a creative architect and teacher, Hunt intuitively knew what others would verify later:

> The most powerful way to develop creativity in your students is to be a role model. Students develop creativity not when you tell them to, but when you show them. Teachers who balance an emphasis on the discipline or content knowledge with emphasis on investigating and applying the content are opening up a new world of learning. (Reisman, 2016, p. 185).

This was undoubtedly a remarkable educational experience for Frank, especially for a time period in America when education was a rare gift. The effect of seeing architects and artists routinely pay homage to the well-known, and well-heeled Richard Morris Hunt in his New York atelier must have captivated Frank Furness. It also introduced Frank to a cadre of wealthy and influential intellectuals that traveled south to Philadelphia on the Pennsylvania Railroad. The influence of Hunt on Furness was profound in every aspect. After all, Richard Hunt designed the base of the Statue of Liberty, entrance façade of the Metropolitan Museum of Art, and his Biltmore Estate. It was therefore extraordinary for Richard Morris Hunt to see something so *unique* in the young Philadelphian, *something* that convinced him to accept the son of a Unitarian minister as an apprentice in New York, and cultivate the creative potential of Frank Furness. Thankfully for Philadelphia, Richard Hunt recognized an *immense* creative talent had been misdiagnosed as listlessness and melancholy in the young Frank Furness.

Hunt captured Frank's imagination. With many inspirational phrases such as, "A design without action is merely a mechanical affair that might be produced by a mere machine" (Lewis, 2001, p, 26), Hunt made an indelible impression. Frank Furness was motivated to apply himself and learn from a teacher. Furness was determined to forge his path and express his creativity through architecture and worked harder than ever before. Richard Morris Hunt proved to be an extremely effective "teacher who focus[ed] on the excitement of learning rather than on grades…fostering intrinsic motivation in [his] students" (Reisman, 2016), and allowed Frank's creativity to

blossom. Eventually Frank left to fight in the Civil War, then briefly returning for two years before departing again to start his firm, in Philadelphia.

Following in his mentor's footsteps, Furness became one of the founding charter members of the Philadelphia chapter of the American Institute of Architects. Hunt had educated Frank Furness to become an architect of the first degree. Still, Furness lamented that he never attended the Ecole des Beaux-Arts, until it became clear through his creative achievements, that he did, in fact, attain the knowledge, if not the degree. Years later, Frank Furness trained the young Louis Sullivan, who became known as *the father of the skyscraper*. Sullivan, in turn, trained Frank Lloyd Wright, who became known for a house called *Falling Water* located in Pennsylvania. Additionally, Frank left his mark on Louis Kahn, who trained Robert Venturi- the two other famous Philadelphia architects, bringing the legacy of "Furness" full-circle.

Selected buildings by Furness

Frank Furness designed over 600 projects from 1867 until his death in 1912, according to *Frank Furness: The complete works* (Thomas et al., 1996). Furness was an exceptionally prolific and creative architect for his zeitgeist of the Industrial Revolution in Victorian Philadelphia. The majority of Americans in his lifetime were immigrants or the offspring of recently established families. His was a time of minimal education, manual labor, and manufacturing jobs for the lower classes in Philadelphia. In professions like architecture, the required triplicate documents were still produced by hand, and the calculator had not been invented. After two years working in Hunt's office after the war ended, Furness had finally saved enough money to establish his practice, get married, and start a family, all in Philadelphia. The work of Furness must, therefore, be situated within the historical, cultural, and contextual tension between conservative Philadelphia, and progressive American democracy. "Given the unbridled originality of the Furness designs, what is more remarkable than the torrent of his work is his ability to persuade the reputedly conservative Philadelphia gentry and their institutions to accept his metaphors and insights as their own" (Thomas et al., 1996, p. 14).

It is unknown exactly how many buildings and projects by Furness remain, either in original condition or survives at all. Sadly, most of the work of Frank Furness has been either demolished or altered beyond restoration. Nonetheless, many buildings and projects designed by Frank Furness were visited and photographed by the author for this research. Of those, the four buildings selected illustrate his oeuvre, and support the thesis that Frank Furness was a creative genius. Perhaps Lewis (2001) captured this sentiment best, "Furness's buildings were perhaps the first to capture the modern industrial world in all its strangeness and wonder" (p. 252).

Thomas Hockley House – 1875

At the age of thirty-six, Furness designed this mansion in the Rittenhouse Square District of Philadelphia for Thomas Hockley, an influential lawyer. After acquiring more than ten years practicing architecture, Frank Furness exhibited *domain mastery* (Runco, 2014) with this project. The design illustrated originality, not only by employing Victorian and Gothic forms such as mansard roofs, pointed arches, pointed dormers, projecting bay windows, and a rusticated stone base, but by composing those same elements in novel ways (Figure 2). The corner of this load-bearing masonry building was a surprise-supported only by one column marking the entrance.

Figure 2. A single pier surprisingly supports a corner of the massive Thomas Hockley House.

The exterior walls were constructed from local materials, and the brick craftsmanship was incredibly inventive with many variations- cut, pressed, colored, stacked, diagonal, checkered, string-courses, and corbels.

Adjacent to the corner entry steps, a large chimney appeared to step out of the wall of the house, as a masterful arrangement of corbels in a work of sculpture (Figure 3). The composition of recessed entry and projecting chimney at the corner was original. Furness skillfully pushed and pulled elements on the front façade for sculptural effect- a hallmark of his future designs. Various elements were oversized and details combined in a collage-like manner that gave dynamic vitality. The craftsmanship was superb- rough stone base, dark brick bands, and intricate brickwork, wood entry doors, ornamental ironwork, chimney articulation, and complex roof styles. Furness would often insert decorative tympanum panels in the arches, and mark the entry to his buildings with stubby columns (Figure 4). The masonry alone is noteworthy; its rich detail and complexity are creatively juxtaposed against the homogeneity of red brick (Figure 5).Frank learned to manipulate the scale of elements when studying the art of caricature in Hunt's atelier, and here he applies exaggeration of size and pattern to create what would become called *"Furnessian or Furnessque"* design moves.

Figure 3. The corner design of the Thomas Hockley House is creative- original and appropriate to mark entry and support loads ceremoniously supported by one pier. Although the downspout added by contemporary owners detracts from the chimney design, and an extension has been added to the rear of the building, the design still conveys the originally of Frank Furness.

Figure 4. The entrance of the Thomas Hockley House is recessed back from the street behind ornate wood doors and original metalwork for security, privacy, and grandeur.

Figure 5. Furness freely mixed many styles of windows, materials, and details on the Thomas Hockley House for great sculptural effect and variety of patterns and textures.

Pennsylvania Academy of the Fine Arts – 1876

Figure 6. The Pennsylvania Academy of the Fine Arts, and City Hall capped by a statue of Penn seen in the distance, are distinctive landmarks that reinforce the city grid of Philadelphia.

Frank Furness won this commission in a competition because he satisfied all of the strict requirements of the program and related the design directly to the city of Philadelphia. Furness oriented the front of the building on Broad Street, instead of the much longer side facing Cherry Street as other competitors did. He recognized how important Broad Street would become with the ongoing construction of city hall filling in the central square of Philadelphia, and how it would change the scale and character of the city forever. City Hall was designed by McArthur and Walter in 1871 to be the largest Municipal building in the country, the most beautiful example of Second Empire style, the tallest masonry building in the world, and confidently hold the center of Penn's Philadelphia (Gallery, 2016, p. 74). As such, Furness's design for The Pennsylvania Academy of Fine Arts reinforced the importance of City Hall by placing the main entrance on Broad Street- the major north-south axis of Philadelphia (Figure 6).

Furness, along with his partner Hewitt, designed the extraordinary Fine Arts Academy building to be a game-changer in architecture. It was immediately recognized across the nation as a masterpiece by elite critics and

practicing architects alike. The building opened for the Centennial Celebration of 1876. Furness was required to use fireproof construction, provide a school for art students on the ground floor, galleries for art display on the second floor, and also incorporate the latest technologies and local materials. Furness designed translucent glass skylights on the roofs to admit diffuse, natural illumination. His insight to cover almost the *entire roof* of the building with skylights yielded total flexibility for arranging art. Architects from all over the nation visited the Pennsylvania Fine Arts Academy, and the Centennial Bank also by Furness, during the Centennial Celebration of 1876. Frank Furness became instantly famous. Indeed, covering the roof of the museum completely with skylights to provide diffuse, natural light for artwork, is still the standard for modern galleries, set by Furness in 1876 (Figure 7).

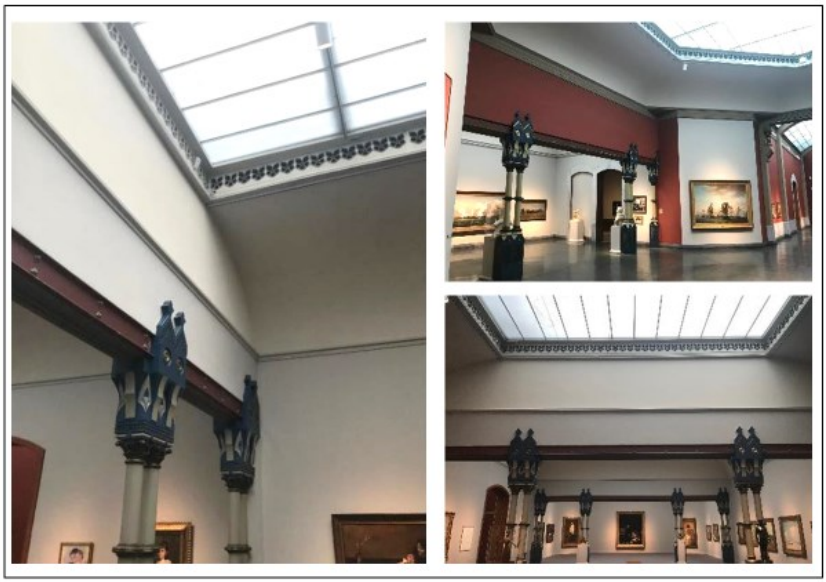


Figure 7. The Academy of Fine Arts galleries are all bathed with natural light.

Figure 8. Furness collaged styles together to create his own at The Academy of Fine Arts.

Figure 9. The Academy of Fine Arts' bifurcated entry evokes Gothic and Quaker buildings.

Like most creative geniuses, Furness was both lauded and ridiculed precisely for the unconventional thinking that made him ahead of his time. Praised for its ingenious application of structure and natural light, The Academy building was simultaneously criticized for its exuberant mix of materials and colors on the front façade. The composition of the front façade communicated to critics that Furness did not obey their general rule of using only one style for a single building. The Academy was certainly a surprise because there was nothing else quite like it at the time (Figure8). This unconventional design was therefore tough to classify- Victorian, Gothic, Queen Anne, Modern- typically *Furnessian*. Nonetheless, Frank did make legible references to his Philadelphia roots by using local building materials and industries.

Moreover, the over-scaled Mansard roofs, stone blocks at the base, and a double-entry portal gave the building a significant prominence worthy of Broad Street, and the Academy's elite status as the first art school in the country. Furness turned classical detail on its head and achieved a rare work of personal originality (Figure 9). Many architects had never imagined combining so much into one building, and few could hold the design together as successfully. With both witty praise and criticism, Gallery (2016) states, "The academy is the most outstanding example of Furness's work and one of the most magnificent Victorian buildings in the country. The façade is an amalgam of historical styles, fused in an aggressively personal manner" (p. 73). Furness never allowed anyone to squelch his unique creativity. When allowed to design freely, rules really were meant to be broken for Frank Furness. For the structure of the exterior masonry wall, Furness attained a level of creative achievement that was heretofore unseen in Philadelphia. He realized that the only way to meet all of the client's requirements and avoid placing columns in the art studios on the ground floor, was to do the unexpected and *invent* a new solution.

Figure 10. Furness inserted similar brick wall patterns as infill for the blind-window-arches and the open webs of the steel truss above the sloping skylight for The Academy of Fine Arts.

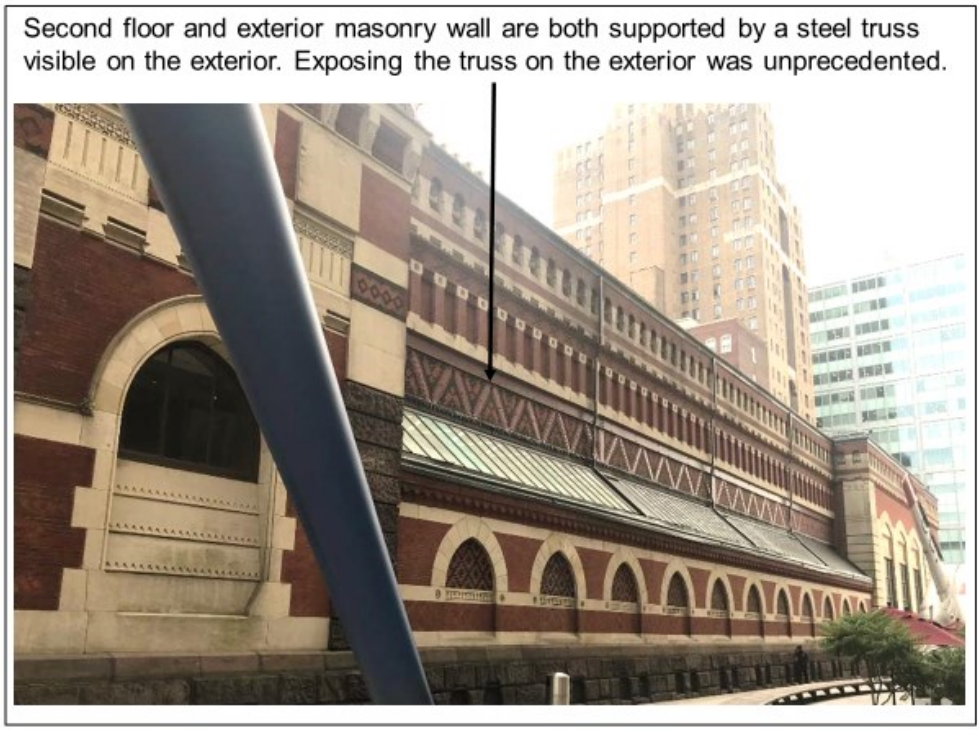


Figure 11. The Academy of Fine Arts sloping skylights illuminate first-floor art studios without compromising wall area. Skylights cover all of the art galleries on the second floor as well.

Frank Furness exhibited creativity by (a) spanning the longest dimension of the building with a large steel truss/girder to eliminate interior columns, (b) exposing the painted steel truss on the exterior, and (c) incorporating the truss into the decorative pattern of brickwork on the façade so seamlessly, that it is was a reward for discerning eyes (Figure 10). This move was structurally inefficient, unconventional, expensive, and counterintuitive- Furness turned the structure in the longest dimension rather than spanning the shortest dimension. His design solved the functional problems that no other competitor could. Not only did Furness expose the steel truss structure on the exterior, but he also integrated exposed structural members inside the art galleries. Perhaps Furness's most astonishing insight was to *celebrate structure* by pushing the very long and expensive truss to the exterior, ingeniously *signifying* the building structure as an *exoskeleton* (Figure 11). The design was so creative, skillful, unconventional, and ahead of its time that Frank's contemporaries simply did not know what to think of the building.

Figure 12. View looking west beyond bifurcated main entry towards grand stair of The Academy of Fine Arts. The building was praised when it opened during Centennial Celebration.

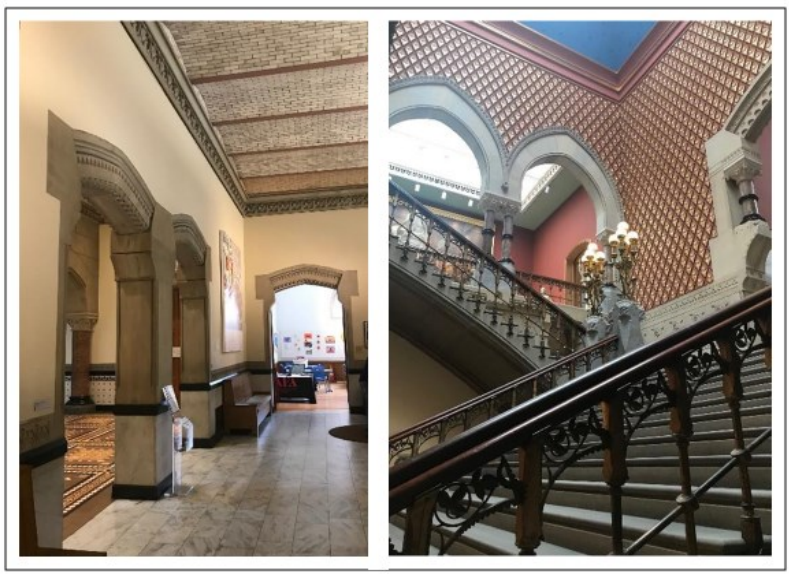


Figure 13. Structural brick vaults supported by steel beams are exposed in the first-floor ceiling of The Academy of Fine Arts. The central stair hall matches the exuberance of the front façade.

Figure 15. Ornamentation was based upon the gears, pistons, sprockets, and wheels of Pennsylvania Railroad locomotives at The Academy of Fine Arts.

With the Academy of Fine Arts, it finally seemed that the investment Frank had made in developing his creativity by studying the skin and bones of buildings all around him for over a decade was paying off, and Furness quickly moved to capitalize on his success. In alignment with *Sternberg's Investment Theory of Creativity,* the Academy of Fine Arts building confirmed that Furness possessed the confluence of synthetic, analytical, and practical intellectual skills, domain knowledge, open-minded thinking style, a risk-taking personality, intrinsic motivation, and a supportive environment from his father and Hunt to produce creative works of architecture on a consistent basis (Sternberg, 2016, pp. 359-362). Moreover, unlike his mentor Richard Morris Hunt who seemed trapped by his extensive education, Furness balanced his knowledge with the freedom to draw from his zeitgeist in Philadelphia. Frank also sought opportunities, encouragement, and rewards for his creative work. "Instead of being based on a look into the rearview mirror of history, the new Academy faced the present and the future. The academy's machine for making art can rightly be termed *the first modern building*" (Thomas, 2017, p. 12).

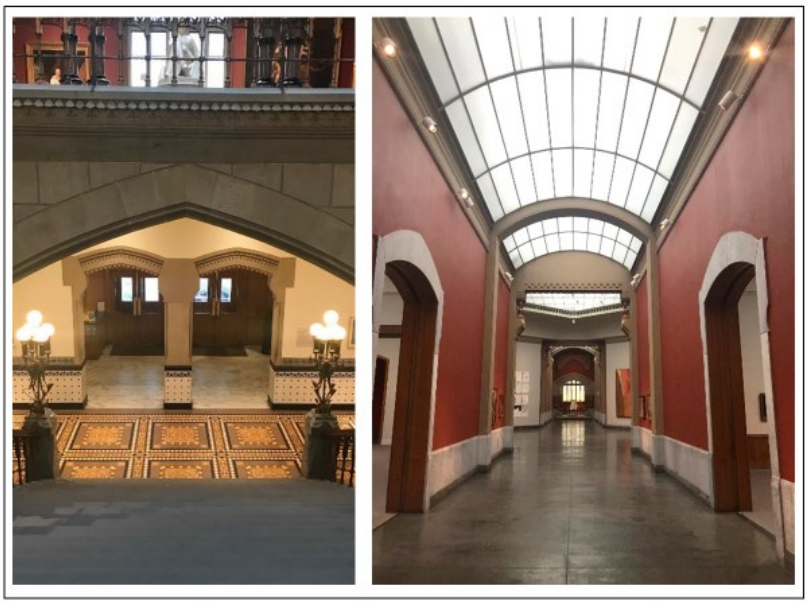


Figure 14. View looking east towards bifurcated main entry from the second-floor of The Academy of Fine Arts. Individual galleries can be closed with pocket doors for flexibility.

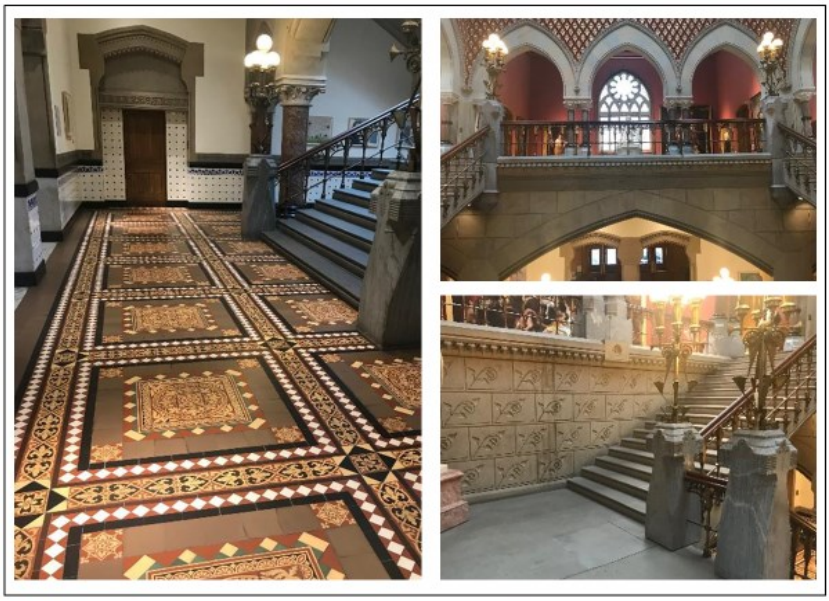


Figure 16. A magnificent stair hall is the heart of The Academy of Fine Arts circulation.

Figure 17. The Academy of Fine Arts galleries have iron columns, exposed beams, and skylights. Columns have discs added at the midpoint to evoke imagery of machine pistons.

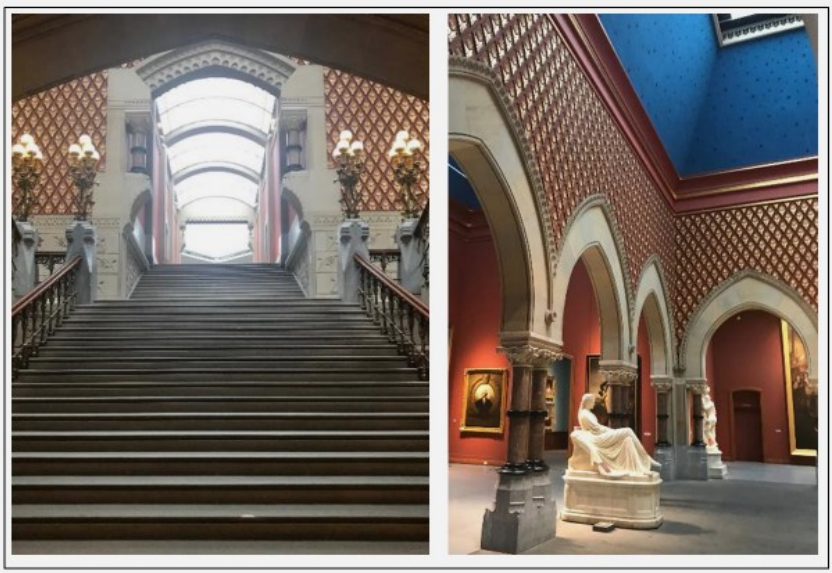


Figure 18. The Academy of Fine Arts transports visitors into a fantastical domain.

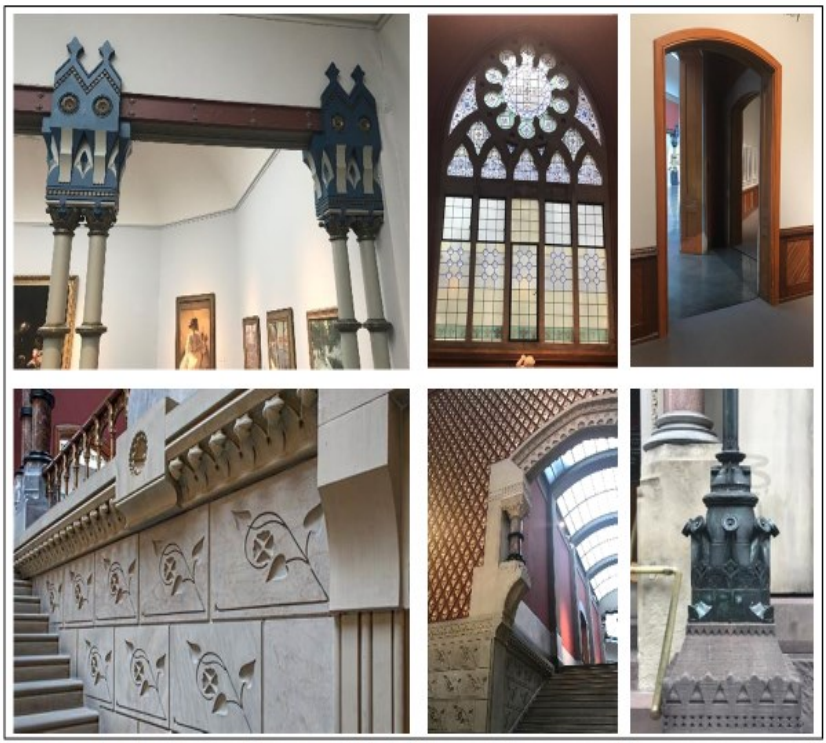


Figure 19. Almost all components of The Academy of Fine Arts building were made with machines in Philadelphia- bricks, stone-cutting, metalwork, and glass.

Centennial National Bank – 1876

With fame from The Pennsylvania Academy of Fine Arts commission, Furness received this project, designed to also open for the Centennial Celebration of 1876. Frank ingeniously located the main entrance on the bevel, so that it faced north towards 30th Street train station, northwest towards Lancaster Avenue, and southwest towards Woodland Avenue. Furness freely composed the entrance and overall form to recall the *exuberance* of Victorian buildings, and the *simplicity* of Quaker red brick buildings indicative of Philadelphia. "In the Centennial Bank Furness developed his expressive vocabulary, his blend of sources, to produce within the general Victorian style, a personal work of great distinction" (O'Gorman, 1973, p. 44). The roof gable-end over the main entrance was intentionally over-scaled and heavy-handed to attract attention from far away, like a caricature. Furness was praised in a national journal as architect of the two most interesting buildings of the Centennial Celebration. (Thomas, 2018, p. 3)

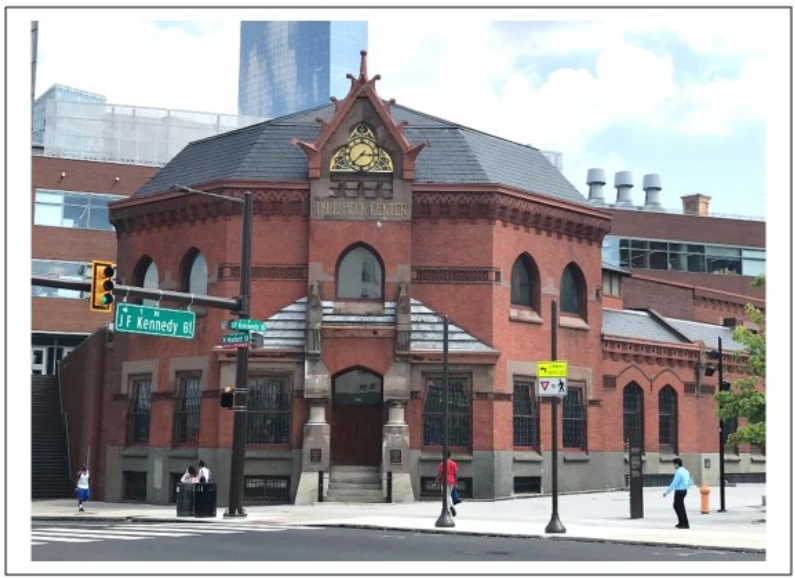


Figure 18. Centennial Bank was designed like a billboard on Market Street.

Figure 19. Centennial Bank is now preserved as a part of Drexel University's campus.

Figure 20. Centennial Bank interior has exposed brick, millwork, and a chandelier by Furness.

University of Pennsylvania Fisher Fine Arts Library - 1888

Figure 21. Fisher Library's Neo-Gothic forms create a sculptural landmark for the campus.

Figure 22. Furness combined many styles and freely composed elements at Fisher Library.

Figure 23. Fisher Library's reading room is the symbolic heart of campus, *and there is only one.*

Figure 24. Classic forms and industrial details are ingeniously combined at Fisher Library.

Figure 25. Elements appear to push and pull Fisher Library with exaggeration and juxtaposition.

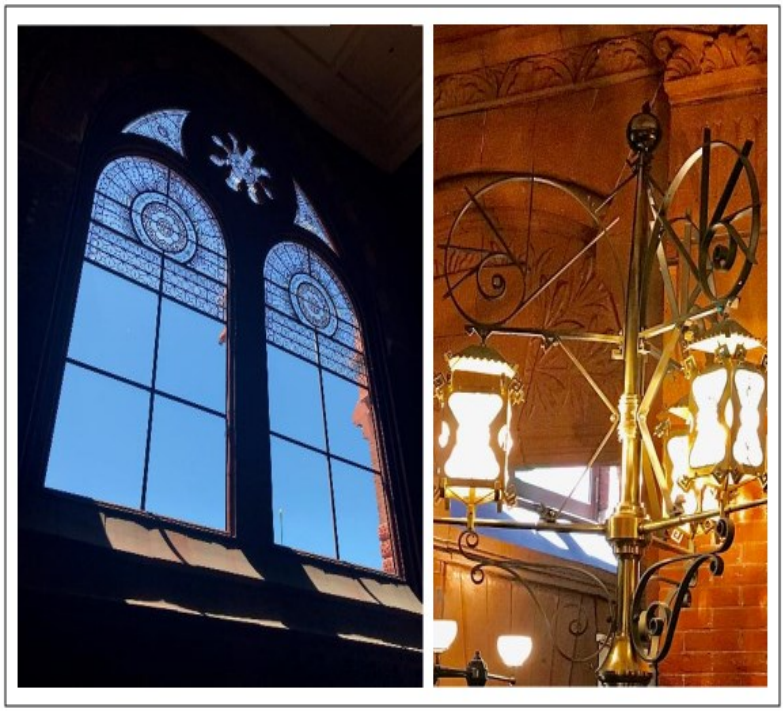


Figure 26. Fisher Library has unique details derived from locomotives and the Golden Section.

Conclusion

Five forces converged to shape creativity in Furness: the industrial roots of Philadelphia, the influence of his father, a gift from Emerson, tutelage from Hunt, and Frank's unconventional thinking. These factors helped Furness become an architect, unlike any other- an original. Despite his harsh critics, Furness expressed a playful optimism for his zeitgeist. Furness possessed a remarkably intuitive, unhampered, freedom of expression. Moreover, the rapid changes of the Industrial Revolution, traveling between two cities always under construction, and encouragement from family and mentors to *express his ideas*, combined to shape Frank's creativity as well. Furness possessed the traits conducive to invention, and thankfully, he also possessed opportunities to build.

This paper has shown that Furness received the encouragement and education necessary to develop his creative potential into extraordinary creative achievement. As evidenced by the numerous publications on Frank Furness, *The Standard Definition of Creativity* (Runco, 2012) was met by a man

with no formal architecture degree. The unconventional thinking, domain-knowledge, risk-taking, originality, and designs "Furness" realized around Philadelphia, were the manifestation of creativity.

Note:
All images are by the author, D. C. Sledge.

References

Beghetto, R. A., & Kaufman, J. C. (Eds.) (2016). *Nurturing creativity in the classroom* (2nd Ed.). New York, NY: Cambridge University Press. ISBN 9781107501300

Gallery, J. A. (2016). *Philadelphia architecture: A guide to the city* (4th ed.). Philadelphia, PA: Paul Dry Books.

O'Gorman, J. (1973). *The architecture of Frank Furness*. Philadelphia, PA: Falcon Press.

Lewis, M. J. (2001). *Frank Furness: Architecture and the violent mind*. New York, NY: W. W. Norton & Company.

Reisman, F. (2016). Creativity embedded into K-12 teacher preparation and beyond. In Beghetto, R., & Kaufman, J. (Eds.), *Nurturing creativity in the classroom* (pp. 162-189). New York, Cambridge University Press.

Runco, M. A. (2014). *Creativity: Theories and themes: Research, development and practice.* Academic Press. ISBN 9780124105126

Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal, 24*(*1*), 92-96.

Sternberg, R. J. (2016). Teaching for creativity. In Beghetto, R., & Kaufman, J. (Eds.), *Nurturing creativity in the classroom* (pp. 162-189). New York, Cambridge University Press.

Thomas, G. E. (2017). *First modern: Pennsylvania academy of the fine arts.* Philadelphia, PA: Pennsylvania Academy of the Fine Arts.

Thomas, G. E. (2018). *Frank Furness: Architecture in the age of the great machines*. Philadelphia, PA: University of Pennsylvania Press.

Thomas, G. E., Cohen, J. A., & Lewis, M. J. (1996). *Frank Furness: The complete works.* New York, NY: Princeton Architectural Press.

CHAPTER SEVEN

MARKING THE 105TH BIRTHDAY OF THE CONTEMPORARY FATHER OF MODERN CREATIVITY: E. PAUL TORRANCE

KOBUS NEETHLING

First Steps

I met Paul Torrance for the first time in March 1980. I was just appointed the first director of gifted education in South Africa (and in Africa) and was on a sabbatical to research the most successful gifted programs in the US and Europe. I believe that the first meeting set the tone for my decision to make 'Torrance Creativity' the essence of our South African programmes.

The first person to greet me as I stepped off the bus that brought me from the Atlanta Airport was Dr Torrance. It was this kind of generosity and kindness of spirit that distinguished him from most of his peers. During that first visit it became clear that he was keen to start a dialogue not only regarding creativity in South African education but creativity as a transformation tool (Remembering that it was the last decade of Apartheid)

In 1983, I returned and embarked on a Master's programme (I already obtained a doctorate a few years earlier) as well as a Post PhD – with the focus on the identifying and development of creative behaviour. For the following 20 years a mentoring friendship was established that not only changed my life forever but also impacted on many facets of South African society.

Beyonder Torrance versus Creativity Torrance

Over many years I have applied Torrance models and methodologies in business, education, sport and in my personal life. It became clear that Torrance was much more than just creativity and that the Beyonder research was in a sense a study in identifying 'successful' creativity. Successful creativity – the enhancement of the human being, the enrichment of the lives we touch, the progress in the organizations we train – the list is endless. It was thus the creativity of Torrance plus his passion, his courage, his perseverance, his empathy, his possibility seeking (rather than problem solving) that made him Mr Creativity of the 20th century.

Personal Experiences

Because of a very generous Rotary Scholarship I was given a house in a new development in Athens. Early on a Saturday morning, two weeks after my arrival, I heard strange noises outside my front door. Going outside I saw Paul and his wife Pansy on their knees planting flowers in the barren piece of soil outside our house. Apparently, the previous day he drove past my house and noticed the bleak patch of land and he decided he wanted to beautify my environment. An overwhelming sense of gratitude---coming from a far-off African country and experiencing kind-heartedness way beyond the ordinary.

Because Dr. Torrance could not drive a car, I had to drive him home after evening classes, drive him to seminars and talks outside Athens and accompany him on a number of errands. One specific afternoon we entered a supermarket and he took out a check list and started ticking off the items one by one. While packing the items in the trolley I asked him about the checklist (he never seemed a checklist person to me) And then he said these profound words: "The checklist is my left brain – and the more I respect my left brain the more freedom it gives my right brain."

There are so many wonderful and very special moments with Paul Torrance that it will fill a book but let me conclude with my last and maybe the most precious moment with him. He was in hospital and very ill – dying. I brought with me about 50 cards that South African children wrote to wish him well. Just as I was putting the cards on the table next to his bed, he shook his head whispering that I should put the cards on his chest. Slowly he picked up every card, smiling while reading the childlike messages these young children wrote. At that stage I had known Dr Torrance intimately for more than twenty years and I thought I knew him well. But again, this ultimate Beyonder surprised me with his humanity and compassion. His words will remain with me forever:" These little children took time and effort to write the cards – the least I can do is to show respect and read their cards."

Paul Torrance was much more than Mr Creativity of the 20th century – he was the ultimate Beyonder.

CHAPTER EIGHT

E. PAUL TORRANCE: MENTOR, COLLEAGUE AND FRIEND

KATHY GOFF

I first became acquainted with E. Paul Torrance's work in 1984 in a graduate school extension course called "Creativity for Teachers." The text was *The Search for Satori and Creativity* (1979). This book was about his creativity assessments and how they measured strengths. This meant that you could only add points, not lose points, on the tests. This resonated so strongly with me that I focused my master's thesis on creativity and decided to go to the University of Georgia to study at the Torrance Center for Creative Studies and pursue a doctorate in 1987.

Upon arriving in Athens, Georgia, I found that Dr. Torrance had retired and was working out of his home. I met him within 2 weeks of arriving. He called me the next day to hire me to evaluate his assessment, *Sounds and Images*. I jumped at the opportunity and began work immediately. I continued to work for EPT daily as his personal research assistant for the next four years.

I wore many hats while working for EPT, chauffeur (he didn't have a drivers license), researcher, co-author, secretary, gardener, errand girl, graduate student. Most mornings began with dictation in response to the numerous letters he received. I literally sat at his feet, on the floor, to take notes. He had torticollis which caused his head to slump forward, so it was easier for us to communicate if I sat below him, plus I got to play with Princess the Cat.

I asked EPT to be my mentor and he said that he would be "unofficially." I wondered why, but didn't question him. About 6 months later, I experienced the professional jealousy that still remained in the Educational Psychology Department at the University of Georgia where EPT was Department Chair. One particular incident left me disillusioned and initiated my search for another doctoral program. When I told EPT about it he gave me a sticker of a smiling cat that said, "Grin and ignore it!"

I changed majors to a department that was very respectful and accepting of our work together. When I switched majors, I began focusing on older adults, EPT found a national research grant project for us to participate in. EPT actively participated in my doctoral research and served on my doctoral committee. We published several articles about this work initiating his study of creativity in later life.

Torrance believed that each person is unique and has particular strengths that are of value and must be respected.

> It takes little imagination to recognize that the future of our civilization – our very survival – depends upon the quality of the creative imagination of our next generation. Democracies collapse only when they fail to use intelligent, imaginative methods for solving their problems. (Torrance, 1962, p. 6)

Research

A pivotal point in Torrance's career came when he accepted the appointment of Director of survival Research for the U.S. Air Force. In survival training, Torrance was immersed in experiential learning which thrilled and excited him. He and his staff developed training materials for combat aircrews to survive in extreme conditions.

Through his research, Torrance learned that creative behavior is required in emergency and extreme conditions. His research laid the foundation for his lifelong pursuit of identifying and developing creative potential. He learned that the underlying element of survival is creativity. His "survival" definition of creativity is "whenever faced with a problem with no learned or practiced solution, some creativity is required." (Millar, 1995, p. 39)

Upon the close of the Korean War and the closure of the survival research training program, Torrance was appointed director of the Bureau of Education Research and professor at the University of Minnesota.

Torrance had been involved in original research for several years and the University of Minnesota provided an opportunity to gain an understanding of the role of creativity in the education of gifted children. He had seen creativity 20 years earlier in many of the most difficult students while teaching at Georgia Military College. He described them as "wild colts" and saw the same characteristics in the jet pilot aces that he trained at the Survival Training School. According to EPT, there is little doubt that one's creativity is his most valuable resource in coping with life's daily stresses. (Torrance, 1962, p. 2)

It was at the University of Minnesota that EPT launched his longitudinal studies from1958 to 2008, the longest running study of creativity to date. In the longitudinal studies, Torrance found that students identified as creatively gifted, but not intellectually gifted (IQ of 130+), out achieved the intellectually gifted during adulthood. He found that characteristics of the creative thinking abilities differ from those of the abilities involved in intelligence and logical reasoning. In fact, the use of intelligence tests to identify gifted students fails to identify about 70% of those who are creatively gifted.

Theses studies led to the development of the *Torrance Tests of Creative Thinking* (*TTCT*) in 1966 for students in kindergarten through graduate school. The *Torrance Tests of Creative Thinking* (TTCT) are the most wide-

ly used tests of creative talents in the world and have been translated into over 50 languages. He found that creative growth seems to be greatest and most predictable when deliberate, direct teaching of creative thinking skills is involved.

Torrance chose to define creativity as a process because he thought if we understood the creative process, we could predict what kind of person could master the process, what kind of climate made it grow and what products would be involved.

It takes courage to be creative. Just as soon as you have a new idea, you are a minority of one. Torrance found that learning and thinking creatively takes place in the processes of sensing difficulties, problems, gaps in information; in making guesses or formulating hypotheses about these deficiencies; in testing these guesses and possibly revising and retesting them; and finally in communicating the results. Vital human needs are involved in each of these four stags. (Torrance, 1962, p. 6)

If we sense something is missing or wrong, our tension is aroused and we become uncomfortable. To relieve our tension we try to make guesses in order to fill gaps and make connections. We know that our guesses may be wrong, but we find out early on if they are correct. Thus we are driven to test our hypotheses, to modify them, and to correct our errors. Once we make a discovery, we want to tell somebody about it. It is natural for humans to learn creatively.

Torrance extended his work to older adults when we studied their creativity from 1989-1991. We participated in the Quality of Life study of elders transitioning from rural sheltered workshops to their local community senior centers. We developed a "recipe" book of activities for an Activity Directors or senior themself to lead in the creative expressive arts of art, dance, drama, fitness and creativity.

Graduate students from each discipline were taught to develop and lead the transdisciplinary activities using Torrance's Incubation Model of Learning. The study involved 13 rural senior centers in Northeast Georgia. Over a 4 month period of experiencing the creative activities for 3 hours per week, the participants' creativity and life satisfaction increased significantly when compared to non-participants.

We continued this line of research resulting in the creation of the *Abbreviated Torrance Tests for Adults* (ATTA) in 2000. I have continued our to research into the creativity of adults with the development of a cloud-based creativity assessment called the VCAI (*Vast Creative Abilities Indicator*) (www.vastlearningsystems.com) with my colleague, Dr. Erik Guzik.

Insights

Based on his longitudinal studies, EPT gave us with two manifestos for developing creativity, one for children and one for adults. The Manifesto for Children came from his 22-year follow-up (Torrance, 2002).

Manifesto for Children

E. Paul Torrance

1. Don't be afraid to fall in love with something and pursue it with intensity.
2. Know, understand, take pride in, practice, develop, exploit, and enjoy your greatest strengths.
3. Learn to free yourself from the expectations of others and to walk away from the games them impose on you. Free yourself to play your own game.
4. Find a great teacher or mentor who will help you.
5. Don't waste energy trying to be well rounded.
6. Do what you love and can do well.
7. Learn the skills of interdependence.

The 40-year follow-up gave us the term Beyonders which is meant to designate individuals in society who exhibit advanced creativity—individuals who move beyond others in terms of the development and application of advanced creative thinking and problem solving abilities (Torrance, 1995).

Manifesto for Adults

E. Paul Torrance and Garnet Millar

Being a Beyonder means doing your very best, going beyond where you have been before, and going beyond where others have gone.

- They are tolerant of mistakes by themselves and others.
- The beyonders take delight in deep thinking.
- They are able to feel comfortable as a minority of one.
- They love the work that they do and do it well.
- They have a sense of mission and have the courage to be creative.
- They do not waste needless energy trying to be well rounded.

EPT had an amazing memory. One assignment was to fill ninety-two 8 ½ x 11" photo albums with photos from his lifelong research. He remembered every person in every photo, even teachers and students who participated in his research.

He must have created a ninety-third album citing me as Princess the Cat's favorite playmate. EPT and I had many similar interests. We both love plants and growing them. We both love cats and humor. EPT tried to get me to work on developing an assessment of creativity in humor. I did research it quite a bit, but it just seemed too infinite to me. I do believe that humor and creativity are connected, because it is often the unexpected or a twist that evokes humor. Without creativity, there is no humor.

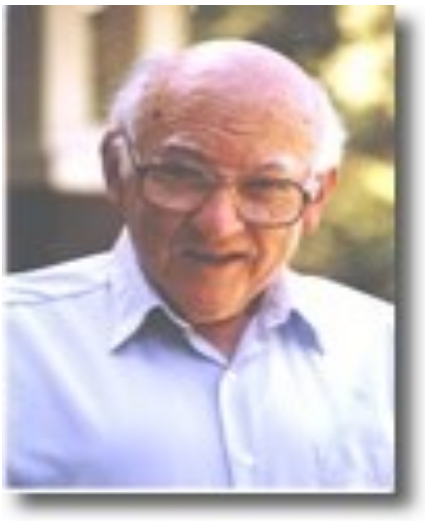
EPT shared the following experiment with me. The experiment, using a single litter of rats, demonstrated the power of learned behaviors as a result of sensory deprivation. The litter was divided into three groups. The ears of one group were taped, the eyes of another group were taped, and the third group was left alone. In time, the taped groups learned to adapt to their deafness and blindness. The tape was then removed, and they learned to adjust as hearing and seeing rats. However, when placed under stress, the rats that had been taped reverted back to their deaf and blind behaviors.

So, if we learn to suppress or neglect our creative potential and are later faced with stress as adults, we will most likely not refer to or rely on our creative abilities to deal with stress. We will revert back to learned defensive behaviors instead of opening up to new possibilities and options. There is little doubt that one's creativity is his most valuable resource in coping with life's daily stresses. (Torrance, 1962, p. 2) EPT refuted the Golden Rule. He said that people want to be treated how they want to be treated. not how you want to be treated. It took me a while to comprehend what he was saying. So if you are sarcastic and like biting humor, don't assume everyone enjoys those characteristics. Or if you like small intimate gatherings, don't assume

everyone does. So, a revised Golden Rule would be to treat everyone how they want to be treated.

Summary

EPT was a physically challenged country boy who learned to live comfortably as a member of a minority. He struck out to understand the strengths of smart and clever people who don't fit the norm. He was playful, intelligent, positive, humble, hard working, fun loving and very spiritual. He was a tireless advocate for creativity and the creative potentials of all people of all ages and abilities. E. Paul Torrance was brilliant. He was my mentor, my colleague and my friend. I really miss him.



References

Millar, G. W. (1995). E. Paul Torrance: "The Creativity Man." Norwood, NJ: Able.

Torrance, E. P. (1962). Guiding Creative Talent. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Torrance, E. P. (1979) Th Search for Satori and Creativity. Buffalo, NY: Creative Education Foundation.

Torrance, E. P. (1995). Why Fly? A Philosophy of Creativity. Norwood, NJ: Ablex Publishing Corp.

Torrance, E. P. (2002). The Manifesto: A Guide to Developing a Creative Career. Westport, CT: Ablex Publishing.

CHAPTER NINE

UNLEASHING CREATIVE TALENT: THE ENDURING LEGACY OF E. PAUL TORRANCE

JOAN FRANKLIN SMUTNY

ABSTRACT The contributions of E. Paul Torrance to the cause of creativity are immense, so much so that it would not be an exaggeration to state that his pioneer research, writings, teaching models, creativity tests, and longitudinal studies laid the groundwork for creativity as a field. I became aware of his work while founding The Center for Gifted in 1983 and responding to what I saw as a dire need for young people to do something with their talents other than absorb and reproduce academic subject matter. What would happen if, instead of having advanced students acquire more and more knowledge, they could devote at least some of their time to problems or challenges that have no single solution, that require instead a creative response? The Center for Gifted/Midwest Torrance Center for Creativity is a response to this question. Since its inception, the Center has become a source of inspiration and invention for thousands of children and young people, PreK-grade 12, precisely because of its creative programming in the humanities, sciences, technology, engineering, math, and the arts. The Center also hosts The International Torrance Legacy Creativity Awards competition which began in 2009 in conjunction with Frank Kauffman of the Scholastic Testing Service. The first year focused on creative writing (stories and poems) for ages 8 to 18. In subsequent years, visual art, musical composition, and, in 2014, inventions became divisions in the annual competition. Entries come from many countries and participation continues to grow, demonstrating that the creative spirit is alive and well in young people, and in great need of encouragement and support.

Unleashing Creative Talent: The Enduring Legacy of E. Paul Torrance

Fondly called "The Father of Creativity," E. Paul Torrance devoted his life to unlocking the talents of thousands of children and adults in the United States and around the world. Like so many, I was touched and inspired by his immense contributions as an author of almost 2000 books and articles (Millar 2007, p. xxi), and pioneer in creating teaching models such as the Torrance

Incubation Model (TIM), in his longitudinal studies of creative learners, and in developing the widely used Torrance Tests of Creative Thinking.

With such accomplishments, one might expect a towering figure, pressured by the demands his success brought upon him, and careful about his time, but Torrance was the opposite. Instead, I found a man of great depth, but also of modesty and kindness, a rare combination. He had tremendous generosity—sharing time he barely had with students, visitors, scholars, and colleagues with whom he openly collaborated and promoted. There was always much to do, but he never failed to make time for people who came to him for a chat or for help on some problem or question they had.

I had occasion to visit him a few times in his home in Athens, Georgia. We would sit in his study and share experiences with creative teaching and our hope that creativity would become more fundamental to education across the globe. It was so clear to me then that his focus in developing creative potential was not simply a career choice, but a true calling.

> He was a leader who motivated individuals to apply their energy and creative abilities to make the world a better place in which to live. From Georgia farm boy to world renowned scholar, E. Paul Torrance has made an indelible mark and significant contribution to our understanding of creativity, problem solving, and intelligence… (Millar 2007, p. 233).

Torrance was a visionary—keenly aware that creativity has the power to transform individuals, organizations, and communities through creative endeavors that address real world problems. He once quoted Plato's observation, "What is honored in a culture will be cultivated there" (Shaughnessy, p. 448), stressing the deeply felt need people have to follow what they love and use their greatest strengths. Working toward a world that fully honors and cultivates creativity became Torrance's life work.

Creativity Definitions

Creativity defies precise definition. This conclusion does not bother me at all. In fact, I am quite happy with it. Creativity is almost infinite. It involves every sense—sight, smell, hearing, feeling, taste and even perhaps the extrasensory. Much of it is unseen, nonverbal and unconscious. Therefore, even if we had a precise concept of creativity, I am certain we would have difficulty putting it into words. (Torrance 1988, pg. 43)

It may seem contradictory that Torrance, the man who developed creativity models, tests, initiated and supervised longitudinal studies, and wrote prolifically on how to elicit the creative and imaginative powers of students through fairly specific processes should at the same time see creativity itself as indefinable and even elusive. Yet this is what makes his concept so rich and limitless. He once said: "The truly creative is always that which cannot

be taught. Yet creativity cannot come from the untaught" (1988, pg. 58). In many of our conversations, he made comments similar to this and we often spoke about the elements or processes that elicit the creative response and help students discover it and then channel it through practice and discipline. But the creative moment, the sudden shift in consciousness arrives in its own time, when combinations, connections, and imaginations have prepared the ground. I saw this played out repeatedly in my own experience with creative programming for gifted students.

Survival Process

During the 1950s, Torrance worked for the U.S. Air Force as Director of Survival Research, focusing on jet fighter pilots and the process by which jet "aces" must draw upon their creativity as independent risk-takers to address potentially dangerous problems with no practiced solution. His survival definition—"the briefest and, in some ways, most satisfactory definition of creativity" (Millar 2007, pg. 37)—involves great urgency, as the pilots often faced emergencies and extreme conditions in their missions. When problems arose, they drew upon their training, shared experiences, specialized knowledge. Yet the conditions would arise that required a response beyond the practiced one. This was where, according to Torrance's research, creativity entered the scene. The "aces" had to focus their skills, knowledge, and creative thinking to calculate their risks and discover a new solution.

Though not all creative problem solving happens under such extreme conditions, Torrance maintained that human need often impelled and propelled it. He stated, in fact, that his survival research was one of the most significant influences on how creativity operates in many other circumstances. Discovering a new way to fix, solve, or restore something is a natural process. "Such a definition places creativity in the realm of everyday living and does not reserve it for the ethereal and rarely achieved heights of creativity" (Shaughnessy 1998, pg. 442). It begins with sensing problems, gaps in knowledge. Teachers assist students in moving forward through questioning, encouraging, mentoring; new ideas surface which lead to other responses not considered; actions are suggested and tried; students re-consider the nature of the challenge, leading to further interpretations and options to explore; students test, re-test, revise, refine ideas; they share their discoveries. There is an emotional aspect to this creative work. Discomfort or tension over the problem (something must be done), curiosity about its baffling or complex nature (what is its nature?), drawing on multiple resources, viewing it from different angles (does it change?), making associations, taking risks, theorizing, improvising and so on. Even at the end, when verifying their new, never before imagined idea, students are not satisfied until they share their discovery or invention with others.

Incubation Process

The Torrance Incubation Model, which Torrance first created in 1966, follows three stages which are nevertheless interactive: 1. Heightening Anticipation; 2. Deepening Expectations; and 3. Keeping It Going (1994, pgs. 215-233). Many of the elements in this model are similar to those that teachers have designed with great success in the programs I developed at the Center for Gifted. Imaginative children from diverse backgrounds throughout Chicagoland—those who feel they will never fit in, who learn and think differently, or are so curious and creative they run into trouble in school—often come to our doors hungry for some encouragement of their hidden abilities. When beginning a new program, I often stand at the door to greet the new students. Many are tentative but curious, hopeful even. As time passes, the growth and transformation become evident as they rush to their classes, make new friends, take creative risks, and attempt new challenges.

In addition to such strategies as arousing curiosity and interest, exploring and integrating new information, following hunches, considering new questions, interacting with a variety of resources, making associations, sharing ideas, discovering humor, looking below the surface, other arts-related processes come to play: drawing on the senses ("listening to smells"), visualizing, moving, feeling, intuiting; or being open to other interpretations, reviewing progress, making leaps to new thoughts ("cutting corners"). The incubation process is highly immersive and encourages children to draw broadly on their knowledge and experience as well as their unique qualities. In my experience, this kind of approach enables young people to become aware of their greatest strengths, some for the first time, and to use their creative powers to forge a new path for themselves.

The Center for Gifted and Midwest Torrance Center for Creativity

The Center for Gifted / Midwest Torrance Center for Creativity fosters creative and intellectual growth in talented Chicago area students, including those from multicultural and economically disadvantaged communities. Since its inception in 1983, the Center has become a source of inspiration and activity for thousands of children and young people, PreK-grade 12, through its creative programming in the humanities, sciences, technology, engineering, math, and the arts. Classes and workshops have included such topics as Moto-Pets, Creative Writing, Art Workshop, Physics Experiments, Engineering Challenges, Photography, LEGO Free Builds, Lego WeDo and Mindstorms Robotics for younger students. For older students, there has been Creative Writing, Computer Graphic Design, Combustion and Pyrotechnics, Geometry Art and Architecture, Scene Study, Stand-Up, Mysterious Math, Eco-Warriors, Artists' Studio, Creating Music in a Digital World, Fashion Design, History Games of Strategy and Diplomacy, and STEM with STEAM: Rube's Longevity.

Instructors for the summer and fall programs are often professionals in their fields and assume a mentoring role with students. The range of experience and expertise draws students into real-world phenomena, problems, designs, and inventions; they become aquatic biologists, filmmakers, engineers, journalists, architects. The opportunity to test out the broader professional world—working on immersive projects that are significant to a field that interests and intrigues them—ignites their imagination and makes them curious. I have seen a child develop a keen interest and passion for a subject for the first time in their lives, the direct effect of exposure to new worlds previously unknown to them.

Meeting E. Paul Torrance was a particular joy for me as I had always forged ahead with a vision to develop programs for gifted students that would focus more on creative growth. Rather than have them use what they'd mastered in knowledge and skill to acquire more advanced knowledge and skill, I felt they needed to use at least some of their time on creative endeavors—to try something new, take risks with what they knew, step into the unknown, improvise with materials, question, combine, explore. Guided, open-ended activities for students to peer into the mysteries of a problem or situation may require more time and preparation, but the benefits in terms of class motivation, discovery, and invention cannot be denied.

Catalysts

Like the first step in Torrance's incubation model (Heightening Anticipation), every class in our programs begins with some kind of catalyst, stimulating curiosity and engagement. It may begin by exposing children to unusual materials (cubist paintings and a box of random objects for a writing class), a visiting professional (an actor playing Isaac Newton for a physics class; a spoken word poet for a journalism class), or a short activity to start children wondering. What is that? What made that happen? Where did it come from? Young people quickly intuit that something different is being asked of them.

Students love to discover things on their own. A creative math teacher who has regularly taught at the Center once told me that students should be given opportunities to "invent math for themselves"—that is, not just learn mathematics created by others, but explore special cases that enable them to make discoveries—to think openly and inductively and formulate theorems in new ways. In a class of creative third graders, he would start off with a visualization. One day he asked them to imagine that a man on the 25th floor of an office building threw his dictionary out the window. They were to place themselves on the outside of the building about half way down and watch the book fall. Did it pick up speed as it fell? They closed their eyes to imagine this. Then the teacher asked for their conclusions and why they suspected the object accelerated or did not accelerate as it fell. He followed this exercise with a simple experiment and validated, to the instant delight of the children, many of their suspicions.

In another class he taught, students learned by creating paper models of the Archimedean solids. They cut out orange pentagons, folded the flaps, stapled these together, and discovered that 12 pentagons fit together nicely to form a three-dimensional object (called a dodecahedron). While sharing their observations, the teacher then gave them triangles to cut out and fit together into three different solids. One of the children suggested putting triangles and pentagons together, which formed a solid called icosidodecahedron. The children took great pleasure in discovering the various solids, which were then hung on the wall and labeled with the name given to them by Archimedes 2000 years ago. Since these solids form the basis for all crystal structures and for the arrangement of atoms in molecules, building them helps children develop the three-dimensional image so necessary in the study of geology or chemistry.

Resources

A wide range of resources—rich, multilevel, various (different fields, textures, colors, cultures)—provide the environment students need to step beyond the known. Traditional schooling may not prepare them for the ambiguities, the unexpected twists and turns of creative work. As most teachers will testify, activities rarely run as smoothly in open-ended learning as they do in one-answer assignments. The rewards to be had are intrinsic to a process that children do not yet understand or necessarily trust. It is a sad truth that very young children, whose imaginations seem boundless and who freely associate what they learned in one situation with another quite different circumstance, can sometimes lose touch with this natural creativity as they get older. Yet, not all do. A nine-year-old gifted student sent a poem for the Torrance Legacy Creativity Awards competition in 2017 that ingeniously interwove creative writing with mathematics in a highly imaginative way.

Mathus Antonius Speaks

By Tanmay Kulkarni

A mathematical parody of Marcus Antonius' speech in Shakespeare's Julius Caesar

Friends, Romans, numerals, lend me your ears;
I come to square Caesar, not to root him.
The reciprocals that men forge live after them;
The coefficients are oft lost with their bones:
So, let it be with Caesar.
The noble Brutus Hath told you Caesar was in base-two:
If it were so, it's a dreadful binary;
And grievously hath Caesar resolved it.

Here, under leave of Brutus and the rest, —
For Brutus is a noble exponent;

So are they all, all noble exponents, —
Come, I to speak in Caesar's funeral.
He was my friend, a faithful variable:
But Brutus says he was in base-two;
And Brutus is a noble exponent.

He hath brought many brackets home to Rome,
Whose axioms did the general theorems fill:
Did this in Caesar seem to be in base-two?
When that the primes have left, Caesar hath wept:
Notation should be made of sterner stuff:
Yet Brutus says he was in base-two;
And Brutus is a noble exponent.

You all did see that on the Modulus I thrice presented him infinity,
Which he did thrice refuse: was this base-two?
Yet Brutus says he was in base-two;
And, sure, he is a noble exponent.

I speak not to disprove what Brutus spoke,
But here I am to speak what I can prove.
You all did love him once, not without logic:
What logic withholds you, then, to mourn for him?

O judgment, thou art fled to great mistakes,
And men have lost their logic!
Think with me;
My decimal is in the coffin with Caesar,
And I must pause till it come back to me.

Experiences that combine different fields in this fashion, that use activities like visualization, dramatics, inductive reasoning, experimentation, and intuition lead students to more original work. Resources are key to this process. In a class of rather tentative seventh and eighth grade writers, the teacher introduced a poetry section by presenting several paintings. She asked the students to close their eyes and place themselves in a Van Gogh's Café Terrace at Night (1888), in Toulouse-Lautrec's At the Moulin Rouge: The Dance (1890), or in Remedios Varo's whimsical Cat's Paradise (1955). After a minute or so, they jotted down a jumble of words and phrases—whatever came to mind—without any conscious effort to form sentences or make sense. Next, they arranged them into four or five phrases and offered at least two interpretations to their writing through dramatic readings. It was in these readings, that the students discovered the flexibility of words. Many of them began to experiment. One child read a few lines in a mood that conflicted with the words he wrote, while other children analyzed the dramatic effect

of combining disparate images. In this way, an hour of prolific poetry writing began. Thoughtful scribblings of engaged children gradually replaced the silence of a class staring at blank paper. As days passed, writers became more confident in sharing their work—sometimes dramatizing a poem or life story, or having different peer "interpreters" read other children's writing anonymously.

An art teacher wanted to introduce cubism to her students. The class first explored paintings by Pablo Picasso and Georges Braque. Through an open questioning process, the class observed that breaking a scene, object or person down into planes made it possible to depict different viewpoints simultaneously. The teacher introduced images of African masks and sculpture, describing the influence of this aesthetic on Picasso and other European artists in the early 1900s—how they integrated highly stylized representations of the human figure into their works, creating fragmented shapes. Cubist artists abandoned a single viewpoint, instead using simple geometric shapes, interlocking planes, and, later, collage. Contemporary examples of cubism, especially in collage, helped students see how they could create more subjective art works.

After some time, exploring and engaging with the images, the teacher then led them all outside with their sketch pads and asked them to walk up to a nearby tree and study all the intricate shapes—blocks-- in the trunk (or anywhere else the children wished to focus). They studied their "subject" and simply rendered on paper the designs (shapes) they saw. Returning to the classroom, they broke them up into different blocks, examining them from different angles, and assembled their subject to reflect their interpretation and insight. Some children incorporated other materials in a collage, adding new textures, colors, and moods to their creations. They discovered with great surprise the beauty of their patterns and the individuality of each person's interpretation. Intuitively the class began to perceive the mazelike internal structure of even the simplest objects and noticed further that the shapes of the space around objects have distinct form and patterns as well. These realizations enlarged their vision and altered the way they tackled not only art but other subjects.

Creativity and Underserved Students

Torrance once told the story of Tammy Debbins, a gifted first grader from the projects with an IQ of 177. A highly imaginative child, she attended a school where no one understood her or recognized her creative talents. In consequence, Tammy became invisible, not only to the teachers who could have encouraged her, but to herself. Within a few short years her performance slipped to average. Sadly, Tammy never used her gifts or even knew she had them. One of her greatest regrets, in fact, was that she wasn't "very smart" (1980, p. 152)

To address tragedies such as Tammy's, Torrance formulated what he called the "creative positives" of disadvantaged youth as early as the 1950s and 1960s (1994, pgs. 152-168). Torrance observed that students whose backgrounds differ from the dominant culture in schools nevertheless show high ability in such areas as improvisation (language—verbal play and inventiveness, use of materials, problem-solving), spatial reasoning (visual arts, keen observation of external cues, signs, behaviors), and kinesthetic processing (hands-on experiments and explorations, role playing, dramatic arts) and many other areas yet to be explored. This is not dissimilar to the findings of educator-anthropologist Luis Moll (1992) in Mexican-American neighborhoods of Tucson. Resisting the deficit approach to this community, he maintained that discovering the expertise, talents, and skills of bilingual communities should become the starting point for the education of these children—an approach he called "funds of knowledge."

In order to reach the wide spectrum of talents, interests, and backgrounds in children from diverse backgrounds, programs at the Center for Gifted draw on creative strengths. Classes in art, architecture, science, and technology, for example, begin with what students bring to the table—their passions, skills, life experiences, inventiveness, humor, and so forth. Many courses expose children to fields they ordinarily would not study in school—law, filmmaking, engineering, robotics, all taught by mentors who can share their professional experience and design meaningful projects. A former college professor taught a class in one of our programs called Mathematical Curves, which involved students in a progression of explorations from the simplest circles to the more exotic cycloid and spiral curves. Finding curves in spider webs, soundwaves, and galaxies, as demonstrated in class activities, stimulated new discoveries for many children.

Students from diverse backgrounds have always attended classes together in Center programs. In such circumstances, there may be differences in knowledge and skill depending on their academic background and other factors. However, teachers consistently notice that by setting up creative projects in an open learning environment and by anticipating special needs and accommodating them, everyone participates. Working together eliminates comparisons or feelings of not fitting in. Children grow in confidence as they share different experiences and viewpoints.

In an Aquatic Biology class, urban and suburban students researched the ecosystems of rivers, lakes, and ponds, comparing their findings. They tested samples, studied organisms, and made discoveries about the biodiversity in a local stream. Others took notes and sketched animal life in and around the water—chickadees, minnows, a toad, squirrels, dragonflies.

Diversity in the student body enhances creativity overall. The pooling of multiple ideas and viewpoints as children share and work together expands creative achievement. Students bring their different cultures, histories, experiences, and talents together to pursue a common interest or solve a problem, and everyone benefits.

Open House

Torrance pointed out that the discovery of a creative idea or the solving of a problem feels incomplete/unfinished until it is shared with others (1994, pg. 49). The Center's open house events are animated happenings. Children and young people are thrilled to share their projects—art work, writing, inventions, robots, math experiments and models, dance pieces, and theater performances. Parents who attend an open house, observe their children in action—on the dance floor, on stage, in the science lab, in print. Teachers explain the class projects and share ideas with parents on resources for their children during the year.

A notable performance at an open house took place when a drama teacher in our three-week Project program used the work of Eduardo Galeano—*Walking Words* (1995) with evocative woodcuts by Jose Francisco Borges—to prepare a class of culturally diverse students for a dramatization. Art class students created paintings based on the woodcuts which they displayed for the performance, while those in the theater class selected and prepared their "pieces." Galeano's stories and poems—brilliant, simple, and whimsically told—draw on the rich folklore of rural and urban Latin America. An extraordinary event for both students and families, each tale or poem inspired different talents. Some students acted and mimed, others read, others choreographed and directed, and others created costumes or designed and built props. The source material had wide appeal. Children felt they found their cultures and their voices in the stories, the speech of their parents or grandparents. Others enjoyed the novelty of the fables, aphorisms, and fairytales with their unexpected turns and poetic language. Mentoring the small groups, the teacher loved observing students discover how subtle changes in direction, movement, or style of reading could shift the interpretation of words. "In Galeano's 'walking words,' we became a community," she said.

Torrance Legacy Creativity Awards

The international Torrance Legacy Creativity Awards competition embodies and imparts the commitment and vision of E. Paul Torrance. Founded by John Kauffman at Scholastic Testing Service and I, this competition is now in its 10th year. John Kauffman, who sadly passed away in 2013, came to my home one day in 2008 and we sat in my living room sharing personal stories about E. Paul Torrance. In impromptu fashion, we spontaneously came up with an idea that I believe would have pleased him. We formulated a plan for an international creativity competition for students around the world that would provide an opportunity for them to submit their most imaginative work.

Kauffman's leadership in the cause of creativity and to E. Paul Torrance was immense, as his role as Vice President of Marketing enabled him to promote and support his research, teaching models, and creativity tests on a

large scale. His expertise and understanding of Torrance's ground-breaking testing instruments made him invaluable in long-term research studies. It is the Torrance Tests, advanced devotedly by John Kauffman that have revealed the continuous decline in creativity scores among U.S. students over the last two decades or more. His publication of Garnet Millar's book, *E. Paul Torrance: The Creativity Man* (2007), became a benchmark in understanding this pioneer.

The International Torrance Legacy Creativity Awards competition honors the legacy of E. Paul Torrance. Writing was the first award competition in 2009. Hundreds of children age 8 to 18 from across the country and around the world submitted their poems and short stories. The themes elicited a wide range of creative writing—some strikingly original and imaginative. Winning entries reflected diverse approaches to written composition from different countries as well as a mature understanding of and sensitivity to current events. A story based on the dramatic rescue in 2018 of a junior soccer team trapped in a flooded cave in Thailand was a profoundly moving, well-paced, and sophisticated piece of writing.

In subsequent years, visual art, musical composition, and, in 2014, inventions became divisions in the annual competition. The visual arts division encourages students to submit any type of 2D or 3D visual art including painting, collage, printmaking, photography, sculpture, ceramics, or other related works. Music composition is perhaps the most difficult division, as students learning any instrument must devote most time to the mastery of technique rather than composition. Yet musicians from elementary to secondary school have submitted notable work in many genres, styles, and cultural traditions. The inventions division continues to generate original products ranging from enjoyable activities (Arts and Leisure) to playful fun (Toys and Games) to helpful solutions (Science and Engineering).

Since its inception, students have sent entries from the United States, Canada, England, Australia, New Zealand, Poland, China, Singapore, South Korea, Bahrain, Turkey, India, as well as parts of Africa and South America. Each year, the enthusiasm of children and young people has continued to expand as more teachers encourage them to submit their most imaginative work to the competition. Every November, the Midwest Torrance Center for Creativity publishes a series of online magazines with the prize-winning poems, stories, visual art pieces, musical scores, and inventions.

I would like to conclude this article with a poem about imagination by one of the 2016 winners:

Impetus: Knowledge vs. Imagination
by Liam M. Goodowens, age 11

Twisting passages
winding tunnels
KNOWLEDGE illuminates my way

I travel
alongside history
observing and gathering the seeds
left by IMAGINATION

SOCIETY
teetering on the
brink between
what we IMAGINE
&
what we KNOW

ever becoming the manifestation
of HOPES
&
of DREAMS
&
of NIGHTMARES

shall I blame imagination for war or knowledge for the atomic bomb?
shall i embrace knowledge for the incandescent light bulb or imagination for the
polaroid?

in a soft afternoon
amidst the waning sun
I ponder
the exquisite beauty
of the human endeavor

can it be
the embers of IMAGINATION
fuel the everlasting search for KNOWLEDGE
OR
is it simply
UNDERSTANDING breeds
CREATIVITY

man is constrained
in the grip of his own insecurity

we SEARCH
and SEARCH
and SEARCH

for proof…for purpose…for possibility

we are never enough for ourselves
we endeavor to be enough for others

INTERNAL voids
FILLED by
EXTERNAL accomplishments

you ask which has impacted SOCIETY more…
yet as i sit in this park and see
CARS
&
HOVERBOARDS
&
DRONES
listening to PHONES ring and satellite RADIO fill the air

i can't help but wonder if
society IMPACTS knowledge and imagination
and not the other way around

what's the point? what are we striving for? what does anyone want?

CONNECTION!

in the simple melody of a song inspired
in the soft beauty of an artist's stroke

passion wins the day in the land of imagination
ELEVATING
the foundation of truth and knowledge
BINDING
the souls of men to one another

in TRUE PHILOSOPHER fashion,
i'll answer your QUESTION
with one of my own:

ISN'T IT IMAGINATION THAT MAKES US A SOCIETY AT ALL?

References

Galeano, E. (1995). *Walking words.* (With woodcuts by Jose Francisco Borges). New York: W.W. Norton & Co.

Hebert, T. P., Cramond, B., Speirs Neumeister, K.L., Millar, G., & Silvian, A.F. (2002, February). E. Paul Torrance: His life, accomplishments, and legacy. Storrs, CT: The National Research Center on the Gifted and Talent-University of Connecticut.

Millar, G.W. (2007). *E. Paul Torrance: The creativity man, an authorized biography.* Bensenville, IL: Scholastic Testing Service, Inc.

Moll, L.C. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory Into Practice 31(2), 132-141.*

Shaughnessy, M.F. (1998). An interview with E. Paul Torrance: About creativity. *Educational Psychology Review,* 10(4)), 441-452.

Smutny, J.F., & von Fremd, S.E. (Eds.). (2009). *Igniting creativity in gifted learners, K-6: Strategies for every teacher.* Thousand Oaks, CA: Corwin Press.

Torrance, E.P. (1980). Growing up creatively gifted: A 22-year longitudinal study. *Creative Child and Adult Quarterly*, 5(3), 148-158, 170.

_____. (1988). The nature of creativity as manifest in its testing. In R.J. Sternberg (Ed.), *The nature of creativity: Contemporary psychology perspectives* (pp. 43-74). Cambridge, UK: Cambridge University Press.

_____. (1994). *Creativity: Just wanting to know.* Pretoria, South Africa: Benedic Books.

Torrance, E.P., & Safter, H.T. (1999). *Making the creative leap beyond . . .* Buffalo, NY: Creative Education Foundation Press.

CHAPTER TEN

E. PAUL TORRANCE—MY TEACHER, MY MENTOR, MY CO- AUTHOR, MY CO-RESEARCHER, MY FRIEND, MY INSPIRATION

FREDRICKA REISMAN

Upon the anniversary of E. Paul Torrances 105th birthday celebration, I wish to revisit with you my intimate look at Dr. Torrance. The title of my remembrance indicates that I will be sharing his brilliant theories and research, as well as my very personal interactions with him and to a lesser extent, but just as rewarding, with his wife Pansy.

I met Dr. Torrance in my first year on faculty at the University of Georgia in Athens, Georgia in 1969 – 50 years ago! I looked up from my desk in my small office – with a window – to see a gentleman with the most twinkling blue eyes standing at my doorway. He introduced himself as the Chair of the Division of Educational Psychology, asked if I would help him get gifted certification approved in Georgia, as his goal was to educate teachers to recognize gifted and creative students and then to have strategies to teach them creatively. I of course agreed, for as a third, fifth, middle school and high school math teacher, I intuitively found ways to enrich my students learning experience. My Ph.D. degree is in mathematics education, and I had never heard of Paul Torrance or of creativity as a discipline.

But that soon changed as I took every doctoral level creativity course he taught, many with his wife Pansy's assistance, even though I was an assistant professor in the Division of Elementary Education- a colleague. Dr. Torrance soon became a mentor and we did research together, published together, and I presented our research at my first international conference in Stirling, Scotland.

My favorite remembrance of one of our collaborative research investigations comparing results on the Torrance Tests of Creative Thinking and performance on Piaget tasks and on my modified Piaget tasks was when in 1970, Dr. Torrance and I administered the TTCT, as we fondly referred to the full name of the Torrance Tests of Creative Thinking, to two first grade classes in an elementary school in Athens, Georgia pictured below.

Source: University of Georgia, College of Education
(https://coe.uga.edu/directory/torrance-center)

The children also had taken the Metropolitan Readiness Test, which at that time, was believed to be essential for pre reading and pre mathematics learning in the early school years. Two first grade boys got scores on the TTCT of 120, which is in the highly creative range. Their teachers were shocked and shared that these two boys, according to their Metropolitan results were slated for the special education track for children of lower mental abilities—and also, both of the little boys were "terrible" liars. Dr. Torrance smiled and gently suggested that lying was very creative and that these boys needed to be shown how to apply their creativity in socially acceptable ways. Upon further visits to the school, we discovered that the teachers now perceived these two students—not as troublemakers, but rather as bright gifted learners. The teachers began to enrich lessons for all their students that resulted in these two boys becoming very engaged in learning and indeed even were serving as mentors to their classmates who needed a bit of extra help. The creativity results changed these children's lives.

Thus, began my journey to both make teachers aware of their own and of their students' creative strengths and to look at creativity as a crucial assessment in addition to—or even in lieu of—IQ and/or achievement tests. Subsequently, shortly before Dr. Torrance died at age 87 in 2003, I had the privilege of co-authoring three books on Learning Mathematics Creatively—by the way, Paul Torrance started his career as a high school mathematics teacher.

Well, you now know Dr. Torrance as my Teacher, my Mentor, my Co-Author, and my Co-Researcher. Now we come to Dr. Torrance as my friend. When my father who was a physician in Syracuse, New York died at age 85, Dr. Torrance and Pansy sent me a book entitled *The Fall of Freddie The Leaf* by Leo Buscaglia. Freddie lives a great life and finally drops off his tree when

fall arrives, as is the fate of all leaves who then become much to help new plants sprout up and grow. They inscribed the following:

> To Freddie Reisman at a time of mourning and
> renewal with love and sympathy,
> Paul and Pansy Torrance
> MAY 28, 1984

Their insight and intuition into my feelings were beautifully expressed in this little book.

When we created the Drexel-Torrance Center for Creativity and Innovation at Drexel University in Philadelphia, Pennsylvania, we wanted to spread the word about his main theoretical contributions; namely, demonstrating that we CAN assess creativity through the **TTCT,** which is the most widely used creativity test in the entire world. His controversial **Threshold Hypothesis** holds that in a general sample, there will be a positive correlation between creativity and intelligence scores, but a correlation will not be found with higher scores. He also created the **Future Problem-Solving Program International**, which aims to "engage students in creative problem solving". Founded by Dr. Torrance in 1974, he created this program to stimulate critical and creative thinking skills and to encourage students to develop a vision for the future. The program has involved over 250,000 students annually from Australia, Canada, Hong Kong, Japan, Korea, Malaysia, Portugal, New Zealand, Russia, Singapore, Great Britain, Turkey, India, and the United States and is celebrating its 45th anniversary this year.

Dr. Torrance's Incubation Model of Teaching and Learning, developed to enhance instruction, provides three stages of teaching and learning that can be applied to any assignment or project; namely, Heighten Anticipation, Deepen Expectations, and Extend the Learning. Dr. Torrance's 2001 book, *The Manifesto: A Guide to Developing a Creative Career* includes the results of his 40-year longitudinal study of creativity – the only one of its kind. *His Ideal Pupil Checklist* research resulted in the awareness that teachers do not identify creative students. The Ideal Pupil Checklist and the TTCT provided a trigger for the Reisman Diagnostic Creativity Assessment (RDCA) that comprises the KIE RDCA SIG.

Dr. Torrance published 88 books; 256 parts of books or cooperative volumes; 408 journal articles; 538 reports, manuals, tests, etc.; 162 articles in popular journals or magazines; 355 conference papers; and 64 forewords or prefaces totaling almost 2000 publications. His work and his essence are eternal.

My Inspiration? Indeed!

Data Analytica

AI & Machine Learning

What gets analysed and mined gets managed

The objective is to convert data into facts and facts into insights and assets. We at Data Analytica focus on innovative and comprehensive Big Data, data analytics, data mining, robotics, and operations research related projects. We fuse business and technology and focus on comprehensive data solutions that are based on sound business, science, and engineering principles.

We specialize in customizing all your business data needs into a comprehensive, transparent, and cost effective solution. We do this by applying business and technology strategies applicable to a particular customer solution to provide our clients with a wide spectrum of vertically and horizontally aligned business data solutions

Data Analytica

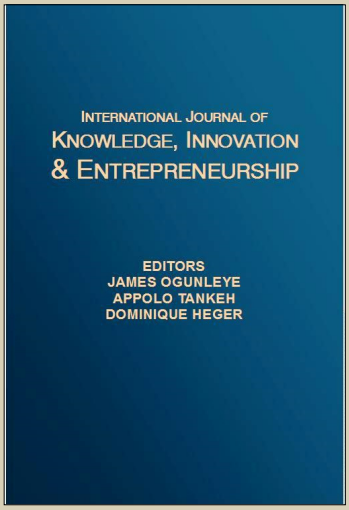
AI & Machine Learning

Please visit our website for more detail information about our services:
www.mlanalytica.com

2020 KIE Conference
Associated Journal

Now in its third year, the *International Journal of Knowledge, Innovation and Entrepreneurship* is dedicated to the advancement of studies in knowledge, innovation and entrepreneurship and provides a forum for the publication of high quality papers in these coverage areas. IJKIE has been around as a collection of occasional papers for over seven years. As a journal, the IJKIE medium term goal is to become a leading journal in the coverage fields.

www.ijkie.org



Coverage fields and subfields

The journal welcomes competitive and high-quality articles from the following and related fields:

Knowledge-Education, Management, Information Management and Systems Organisation and Work Based Learning, Innovation and Creativity, Technology Innovation - Big Data & Business & Predictive Analytics, Artificial Intelligence, Business Intelligence, Data Mining, Discovery & Science, Organisation/Management Innovation, Entrepreneurial Creativity, Servant-Leadership in Enterprise, SME Finance, Risk & Strategy, Supply Chain Management, HR for Entrepreneurship & Social Entrepreneurship

Peer review process

Each paper is reviewed by the editors and, if it is judged suitable for this publication, it is then sent to at least three independent referees for double blind peer review. Based on their recommendation, as well as consultation between relevant Editorial Board members the editors then decide whether the paper should be accepted as is, revised or rejected.

Frequency of Publication

April,
August &
December

9 781859 242179 >