Creativity

Advance Organizer. Chapter 2 contains foundational knowledge regarding creativity, including definitions of creativity by discipline: engineering, architecture, corporate/business/industry, the military, education, scientists, psychologists, and creativity researchers/theorists. Further topics include creativity versus innovation, domain-general versus domain-specific creativity, the relationship between creativity and intelligence, the creative-thinking process, common creativity myths, and creativity killers and quick fixes. Biographies of trailblazing creativity theorists and researchers and their contributions are also presented. Appendix 2A lists popular creativity journals and Appendix 2B is a glossary of relevant terms.

2.1 Introduction

Guilford's (1950) incoming presidential speech to the American Psychological Association annual convention called for psychologists to investigate the neglected study of creativity; he was *appalled* at the neglect of the subject. The following excerpt from Guilford's landmark speech triggered a renaissance in creativity research:

> The neglect of this subject by psychologists is appalling. The evidences of the neglect are so obvious that I need not give proof. But the extent of the neglect I had not realized until recently. Of the approximately 121,000 titles listed in 11 Psychological Abstracts in the past 23 years, only 186 were indexed as definitely bearing on the subject of creativity. In other words, less than two-tenths of one percent of the books and articles indexed in the abstracts for approximately the past quarter century bear directly on the subject. (Guilford, 1950)

2.2 Creativity Defined

It was Moe Stein who published the first clear definition of creativity. Stein (1953) defined creativity as follows:

> The creative work is a novel work that is accepted as tenable or useful or satisfying by a group in some point in time. By "novel" I mean that the creative product did not exist previously in precisely the same form. The extent to which a work is novel depends on the extent to which it deviates from the traditional or the status quo. This may well depend on the nature of the problem that is attacked, the fund of knowledge or experience that exists in the field at the time, and the characteristics of the creative individual and those of the individuals with whom he (or she) is communicating.

Anna Jordanous (2012) stated:

> The components collectively provide a clearer "working" understanding of creativity in the form of components that collectively contribute to our understanding of what creativity is. Together these components act as building blocks for creativity, each contributing to the overall presence of creativity; individually, they make creativity more tractable and easier to understand by breaking down this seemingly impenetrable concept into constituent parts.

Jordanous's fourteen key themes and factors of creativity are defined in Box 2.1.

There are two main components of creativity that are pretty well accepted, namely originality and relevance. An original idea is one that is statistically rare or infrequent and deviates from the traditional or the status quo. The

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Box 2.1   The fourteen components of creativity

The following descriptions of the meaning of each component are adapted from Jordanous (2012, 2014):

1. Active involvement and persistence – being actively involved, reacting, and having a deliberate effect; the tenacity to persist with a process throughout, even at problematic points.
2. Dealing with uncertainty – coping with incomplete, missing, inconsistent, uncertain, and/or ambiguous information. There is an element of risk and chance, with no guarantee that problems can or will be resolved. It includes not requiring every step of the process to be determined, and perhaps even avoiding routine or preexisting methods and solutions.
3. Domain competence – possessing domain-specific intelligence, knowledge, talent, skills, experience, and expertise. It involves having a thorough understanding of a particular domain, which enables one to identify gaps, needs, or problems that require solutions, as well as to create, validate, develop, and promote new ideas within that domain. It also involves flexible and adaptable mental capacity.
4. General Intellect – general intellectual ability and adaptable mental capacity.

Box 2.1   (cont.)

5. Generation of results – working toward some end target or goal and producing something (tangible or intangible) that did not exist.
6. Independence and freedom – working independently with autonomy over actions and decisions, and the freedom to work outside preexisting solutions, processes, or biases.
7. Intention and emotional involvement – personal and emotional investment, immersion, self-expression, and involvement in a process, and an intention and desire to perform a task, a positive process giving fulfillment and enjoyment.
8. Novelty and originality – a new product, doing something in a new way, or seeing new connections between previously unassociated concepts; results that are unexpected, surprising, or out of the ordinary.
9. Progression and development – movement, advancement, evolution, and development during a process. While progress may not be linear, and the end goal may not be specified, the process should represent a developmental progression in a particular domain or task.
10. Social interaction and communication – communicating and promoting work to others persuasively and positively; mutual influence, sharing, and collaboration between society and the individual.
11. Spontaneity/subconscious processing – no need to control the whole process. Thoughts and activities may subconsciously inform a process without being fully accessible for conscious analysis; being able to react quickly and spontaneously during a process when appropriate, without spending too much time thinking about options.
12. Thinking and evaluation – consciously evaluating several options to recognize potential value in each and identify the best option, using reasoning and good judgment; proactively selecting from possible options without allowing the process to stagnate under indecision.
13. Value – making a valuable contribution valued by others and recognized as an influential achievement. The end product is relevant and appropriate.
14. Variety, divergence, and experimentation – generating a variety of different ideas to experiment with different options without bias; multitasking during a process.

idea should be something new that is not simply an extension of something else that already exists. Synonyms for *originality* include new, novel, unique, infrequent, unusual, and statistically rare. *Relevance* refers to an idea being useful, suitable, valuable, adaptive, appropriate, fitting, or functional.

It is interesting to note that there are differences in definitions of creativity, even within different domains of a discipline. For example,

Glück, Ernst & Unger (2002) found that artists with no constraints (sculptors or painters) and those with constraints (architects or designers) had different definitions, such as time pressure, a freely chosen or restricted topic, material, reward, or expectation of evaluation. The only agreed upon definition across the artist domain was that creatives must have many ideas (fluency). Next, we visit the definitions of creativity categorized by a variety of disciplines, commencing with artists.

Artists' Definitions of Creativity

Creativity is the mental capacity to generate novel and useful ideas. It isn't merely about art or design, writing or music. Creativity is, at its core, about ideas and how we develop, understand, and communicate them, not just in terms of the arts, but in every realm of thinking and work (Caslib, Garing & Casual, 2018). Artists' synonyms for creativity include cleverness, genius, imagination, imaginativeness, ingenuity, inspiration, inventiveness, and originality.

Engineering Definitions of Creativity

Creativity is a fundamental competence for engineers concerned with generating effective and novel solutions to problems. Identifying multiple solutions needed for a project is an important part of an engineer's work. Creativity enables them to improvise and successfully confront new situations. Creative engineers find more solutions to problems and are more independent, curious, and tolerant of ambiguous definitions. They are more willing to take risks and show persistence in solving problems. Today's engineers must be creative and innovative, as the problems engineers face today demand original thinking (Charyton, 2015).

Architects' Definitions of Creativity

Architects' definition of creativity mirrors that of engineers; however, in light of the importance of creativity in the design process, it is surprising that creativity theories and foundational knowledge are minimally included in the education architecture curricula.

Emerging innovative work environments coupled with the National Architectural Accreditation Board (NAAB, 2022) accreditation requirements call for a redesign of accredited architectural education, from a focus on solitary projects toward collaborative design dialogues and group

creative production. Because creative collaboration depends upon social agreements of participants pooling their talents for common goals, collaborative design depends on perceptions as much as abilities. Although creativity research within the field of education is relatively new (Glăveanu & Kaufman, 2020), introducing design students to strategies that enhance creativity could surely help architectural education adapt to the emerging innovation economy (Sledge, 2021).

Corporate/Business/Industry Definitions of Creativity

Corporate/business/industry folk define creativity much like the current components described throughout this chapter, namely involving original ideas that are useful and relevant.

Scientists' Definitions of Creativity

Scientists define creativity as a process to determine which smaller questions are likely to yield results, imagine possible answers to their questions, and devise ways to test those answers.

Creativity Researchers'/Theorists' Definitions of Creativity

The various definitions of creativity provided by creativity theorists are listed later in this chapter with their biographies in Section 2.9, "Trailblazing Creativity Theorists and Researchers."

Military Definitions of Creativity

General Mark A. Milley, USA – the Chairman of the Joint Chiefs of Staff, that is, the presiding officer of the United States Joint Chiefs of Staff, since October 1, 2019 – believes that creative thinking is a critical element of strategic thought and is necessary for successful leadership of our military. The creativity of military commanders refers to their ability to find workable, novel solutions to problems – to be innovative and adaptable in fast-moving, potentially confusing situations. A creative intellect allows commanders to surprise enemy counterparts and render them impotent. Success in combat at all levels requires imagination on the part of commanders, who should possess a high degree of creativity in thinking and a readiness to take risks (Zais, 1985). Box 2.2 sets out E. Paul Torrance's application of creative problem-solving to military survival techniques.

Box 2.2   Torrance and the military

I have held that whenever one is faced with a problem for which he has no practiced or learned solution, some degree of creativity is required.

E. Paul Torrance (1975)

The following information about E. Paul Torrance is from Cramond (2021):

In regard to teaching people to survive, Torrance worked with the U. S. Air Force Advanced Survival School (1951–1957). This school was established to prepare fighter pilots who are shot down to survive on the ground. Intrigued by the idea of developing a psychology of survival, Torrance took the job as Director of the Research Unit just as the Korean War began. Among the things they taught in the survival school were how to evade capture, what brainwashing techniques are used, how to live off of the land, how to be self-reliant and to cooperate with the group, how to use what they might have in different ways, and how to slow their pace to conserve their strength. It was tough training, but the men who finished it were well-prepared. Additionally, Torrance's published articles on survival – including adapting to torture, pain, and failure, climatic extremes, deprivation and isolation as well as group dynamics – provided new insights into survival psychology, group dynamics, and sociology (Millar, 2007, p. 32). Torrance gained an international reputation through the 135 research papers on survival in extreme conditions that he and his research team published (Neumeister & Cramond, 2004). Most important to his continuing research, Torrance saw that unpredictable circumstances required teaching them to be resourceful and think creatively.

It was during his time working with U.S. Air Force Advanced Survival School that he conducted studies of jet aces. The basic question was, "What differentiates the approximately 5% of the pilots who are considered aces from other less successful pilots?" In observing and testing these aces, Torrance saw in them . . . that the aces had learned to focus their creativity productively (Hébert et al., 2002). It was also during this time that his basic survival definition of creativity was formulated. He concluded that the most successful pilots and the most likely survivors were those who could focus and use their creativity. His research demonstrated that creativity skills such as risk taking, courage, and independence (Neumeister & Cramond, 2004), as well as inventiveness, imagination, originality, flexibility, and decision-making (Millar, 2007, p. 32) were necessary for survival.

Creativity is a distinctive trait of human excellence in all domains of behavior.

E. Paul Torrance

Education Definitions of Creativity

According to the National Advisory Committee on Creative and Cultural Education (NACCCE, 1999), creativity can be defined as "imaginative activity, fashioned so as to produce outcomes which are original and of value" (p. 29). The NACCCE report further argued for the integration of creativity in teaching and learning, curriculum, management, and leadership. It also argued for deepening young people's cultural knowledge and understanding, helping them to engage positively with cultural change and diversity (Csikszentmihalyi, 1996; Feldman, 1999; Sternberg & Lubart, 1999; Wallace & Gruber, 1989).

Reisman and Severino (2021) point out the result of teachers' lack of exposure to definitions of creativity, especially regarding students. Definitions of creativity affect teachers' ability to identify the hidden creativity of their students. In fact, students that are complacent, agreeable, subordinate, task-oriented, and smile are identified as creative by their teachers (Torrance, 1975; Whitelaw, 2006). Most teachers have a prejudicial perception of what a creative student looks like. In fact, one of the most consistent findings in educational studies of creativity has been that teachers dislike personality traits associated with creativity (Bachtold, 1974; Whitelaw, 2006). Research has indicated that teachers prefer traits that seem to run counter to creativity, such as conformity and unquestioning acceptance of authority. The reason for teachers' preferences is quite clear; creative people tend to have traits that some have referred to as obnoxious (Torrance, 1963). In fact, Torrance (1963) described creative people as not having the time to be courteous, as refusing to take *no* for an answer, and as being negativistic and critical of others.

Research has suggested that traits associated with creativity may not only be neglected, but actively punished (Myers & Torrance, 1961; Stone, 1980; Westby & Dawson, 1995). Stone (1980) found that second graders who scored highest on tests of creativity were also those identified by their peers as engaging in the most misbehavior (e.g., "getting in trouble the most"). Harrington, Block & Block (1987) suggest that a supportive environment is important to the fostering of creativity; it is quite possible that teachers are (perhaps unwittingly) extinguishing creative behaviors. The point is that current classrooms are not designed for impulsive expression – that is, talking out of turn, walking around without permission, responding with out-of-the-box answers to routine questions, daydreaming when bored, or demanding evidence for teacher or peer statements. Instead, in current classrooms, it's all about obeying rules and doing well on standardized

tests. Such skills have little to do with fostering and dealing with creative thinkers.

Research has suggested that teachers who recognize their own creative strengths may be able to better recognize and appreciate the creative strengths of their students, resulting in higher quality learning (Robinson, 2018; Whitelaw, 2006). Previous research at high school level, which unveiled students' hidden talents, demonstrated that "when instructors become aware of their students' creative strengths, positive changes occur in their pedagogy and teacher–student interactions, as well as positively affecting student self-efficacy and academic performance" (Reisman & Torrance, 2002). Colleges and universities preparing teachers and school administrators for their careers in education are experiencing criticism from many arenas. Arthur Levine, former President of Teachers' College at Columbia University and former President of the Woodrow Wilson Foundation, was criticized for negatively assessing the state of teacher preparation. He commented that teacher preparation is archaic and stuck in an ivory tower. Not only do teachers squash kids' creativity, but, tragically, they do not recognize their students' or their own creative strengths (Levine, 2016).

Psychologists' Definitions of Creativity

Psychologists usually define creativity as the capacity to produce original and adaptive ideas. In other words, creative ideas must be new and workable or functional; thus, creativity enables a person to adjust (Simonton, 2001). Kaufman and Beghetto (Beghetto & Kaufman, 2011; Kaufman & Beghetto, 2009) proposed a "Four-C" model of creativity (mini-c, little-c, pro-c, and big-C), as shown in Box 2.3.

Box 2.3   Four-C model of creativity

Big-C   People achieve eminence and their work will be remembered
              throughout history.
Pro-C   Creativity takes place among professionals who are skilled and
              creative in their respective fields.
Little-C   Involves solving everyday problems that one may face and adapting
              to changing environments, thinking, and problem-solving.
Mini-C   Involves gaining new insights into learning and refers to the
              creative processes involved in constructing personal knowledge
              and understanding that are known only to the self.

Another psychological framework for defining creativity is the 4P framework (process, person, product, and press) proposed by Rhodes (1961). Process refers to mental or physical processes involved in creative thought or work. Person involves personality traits or personality types associated with creative thought or work. Products are judged to be creative by a relevant social group. Press refers to external forces that affect creativity (e.g., the sociocultural context and trauma).

2.3   A Variety of Creativity Definitions

Figure 2.1 shows a free two-page poster produced by Demian Farnworth (2021) that addresses the following question: What is creativity? Farnworth asked: What exactly do we refer to when we talk about creativity? His poster answers this question and contains 21 definitions from a wide range of creative folk.

The definition of creativity is elusive, as de Sousa (2008) establishes in a scholarly review of the literature entitled "Still the elusive definition of creativity."

2.4   Creativity versus Innovation

Peek (2021) distinguished between creativity and innovation as follows:

> Although creativity and innovation are often used as interchangeable terms or meshed together as one concept, the difference between the two is an important one that actually helps us to understand each more fully. One way to differentiate between the two is to understand creativity as the mental precursor to innovation; creativity is about imagination and ideas where innovation is about action and process, evolutionary, or radical in its impact on the status quo.

Innovation requires creativity, but creativity does not always lead to innovation. Organizations seeking innovative thinking need workplaces and talent development systems that foster creativity and process systems that can translate creativity into innovation (Reisman & Hartz, 2011). Understanding these distinctions between creativity and innovation allows us to understand, learn, and maximize each more comprehensively. Since creativity is separate from, albeit necessary to, innovation, individuals can develop and utilize their personal creativity capabilities regardless of whether their jobs and workplaces explicitly require or seek innovation. To summarize, *creativity is the ability to produce new and unique ideas; innovation is the implementation of those ideas.*

Figure 2.1 Creativity definitions (free poster from Demian Farnworth, 2021).

Figure 2.1 (cont.)

2.5   Domain-General versus Domain-Specific Creativity

Meihua, Plucker and Yang (2019) state that, "Creativity, as one of the key 21st century skills, has become increasingly important." However, despite the huge volume of research on creativity in the past sixty

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Box 2.4   Domain-general versus domain-specific creativity

1. There are many skills and dispositions that influence how creative someone is.
2. Those skills, traits, and dispositions might be domain-general or domain-specific.
3. If any skills, traits, or dispositions are in line with a domain-general theory of creativity, they are expected to show notable positive correlations between creative achievements across various domains. A greater correlation indicates a more potent domain-general effect.
4. While some skills, traits, and dispositions have a general impact on different domains, certain ones may have a domain-specific effect on creativity. For instance, conscientiousness may have a positive influence on creativity in certain domains, while, in other domains, it may have a negative impact.
5. Domain specificity predicts low (or zero) correlations between assessments of creative performances across domains.
6. Many domain specificity theorists acknowledge that intelligence is a domain-general factor that impacts creativity across different domains. As a result, they predict that low correlations exist among creative achievements across domains due to differences in intelligence, as measured by g-tests.

Adapted from Baer (2016)

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years, a fundamental debate about the nature of creativity still remains unsolved. Baumrind and Milgram (2010) concluded that different life experiences (schooling and culture) may have stronger impacts on domain-specific creative thinking than domain-general creative thinking. Some researchers support the hypothesis that creativity is relatively domain-general, rather than domain-specific (An & Runco, 2016; Diakidoy & Spanoudis, 2002). Others still ask: Is creativity domain-specific or domain-general?

Much of our creativity, such as musical improvisation, painting, and creative writing, is domain-specific. Each of these activities draws on a specific skill set that is different from others and is not fully dependent on domain-general creativity (Plucker, Beghetto & Dow, 2004). Baer (2016) provides a summary of the issue (Box 2.4).

2.6   Relationship between Creativity and Intelligence

Different conceptions about the relationship between intelligence and creativity exist (Jauk et al., 2013). Some researchers assert that, to be creative, a person needs to be intelligent. Still, not all intelligent people

have high creative potential. MacKinnon (1965) argued that a basic level of IQ of about 120 is necessary for creative productivity. This is referred to as the threshold theory. The basic idea behind the threshold hypothesis is that high creativity requires high or above-average intelligence. Above-average intelligence is thought to be a necessary but not a sufficient condition for high creativity (Guilford, 1967). Torrance (1962) proposed that, in a general sample, there will be a positive correlation between low creativity and intelligence scores, but a correlation will not be found with higher scores. While earlier research mostly supported the threshold hypothesis, it has come under fire in recent investigations (Jauk et al., 2013). There is an inverse relation between scoring high on an IQ test and scoring high on a creativity assessment. To score high on an IQ test, the test taker must answer in line with the normative population. The opposite occurs regarding a creativity measure where the highly creative test taker's answers are unique, novel, and different from the normative population.

2.7 Creative-Thinking Process

Creative thinking comprises a sequence of divergent–convergent thinking as shown in Figure 2.2. Divergent thinking involves generating many ideas or solutions and is related to fluency. Convergent thinking involves coming to closure.

2.8 Common Creativity Myths

The following are myths about creativity: the inspiration just hasn't hit yet, you are born with it, you have to be right-brained, it falls into your lap, and you've got to be a little mad. Benedek et al. (2021)

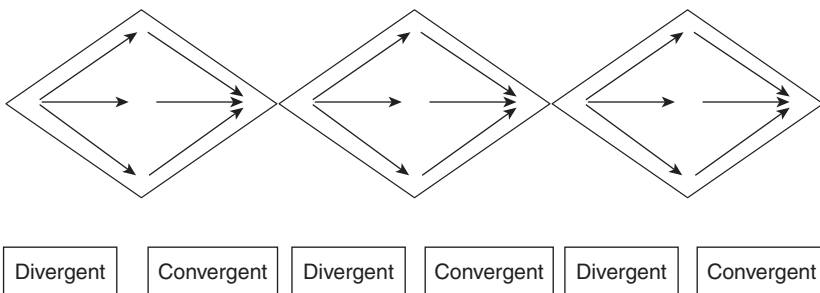| Divergent | Convergent | Divergent | Convergent | Divergent | Convergent |

Figure 2.2 Creative-thinking process (from Tanner & Reisman, 2014, p. 98, with permission).

conducted a global study involving 1,417 recruits; the study "examined the prevalence of known creativity myths across six countries from diverse cultural backgrounds and explored why some people believe in them more than others." Fifteen myths and fifteen facts were identified concerning the definition of creativity, the creative process, the creative person, and ways to stimulate creativity. The creativity myths are presented in Box 2.5 and the creativity facts are presented in Box 2.6.

Regarding teachers' misconceptions of creative students, for decades studies have indicated that teachers prefer traits that seem to run

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Box 2.5   Creativity myths

Creativity cannot be measured

Creativity is essentially the same as art

Creative ideas are naturally a good thing

Most people would not be able to distinguish abstract art from abstract children's drawings

Creative accomplishments are usually the result of sudden inspiration

Creative thinking mostly happens in the right hemisphere of the brain

Creativity tends to be a solitary activity

Creativity is a rare gift

People have a certain amount of creativity and cannot do much to change it

Children are more creative than adults

Exceptional creativity is usually accompanied by mental health disorders

People get more creative ideas under the influence of alcohol or marijuana

Long-term schooling has a negative impact on the creativity of children

Brainstorming in a group generates more ideas than if people were thinking by themselves

Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, or kinesthetic)

Short bouts of coordination exercises can improve integration of left and right hemispheric brain function

Children are less attentive after sugary drinks and snacks

Differences in hemispheric dominance (left brain or right brain) can help to explain individual differences among learners

We mostly use only 10 percent of our brain

Box 2.6   Creativity facts

To be considered creative, something has to be both novel and useful or appropriate

Teachers appreciate the idea of creativity but not necessarily creative pupils

Whether or not something is viewed as creative depends on zeitgeist and social norms

Creativity is an important part of mathematical thinking

Creative ideas are typically based on remembered information that is combined in new ways

The first idea someone has is often not the best one

Alpha activity (10 Hz, a measurement of frequency per second) in the brain plays an important role in creative thought

Creative people are usually more open to new experiences

Creative people are usually more intelligent

Achieving a creative breakthrough in a domain (i.e., publishing a successful novel) typically requires at least ten years of deliberate practice and work

Men and women generally do not differ in their creativity

A man's creativity increases his attractiveness to potential partners

When stuck on a problem, it is helpful to continue working on it after taking a break

Positive moods help people get creative ideas

Getting rewarded for creative performance at work increases one's creativity

One is most creative when there is total freedom in one's actions

We use our brains twenty-four hours a day

Extended cognitive training can change the shape and structure of some parts of the brain

The brains of boys are generally larger than those of girls

Learning occurs through the modification of the brain's neural connections

Normal development of the human brain involves the birth and death of brain cells

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counter to creativity, such as conformity and unquestioning acceptance of authority (Bachtold, 1974; Cropley, 1992; Dettmer, 1981; Getzels & Jackson, 1962; Torrance, 1963). Getzels and Jackson's (1962) study, which triggered an explosion of research into the area

of creativity, found that creative strengths were better predictors of academic achievement than IQ scores. Several research studies have replicated Getzels and Jackson's study and supported the finding that creativity is related to academic achievement. From the elementary level to the graduate level, creativity scores have been found to be either more effective or equivalent in predicting academic achievement (Esquivel & Lopez, 1988). Teachers' myths regarding the identification of their creative students are often a function of teacher preparation programs that do not address creativity.

Creativity Killers and Quick Fixes

Box 2.7 sets out characteristics referred to as *creativity killers* and strategies for addressing them. Readers may google "creativity killers" to access several related websites for additional creativity killers.

Box 2.7   Creativity killers and response strategies

Creativity killers	Response strategies
Pessimism is an overall negative mindset in which you're reluctant to build upon your creative ideas.	Reframe negative experiences by focusing on what went right, using positive language such as "and" instead of "but."
Fear is built on anxieties and an unwillingness to take any form of risk. It focuses on the uncertainties of an idea, rather than the potential benefits and positive outcomes.	Embrace fear as part of the creative process, as one learns from failure.
Pressure can cause one to shut down or freeze up due to stress, by putting a stranglehold on your ability to be creative.	Create a detailed schedule of your tasks and daily/weekly goals with space for free time to relax and unwind.
Isolation leads to always taking the "safe" route and avoiding risk taking, which is a creative characteristic.	Be receptive to the ideas of others, even if you don't agree with their ideas.
Narrow-mindedness means always circling back to the same ideas and same processes.	Resist premature closure.

Source: www.freshgigs.ca/blog/5-culprits-that-are-killing-your-creativity/

2.9 Trailblazing Creativity Theorists and Researchers

The following is a summary of the leading creativity researchers and theorists and their contributions to creativity. Our apologies for any inadvertent omittance.

Teresa Amabile

Amabile serves as the Edsel Bryant Ford Professor of Business Administration in the Entrepreneurial Management Unit at Harvard Business School. She was initially educated as a chemist but received her doctorate in psychology from Stanford. Her research focuses on creativity, productivity, innovation, and the junction of people's emotions, perceptions, and motivation. Amabile has published over 100 scholarly articles and chapters. She is also the author of *The Progress Principle: Using Small Wins to Ignite Joy, Engagement, and Creativity at Work*, which she coauthored with her husband and collaborator, Steven Kramer, Ph.D. (Amabile & Kramer, 2011). She also created the componential theory of creativity, which is a comprehensive model of the components necessary for creative work.

Ronald Beghetto

Beghetto is the Pinnacle West Presidential Chair and Professor in the Mary Lou Fulton Teachers College at Arizona State University, editor for the *Journal of Creative Behavior* and series editor for *Creative Theory and Action in Education* (Springer Books). His research explores the role uncertainty plays in creativity, learning, and instruction. Beghetto defines creative experience as engagement with the unfamiliar and a willingness to approach the familiar in unfamiliar ways (Glăveanu & Beghetto, 2021). Beghetto, with his colleagues Kaufman and Plucker, identified skills key for the twenty-first century, known as the "Four Cs": creativity, critical thinking, collaboration, and communication. These four Cs represent key skills identified by educational, business, and government leaders as essential to successfully deal with our complex future. Beghetto has published seven books and more than 100 articles and scholarly book chapters on creative and innovative approaches to teaching, learning, and leadership in schools and classrooms.

Kristen Betts

Dr. Kristen Betts, Clinical Professor in the School of Education at Drexel University, is affiliated with the Drexel Creativity and Innovation

Program and is Founder of the Drexel Education, Learning, and Brain Sciences (E-LaBS), a research collaborative. Dr. Betts has over twenty years of experience in higher education and online learning as a senior administrator (Chief Academic Officer, Senior Director for e-Learning with 90+ programs, and Director for Online and Blended Learning) and program director (EdD in Educational Leadership and Management and MS in Higher Education). Dr. Betts' expertise is in higher education, online and blended learning, course/program development, curriculum and instructional design, accreditation, and strategic planning. Her research intersects creativity and motivation with a focus on mind, brain, and education science, assessment, technology-enhanced learning, and professional development. A peer evaluator with the Middle States Commission on Higher Education and a Fulbright Specialist, she also is an instructor for the Online Learning Consortium certificate programs and a grant reviewer with the Hong Kong Research Grants Council. At Drexel University, Dr. Betts served as the National Faculty Academy Coordinator for the Urban Special Education Leaders for Tomorrow (USELT) grant project ($1.25 million). Dr. Betts has received distinguished national awards for her work in higher education and online learning and has been a keynote speaker at conferences and government-supported events in Sweden, South Korea, Canada, and across the United States. Dr. Betts is also engaged in innovative research initiatives with INTERACT123.com related to pedagogical practices and pivoting courses and programs seamlessly from on-campus to online learning for higher education and kindergarten to twelfth grade (K–12) education.

Jerome Bruner

Bruner defined the creative act as effective surprise – the production of novelty. He (Bruner, 1973) suggested that play and creativity are linchpins in constructivism epistemology and are clearly needed to the notion of "surprised amusement," which was central to Bruner's conception of creativity, as he writes that an act that produces *effective surprise* is the hallmark of the creative enterprise. Bruner distinguished between creativity and originality, as he proposed six essential conditions of creativity: (1) detachment and commitment, (2) passion and decorum, (3) freedom to be dominated by the object, (4) deferral and immediacy (there is an immediacy to creating anything), (5) the internal drama, and (6) the dilemma of abilities.

Bonnie Cramond

Professor Emerita in the Educational Psychology Department of the University of Georgia at Athens, Cramond has been director of the Torrance Center for Creativity and Talent Development, a member of the board of directors of the National Association for Gifted Children, editor of the *Journal of Secondary Gifted Education*, and a teacher. Currently on the advisory board for the Future Problem Solving Program International, the Global Center for Gifted and Talented Children, and a member of the Japan International Creativity Society, she is on the review board for several journals and a survivor of parenting two gifted and creative people.

Arthur Cropley

Arthur Cropley obtained his Ph.D. from the University of Alberta (Canada) and taught at the Universities of Regina (Canada) and Hamburg (Germany), with brief stints in Australia. He was founding editor of *High Ability Studies* and is on the board of the *Creativity Research Journal*. He has received awards and fellowships, as well as an honorary doctorate from the University of Latvia. In 2004, he received the Order of the Three Stars from the President of Latvia. He has published extensively on creativity and is the author of 25 books, with translations into a dozen languages including Hungarian, Latvian, Chinese, and Korean. He has become increasingly interested in recent years in using creativity concepts to examine areas not usually associated with creativity (such as engineering) and has looked closely at the dark side of creativity, and particularly crime.

David H. Cropley

David H. Cropley of the Centre for Change and Complexity in Learning of the University of South Australia is Professor of Engineering Innovation at the University of South Australia. He joined the School of Engineering at the South Australian Institute of Technology (SAIT) in 1990, after serving for four years in the United Kingdom's Royal Navy, including a deployment to the Arabian Gulf in 1988. His research interests lie in the measurement of product creativity, namely measuring innovation capacity in organizations, creativity in schools and education, creativity and innovation in terrorism and crime, and the nexus of creative problem-solving and engineering. Dr. Cropley is author of four books including *Creativity in Engineering: Novel Solutions to*

Complex Problems (Academic Press, 2015), *The Psychology of Innovation in Organizations* (Cambridge University Press, 2015), and *Creativity and Crime: A Psychological Analysis* (Cambridge University Press, 2013).

Mihalyi Cskiszentmihalyi

(pronounced me-HIGH chick-sent-me-HIGH-ee)

Mihalyi Cskiszentmihalyi is a founder of the positive psychology movement who created the Systems Model of Creativity (Csikszentmihalyi, 2014) that includes the individual, the domain (the gatekeepers of a discipline), and the field (society or humanity as a whole). He also proposed the concept of flow in his book *Flow: The Psychology of Optimal Experience* (Csikszentmihalyi, 1990). According to Csikszentmihalyi, people feel happy when in a state of flow. Flow is a type of intrinsic motivation where an individual is fully focused on a situation or task. He describes flow as "being completely involved in an activity for its own sake. The ego falls away, time flies" (Csikszentmihalyi, 1990). He defines creativity as "any act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one … What counts is whether the novelty he or she produces is accepted for inclusion in the domain" (Csikszentmihalyi, 1990, p. 28).

Edward de Bono

Edward de Bono died in June 2021 at 88 years of age. He was a Maltese physician, psychologist, author, inventor, philosopher, and consultant. He originated the term lateral thinking, wrote the book *Six Thinking Hats* (de Bono, 1985), and is a proponent of teaching thinking as a subject in schools. Lateral thinking "is a manner of solving problems using an indirect and creative approach via reasoning that is not immediately obvious. It involves ideas that may not be obtainable using only traditional step-by-step logic" (Syahrin et al., 2019).

The six hats are a process that involves taking different perspectives of a situation. The white hat is the objective hat, which focuses on facts and logic. The red hat is the intuitive hat, which focuses on emotion and instinct. The black hat is the cautious hat, which is used to predict negative outcomes. The yellow hat is the optimistic hat, which is used to look for positive outcomes. The green hat is the creative hat, where ideas are abundant and criticism spare. The blue hat is the hat of control and is used for management and organization.

His theory of lateral thinking is not recognized as a coherent and empirically validated theory within psychology (Moseley et al., 2005; Sternberg & Lubart 1999). However, his critics do recognize the potential usefulness of his tools and make a point not to reject them simply because they have not been studied and validated empirically (Sternberg, Kaufman & Pretz, 2002, p. 99; Sternberg & Lubart, 1999).

Howard Gardner

Gardner's theory of human intelligence contradicts the view that there is one type of intelligence. He described seven intelligence types: linguistic, logical/mathematical, spatial, bodily kinesthetic, musical, interpersonal, and intrapersonal, and later he added naturalist. He warned that teachers develop certain intelligence types in their students while placing less emphasis on other types – a practice that is detrimental, as it fails to recognize student cognitive strengths and creativity.

Vlad Glăveanu

Vlad Glăveanu is Professor of Psychology at Dublin City University. His work focuses on creativity, imagination, culture, collaboration, and societal challenges. There are multiple historical ways of defining and measuring creativity. He suggests that "Art based definitions are grounded in novelty, spontaneity and self-expression. Invention based definitions are grounded in utility, insight, and problem solving. Craft based definitions are grounded in collaboration, materiality, and culture. Understanding this multiplicity and fostering it is essential in education" (Glăveanu & Zittoun, 2018).

John Curtis Gowan

Gowan was a psychologist who studied the development of creative capabilities in children and gifted populations. He also had an interest in psychic (or psychedelic) phenomena in relation to human creativity. He described the entire spectrum of available states in his classic book *Trance, Art and Creativity* (Gowan, 1975), with its different modalities of spiritual and esthetic expression.

Joy Paul Guilford

Guilford is known for his study of human intelligence, including the distinction between convergent and divergent production. He identified three components of divergent thinking: fluency (the ability to quickly find multiple solutions to a problem), flexibility (being able to simultaneously consider a variety of alternatives), and originality (referring to ideas that differ from those of other people). His structure of the intellect theory comprises up to 180 different intellectual abilities organized along three dimensions: operations, content, and products. Guilford's structure of the intellect model of human abilities has few supporters today. Carroll (1993) summarized the view of later researchers:

> Guilford's SOI [structure of the intellect] model must, therefore, be marked down as a somewhat eccentric aberration in the history of intelligence models. The fact that so much attention has been paid to it is disturbing to the extent that textbooks and other treatments of it have given the impression that the model is valid and widely accepted, when clearly it is not.

Guilford's challenge at the 1950 American Psychological Association (APA) Conference triggered a renaissance in creativity research:

> Of approximately 121,000 titles listed in the past 23 years, only 186 were indexed as definitely bearing on the subject of creativity. The topics under which such references are listed include creativity, imagination, original-ity, thinking, and tests in these areas. In other words, less than two-tenths of one per cent of the books and articles indexed in the Abstracts for approximately the past quarter century bear directly on this subject. Few of these advance our understanding or control of creative activity very much. Of the large number of textbooks on general psychology, only two have devoted separate chapters to the subject during the same period. (Guilford, 1950, p. 445)

Scott G. Isaksen

Scott G. Isaksen is an academic scholar, practitioner, leader, and mentor. His contributions to the research and practice of creativity include the Cognitive Styles Project, which identifies links between person and process, and the integration of convergent thinking within creative problem-solving, as well as the development and validation of the VIEW tool (an assessment of problem-solving style) and the Situational Outlook Questionnaire.

Alan and Nadeen Kaufman

Alan and Nadeen Kaufman created the Kaufman Assessment Battery for Children (KABC and KABC-II) (Kaufman & Kaufman, 1983, 2004; Drozdick et al., 2018), an important contribution to the field of intelligence testing for assessing cognitive development. This assessment is based upon the planning, attention, simultaneous, and successive cognitive processing (PASS) intelligence theory and the Cattell–Horn–Carroll (CHC) theory of cognitive abilities (Benyamin et al., 2014). The updated version (KABC-II) helps to identify an individual's strengths and weaknesses in cognitive ability and mental processing. The information provided by the KABC-II can facilitate clinical and educational planning, treatment, and placement decisions. Alan and Nadeen Kaufman are the parents of James C. Kaufman.

James C. Kaufman

James C. Kaufman is Professor of Educational Psychology at the University of Connecticut. He is the author/editor of more than fifty books, including *Creativity 101* (2nd edition; Kaufman, 2016) and the *Cambridge Handbook of Creativity* (2nd edition; Kaufman & Sternberg, 2019). He has published more than 300 papers, including the study that spawned the "Sylvia Plath effect," and three well-known theories of creativity, including (with Ron Beghetto) the Four-C model of creativity (Beghetto & Kaufman, 2010; Kaufman & Beghetto, 2009). He is a past president of Division 10 of the APA. Dr. Kaufman has won many awards, including Mensa's research award, the Torrance Award from the National Association for Gifted Children, and the APA's Berlyne and Farnsworth awards. He cofounded two major journals (*Psychology of Aesthetics, Creativity, and the Arts* and *Psychology of Popular Media Culture*) and wrote the book and lyrics to *Discovering Magenta*, which had its Manhattan premiere in 2015.

Kyung-Hee Kim (Kay)

Dr. Kim is originally from Korea and came to the USA in 2000. Through the support of one of her teachers at a young age, she became the first female from her village to progress to high school. Thanks to that teacher, Kim avoided a future as a worker in a sock shop. She already had a master's degree and a Ph.D. from Korea, but when she came to the USA, she did a second Ph.D. under the supervision of Dr. Torrance and found an

additional mentor, Dr. Bonnie Cramond, during graduate study at the Torrance Center.

Kim's paper "The creativity crisis: The decrease in creative thinking scores on the Torrance Tests of Creative Thinking" was published in the *Creativity Research Journal* in 2011 (Kim, 2011) and publicized in *Newsweek* magazine (Bronson & Merryman, 2010); in this paper, she reported a significant decrease in creativity scores, which had been on the rise prior to 1990. Kim discovered that there is a negligible relationship between IQ and creativity: "You can have a low IQ and be creative." Kim also noted that "The Torrance Tests of Creative Thinking predicts creative achievement three times better than IQ tests." She is professor at William and Mary College.

Nathan Kogan

Dr. Nathan Kogan was Professor Emeritus of Psychology at the New School for Social Research, New York City, and Visiting Scholar at the Center for New Constructs, Educational Testing Service, Princeton, New Jersey. Dr. Kogan served two terms as President of APA Division 10 (Society for the Psychology of Aesthetics, Creativity, and the Arts). He received the Sir Francis Galton award from the International Association for Empirical Aesthetics, the SAGES award from the Society for the Psychological Study of Social Issues, and the Farnsworth Award from Division 10 of the APA. Over the course of his career, Dr. Kogan's research has been supported in part or in whole by the Office of Naval Research, the National Science Foundation, the National Institute of Mental Health, the Advanced Research Projects Agency, the Cooperative Research Program of the US Office of Education, and the National Institute of Child Health and Human Development. Kogan indicated that creativity measures are influenced when creativity tests are administered as serious tests rather than as fun activities, especially for children in kindergarten or in the early grades (Wallach & Kogan, 1965).

Stanley Krippner

Krippner investigated altered states of consciousness, dream telepathy, hypnosis, shamanism, dissociation, and parapsychological subjects. Krippner served as a leader in Division 32 of the APA, the division concerned with humanistic psychology, serving as president of the division from 1980 to 1981. He also served as president of Division 30, the Society for Psychological

Hypnosis, and is a fellow of four APA divisions. In 2002, Krippner won the APA Award for Distinguished Contributions to the International Advancement of Psychology.

Todd Lubart

Todd Lubart is Professor of Psychology at the University Paris Descartes and is a former member of the Institute Universiatire de France. He received his Ph.D. from Yale and collaborated with Robert Sternberg on the investment theory of creativity (Sternberg & Lubart, 1991). He is author or coauthor of approximately 100 scientific reports (journal papers and book chapters) on creativity, as well as the book *Defying the Crowd: Cultivating Creativity in a Culture of Conformity* (Sternberg & Lubart, 1995).

Colin Martindale

Colin Martindale was Professor of Psychology at the University of Maine for 35 years. He studied creativity and the artistic process. In his book *The Clockwork Muse* (Martindale, 1990), he argued that artistic development was the result of a search for novelty and could be studied quantitatively. Martindale earned the American Association for the Advancement of Science Prize for Behavioral Science Research in 1984.

Michael Mumford

Dr. Mumford has held faculty positions at the Georgia Institute of Technology and George Mason University. He has also been a Senior Research Fellow and Managing Partner of the American Institutes for Research. Dr. Mumford has published more than 150 articles on creativity, leadership, integrity, and planning. He serves on the editorial boards of *Leadership Quarterly*, the *Creativity Research Journal*, and the *Journal of Creative Behavior*. He is a fellow of the APA (Divisions 3, 5, and 14), the American Psychological Society, and the Society for Industrial and Organizational Psychology. In 2002, he received the Society for Industrial and Organizational Psychologies' Myers Applied Research Award. He received his master's (1981) and Ph.D. (1983) degrees from the University of Georgia and his B.A. from Bucknell University in 1979. He defined creativity as follows: "creativity is the process of producing something that is both original and worthwhile or which is characterized by originality and

expressiveness and imaginative." He further adds that creativity involves the production of novel and useful products.

Kobus Neethling

Neethling is President of the South African Creativity Foundation and the creator of the Neethling Brain Instruments. Neethling's interactions with Torrance and Parnes opened the door to creativity in South Africa, supported by his relations with Nelson Mandela.

Ruth Noller

Dr. Ruth Noller was a noted mathematician, computer programmer, and professor of creativity studies. During World War II, she participated in the pioneering work of programming the Mark 1 computer at Harvard University – as the second known woman computer programmer in the country. Noller merged her loves of math and creativity, resulting in her formula for creativity, $C = fa(K,I,E)$, which claimed that creativity is a function of knowledge (semantics), imagination (divergence), and evaluation.

Alex Faickney Osborn

Osborn coined and popularized the creative-thinking tool known as "brainstorming" – using the brain to storm a creative problem. In his book *Your Creative Power* (Osborn, 1948), he laid out the basic tenets of brainstorming, the most important of which was that no idea should be discouraged or judged. The objective of brainstorming was to generate as many ideas or suggestions around one specific issue as possible. Brainstorming, by the 1950s, was employed in planning and research in eight out of ten of the largest companies in the USA. However, when brainstorming was subject to its first empirical study at Yale University in 1958, groups were found to work far less effectively than individuals on a series of creative puzzles. In the sixty or so independent studies that have since been conducted, the evidence has stacked up against the claims made by Osborn and others.

Sidney Parnes

Sidney Parnes, cofounder of what is today the Center for Applied Imagination at Buffalo State University, partnered with advertising executive Dr. Alex Osborn to develop the Osborn–Parnes creative

problem-solving model, based on Osborn's brainstorming techniques. Parnes published more than a dozen books and hundreds of articles on creativity, perhaps most notably the *Creative Behavior Guidebook* (Parnes, 1967). He spoke at conferences, workshops, and seminars around the world and received numerous awards, including a Lifetime Achievement Award from the Innovation Network.

Jean Piaget

Piaget's theory is an interactive theory in which the basis of all actions, growth, and invention is the interaction of individuals with their environment. Within this theory of creative thinking developed from Piaget's dialectic notions of assimilation and accommodation, this interaction is vital. Ayman-Nolley (1999) challenged the widely accepted myth that Piaget did not address the concept of creativity in his theoretical interpretation of the development of the mind. Using Piaget's own explanations, Ayman-Nolley explored the possibility of a dialectic approach to creativity. The proposed explanation does not focus on Piaget's stage theory but utilizes his explanation of development (assimilation and accommodation). Thus, Piaget explores the integration of creative thought as integral to understanding thought processes in general.

Jonathan Plucker

Jonathan Plucker's work includes the following aspects: (1) defining creativity (and how researchers can push its boundaries), (2) the assessment and psychometrics of creativity, (3) assessing the evidence of creativity, (4) creativity across the globe, (5) creativity in the classroom, and (6) talent development through gifted education and reducing excellence gaps across students from different demographic backgrounds. He defined creativity as follows: "creativity is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context" (Plucker, Beghetto & Dow, 2004).

Steven Pritzker

Steven Pritzker started in the arts and later recreated himself as a scholar of creativity. He began his career as a comedy writer on network television, rising from Executive Story Editor of the Emmy-winning Room 222 and

the Mary Tyler Moore Show to eventually become an executive producer on subsequent sitcoms. In the 1990s, Pritzker left television to pursue a doctorate in educational psychology. With backgrounds in business and counseling, Pritzker pursued topics ranging from organizational culture and expressive arts to substance abuse and humanistic therapies. He applied his expertise to writing, teaching, and life coaching before founding the master's and doctoral specializations in creativity at Saybrook University, Pasadena, California. Pritzker conceived and became Co-Editor-in-Chief of the *Encyclopedia of Creativity*, which provides a wealth of information on creativity research. Pritzker defined creativity as influencing each of our lives and is essential for the advancement of society.

Gerard J. Puccio

Gerard is the department chair of the Center for Applied Imagination (formerly the International Center for Studies in Creativity) at Buffalo State University, where they have created the Doctor of Professional Studies (DPS) program as part of the Creativity and Change Leadership program. Puccio received the State University of New York Chancellor's Recognition Award for Research Excellence and the President's Medal for Scholarship and Creativity. He developed the FourSight model, which comprises the following four steps: (1) you clarify, (2) you ideate, (3) you develop, and (4) you implement. When you clarify, you define the problem. You are working to make sure that you are solving the right problems, creating the right work, using the right voice/medium, etc. When you ideate, you come up with lots of possible ideas to meet the challenges. When you develop, you are finding a solution. When you implement, you find and tap into acceptance of the idea and/or product.

Ruth Richards

Dr. Ruth Richards is an Educational Psychologist and Board Certified Psychiatrist and has been a Professor for almost 25 years at Saybrook University in Creativity Studies and in Consciousness, Spirituality, and Integrative Health. She is also a fellow with the APA in Divisions 10, 32, 34, and 48. She has published numerous articles, has edited/written four books on everyday creativity, and has received the Rudolf Arnheim Award from APA Division 10 for Outstanding Lifetime Accomplishment in Psychology and the Arts. Dr. Richards' 2018 book *Everyday Creativity and the Healthy Mind* (Richards, 2017) won a Silver Nautilus Award ("Better Books for a

Better World"). Dr. Richards' work spans education, clinical areas, social action, spirituality, esthetics and awareness, and the importance of chaos and complexity theories in areas including our dynamic identity, interconnection, mutual awareness, expanded empathy, and forward potentials for evolution in a challenged world and evolving cosmos. She also is a creative poet.

Ken Robinson

Sir Ken Robinson asked: Do schools continue to kill creativity? In 2006, Robinson declared that the school system alienated students and did not provide a place for creativity. According to him (Robinson, 2017), this is contradictory with the needs of contemporary organizations that look for creative thinkers. He pointed out the problem of the current design of the educational system, sharing a view of it as one of a non-synchronized system that was created for children from a different era. Moreover, he suggested that many people are unaware of the variety of their talents, indicating that many of our institutions are failing the people they're meant to serve and the energies of those who work in them. Sir Ken Robinson believed that creativity is essential for navigating a fundamentally unpredictable world. He defined creativity as the process of having original ideas that have value. Ken and his daughter Kate coauthored their 2022 book, *Imagine If . . . Creating a Future for Us All* (Robinson & Robinson, 2022).

Mark Runco

Mark Runco earned his Ph.D. in cognitive psychology from the Claremont Graduate School in California. He is currently Director of Creativity Research and Programming at Southern Oregon University. Nearly thirty years ago, Runco founded the *Creativity Research Journal*. In 2014, he founded two more journals: *Business Creativity and the Creative Economy* and the *Journal of Genius and Eminence*. Runco coedited the *Encyclopedia of Creativity* in 1999, 2011, and 2020. He has published approximately 200 articles, book chapters, and books on creativity and its measurement and enhancement. Runco posits that creativity requires originality or novelty because, if something is not unusual, novel, or unique, it is commonplace, mundane, or conventional. In addition, original things must be effective to be creative. Effectiveness is often labeled functional, fit, or appropriate (Runco & Jaeger, 2012).

Robert Keith Sawyer

Sawyer is the Morgan Distinguished Professor in Educational Innovations at University of North Carolina at Chapel Hill. Sawyer's research explores the subtle and often hidden roles of collaboration, conversation, interaction, and improvisation. He posits that creativity researchers can be grouped into two major traditions of research: an individualist approach and a sociocultural approach. Each type of researcher has its own analytic focus and each defines creativity slightly differently. The individualist definition posits that creativity is a new mental combination that is expressed in the world. The sociocultural definition states that creativity is the generation of a product that is judged to be novel and also to be appropriate, useful, or valuable by a suitably knowledgeable social group (Sawyer, 2007). Sawyer is noted for studying group creativity.

Dean Keith Simonton

Simonton investigated creative trailblazers to map patterns and predictors of creative productivity (Simonton, 1997). He supplied the field of creativity studies with a wealth of evidence-based insights and directions for future research (Simonton, 2014). He defines creativity as follows: "Creativity is simply used to create a new, appropriate, original and effective for a task whose outcome is unknown, to design a new product and to find new answers solution" (Simonton, 2018). He also argued that any attempt to define creative ideas cannot fully succeed without also defining uncreative ideas (Simonton, 2016).

Dorothy Sisk

Sisk and Torrance developed the following definition related to their beliefs about spirituality: "spiritual intelligence (SQ) is defined as the capacity to use a multisensory approach – including intuition, meditation, and visualization – to access one's inner knowledge in order to solve problems of a global nature" (Sisk & Torrance, 2001). Sisk explores definitions of creativity, theories and models of creativity, and the classic stages of creativity. She concludes that creativity is best defined in terms of an interactive process. The creative process in adults often results in creative and useful products, and such creativity is judged in terms of the quantity and quality of patents, theories, books, and more. In children,

however, the product may be original with the child, but not original with the culture.

Morris "Moe" Stein

Morris "Moe" Stein was on the faculty of New York University from 1960 and headed the Doctoral Program in Social Psychology. Well known for his work on personality and the nature and encouragement of creativity, he authored over ten books and accrued many honors. He was born in the Bronx, educated at De Witt Clinton High School, the City College of New York, and Harvard, and taught at Wheaton College and Chicago University before returning to New York City. In Stein's *Stimulating Creativity* Volumes 1 and 2 (Stein, 1974, 1975), he developed a framework for stimulating creativity.

Robert Sternberg

Robert Sternberg defined creativity as "the production of something original and worthwhile" (Sternberg, 2011). Sternberg's triarchic theory of human intelligence distinguished between three types of intellectual abilities: analytic, creative, and practical. According to Sternberg, these abilities are interdependent constructs, and every student demonstrates a distinct blend of strengths in one, two, or all three triarchic ability categories. Analytic abilities are those needed to analyze, evaluate, explain, and compare or contrast. The stereotype for students high in analytic abilities is that of the "good student" – that is, such students have been found to excel at the kinds of tasks fostered and reinforced within the United States school system (Sternberg, 1997). Creative abilities are those involved in creating, designing, discovering, or inventing. Creative thinking entails applying problem-solving processes to relatively novel and unfamiliar problems. Students with dominant creative abilities are valued for being able to generate new ideas. Practical abilities are those needed to utilize, implement, and apply problem-solving processes to concrete and relatively familiar everyday problems. Practical students are motivated by and appreciative of knowledge that they can take with them when they leave the classroom. Students with strong practical abilities are considered "street smart" – that is, able to quickly adapt to and shape their environment to achieve a concrete goal. Sternberg also is noted for his investment theory of creativity, in which original ideas are at first not valued by the field (buy low) but then are enthusiastically accepted (sell high) (Sternberg & Davidson, 2005).

Ellis Paul Torrance

Paul Torrance, who is regarded worldwide as the father of creativity, developed benchmarks for quantifying creativity, which proved that IQ is not the only measure of intelligence. Torrance was born in Milledgeville, Georgia, and earned his bachelor's degree from Mercer University and then a doctorate from the University of Michigan. He was very prolific, publishing 1,871 publications, namely 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. He also created the Future Problem-Solving Program International, the Incubation Curriculum Model, and the Torrance Tests of Creative Thinking. Because of this one man's work, children and adults worldwide have the opportunity and wherewithal to develop their creative talent.

Torrance defined creativity as a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; of identifying difficulties; of searching for solutions, making guesses, or formulating hypotheses about the deficiencies; of testing and retesting these hypotheses and possibly modifying and retesting them; and finally of communicating the results (Torrance, 1984).

Kim (2006) wrote: "Torrance's research into creativity as a measure of intelligence shattered the theory that IQ tests alone can measure real intelligence." The Torrance Tests of Creative Thinking provided a physical measure and groundwork for the idea that creative levels can be scaled and then increased through practice. Torrance and Reisman, as math teachers, coauthored a trilogy on teaching math creatively (Reisman & Torrance, 2002; Torrance & Reisman, 2000a, b).

Paul Torrance will best be remembered by those closest to him for his huge heart as much as for his colossal intellect.

Donald John Treffinger

Treffinger's primary interest was in creative problem-solving. He is the author or coauthor of more than 350 publications (Treffinger, 1986; Treffinger & Isaksen, 2005). Treffinger's professorial career has extended over fifty years, including appointments at Purdue and the University of Kansas, the Directorship of the Creative Studies Program at Buffalo State, and founding the Center for Creative Learning in Sarasota, Florida.

Lev Semyonovich Vygotsky

Vygotsky believed that creativity arises from any human activity that produces something new. Creative acts could produce anything from physical objects to a music score to a new mental construct. Creativity is therefore present when major artistic, scientific, and technical discoveries are made. "Psychology has for a long time ascribed too great a significance to just such established stereotypic forms of development that were themselves the result of already developed and fixed processes of development, that is, processes that are concluded and are only repeated and reproduced" (Vygotsky, 1967). Vygotsky considered "creative intelligence" as fundamental to the effective, dialectical interaction of an individual with his or her environment and the intersubjective understandings among members of a community (Vygotsky, 2004, 2010).

Michael A. Wallach

Wallach's early work included contributions on modes of thinking in young children, the distinction between intelligence and creativity, and risk-taking behavior. Wallach and Kogan (1965a, 1965b) proposed that creativity measures were weakly related to one another and were not related to IQ, but they seemed also to draw upon non-creative skills. McNemar (1964) noted that there were major measurement issues, namely that the IQ scores were a mixture from three different IQ tests. Wallach and Kogan administered five measures of creativity, each of which resulted in a score for originality and fluency, and ten measures of general intelligence. These tests were untimed and given in a game-like manner aiming to facilitate creativity. See Crockenberg (1972) for an excellent discussion of the Wallach–Kogan assessment.

Graham Wallas

Wallas dissected the act of creativity into four stages in *The Art of Thought* (Wallas, 1926): preparation, incubation, illumination, and verification. During the preparation stage, the problem is investigated from all angles and includes the accumulation of information from which emerge new ideas. The incubation stage involves unconscious processing, whereby one is unaware that cognitive activity is going on. Wallas found Poincaire's ideas on illumination critical, as Poincaire talks about the value of "procrastination," which is in fact a valuable part of illumination. The verification stage involves a conscious and deliberate effort to test the validity of an idea. Wallas's (1926) classic was

published almost nine decades ago and is still widely referenced today. His work still serves as a "conceptual anchor" for many creativity researchers (e.g., Orlet, 2008; Pagel & Kwiatkowski, 2003; Reisman & Severino, 2021; to name only a few). Although some creativity researchers have proposed a five-stage model (e.g., Cropley & Cropley, 2012), most have held to Wallas's four-stage model.

2.10   What Is the Future of Creativity?

Developing and using personal creativity in the workplace is no longer relegated to the "creative arts" or deemed as "nice to have." Regardless of the setting, creativity is quickly becoming a competitive differentiator and a core competency for leadership. An IBM survey of more than 1,500 chief executives from over sixty countries and thirty industries found that "chief executives believe that – more than rigor, management discipline, integrity, or even vision – successfully navigating an increasingly complex world will require creativity" (IBM, 2010).

According to the World Economic Forum's *Future of Jobs Report* (World Economic Forum, 2018), the top ten skills that employers see as rising in importance leading up to 2025 are:

1.   analytical thinking and innovation
2.   active learning and learning strategies
3.   complex problem-solving
4.   critical thinking and analysis
5.   resilience, stress tolerance, and flexibility
6.   creativity, originality, and initiative
7.   leadership and social influence
8.   reasoning, problem-solving, and ideation
9.   emotional intelligence
10.   technology design and programming

Source: https://lepaya.com/en/top-10-skills-of-the -future/#10-skills-of-2025

In addition, LinkedIn's *Global Talent Trends* report, published in 2019 (LinkedIn, 2019), emphasized that the soft skills identified as most important by industry talent managers, in order of importance, were:

1.   creativity
2.   persuasion
3.   collaboration
4.   adaptability
5.   time management

Source: www.upsidelms.com/blog/linkedin-global-talent -trends-2019-report/

Box 2.8   World Economic Forum 2016 report

Skills for future jobs 2020	Skills for future jobs 2015
1. Complex problem-solving	1. Complex problem-solving
2. Critical thinking	2. Coordinating with others
3. Creativity	3. People management
4. People management	4. Critical thinking
5. Coordinating with others	5. Negotiation
6. Emotional intelligence	6. Quality control
7. Judgment and decision-making	7. Service orientation
8. Service orientation	8. Judgment and decision-making
9. Negotiation	9. Active listening
10. Cognitive flexibility	10. Creativity

Sources: Idea to Value (2020), World Economic Forum (2016)

The following historical data (see Box 2.8 and Box 2.9) indicate that the future of creativity is an extension of the past. According to the World Economic Forum, creativity will be the third-most-important skill for employees by 2020. A report by the World Economic Forum (2019) stated that, "With the avalanche of new products, new technologies, and new ways of working, workers are going to have to become more creative in order to benefit from these changes." The World Economic Forum's *Future of Jobs* report (Box 2.9) predicted creativity, innovation, and ideation as key skills for the workforce of the future. These so-called soft skills, which sit alongside analytic thinking and problem-solving, will replace manual tasks that become automated.

Companies that want to realize their full potential must prioritize creativity as an essential component of success. Creative problem-solving will unlock innovation in the workplace in many ways – for example by finding new approaches to problems inherent to the business, developing new products, or improving existing processes. Creativity will allow companies to address their customers' biggest challenges.

Regarding how creativity is defined in the future, computational creativity (also known as artificial creativity, mechanical creativity, creative computing, or creative computation) combines the fields of artificial intelligence, cognitive psychology, philosophy, and the arts. Computational creativity (Jordanous, 2014) allows companies to model, simulate, or replicate creativity using artificial intelligence or software. Some goals of computational

Box 2.9 World Economic Forum 2018 report		
2018	Trending 2022	Declining 2022
Analytical thinking and innovation	Analytical thinking and innovation	Manual dexterity, endurance, and precision
Complex problem-solving	Active learning and learning strategies	Memory, verbal, auditory, and spatial abilities
Critical thinking and analysis	Creativity, originality, and initiative	Management of financial and material resources
Active learning and learning strategies	Technology design and programming	Technology installation and maintenance
Creativity, originality, and initiative	Critical thinking and analysis	Reading, writing, math, and active listening
Attention to detail, trustworthiness	Complex problem-solving	Management of personnel
Emotional intelligence	Leadership and social influence	Quality control and safety awareness
Reasoning, problem-solving, and ideation	Emotional intelligence	Coordination and time management
Leadership and social influence	Reasoning, problem-solving, and ideation	Visual, auditory, and speech abilities
Coordination and time management	Systems analysis and evaluation	Technology use, monitoring, and control

Source: World Economic Forum (2018)

creativity include to (1) construct a program or computer capable of human-level creativity, (2) better understand human creativity and formulate an algorithmic perspective on creative behavior in humans, and (3) design programs that can enhance human creativity without necessarily being creative themselves.

The field of computational creativity addresses theoretical and practical issues related to creativity. Theoretical investigation into the nature and proper definition of creativity is performed simultaneously with explorations of practical work on developing systems that exhibit creativity. Each strand of research informs the other. This applied form of computational creativity is known as media synthesis.

2.11 Summary

The chapter acknowledges Joy Paul Guilford's APA Presidential Address entitled "Creativity milestone" that precipitated a renewal of creativity research and an explosion of creativity definitions, many of which are presented in this chapter. The definition that underlies this chapter emphasizes two components: uniqueness and relevance. Creativity is ubiquitous and complex; thus, the assessment of creative thinking and creative action is a challenge.

In this chapter, distinctions are made between creativity and innovation and domain-general and domain-specific creativity, and the relationship between creativity and intelligence is valued. The creative-thinking process and creativity myths also are discussed. This chapter also provides various tools and techniques for teachers, corporate trainers, and talent managers, including by highlighting some creativity killers and suggesting quick fixes to address these killers. Creativity trailblazers and their contributions are also listed.

Appendix 2A Creativity Journals

The *Journal of Creative Behavior* is a quarterly peer-reviewed academic journal published by Wiley-Blackwell on behalf of the Creative Education Foundation and established in 1967. The journal focuses on creativity and problem-solving, including ways to foster creative productivity, giftedness, the management of creative personnel, testing, creativity in business and industry, the development of creative curricula, and creativity in the arts and the sciences. This journal appears to focus on advancing the understanding of creativity as a field of study on a broad spectrum of ideas. A quick look at the articles in the journal reveals a wide variety of topics, ranging from group creativity in children to culinary creativity and associative algorithms for computational creativity.

Creativity and Innovation Management appears to delve into the system implementation of the creativity and innovation. The articles focus on the motivational aspects of creative work such as employee points of view, creative performance, communication, entrepreneurship, and teamwork in relation to creative products, and teamwork in relation to creative products.

The *International Journal of Innovation, Creativity and Change* publishes papers (scholarly works) to "promote and foster" innovation creativity. This journal seeks to influence the field to create a broader understanding.

The *International Journal of Design Creativity and Innovation* provides a forum for discussing the "nature and potential" of creativity and innovation. Its description suggests that it covers theories on design creativity, inventive and innovative processes, methods and tools for design creativity, and education for design creativity.

Thinking Skills and Creativity is a quarterly peer-reviewed academic journal that covers research into the teaching of thinking skills and creativity. The journal was established in 2006 and is published by Elsevier. It provides a forum for researchers to discuss and debate the ideas behind teaching for thinking and creativity. According to the description, the journal welcomes studies of teaching, reports of research, and relevant theoretical and methodological studies.

The *Creativity Research Journal* is a quarterly peer-reviewed academic journal that covers research into all aspects of creativity. The journal was established in 1988 and is published by Routledge. This journal looks at creativity through behavioral, clinical, cognitive, cross-cultural, educational, genetic, organizational, social, and psychoanalytical lenses. The journal also looks at issues such as genius, imagery, intuition, metaphor., and problem-solving/problem-finding.

Psychology of Aesthetics, Creativity, and the Arts is a quarterly peer-reviewed academic journal published by the American Psychological Association. The journal covers research on the psychology of the production and appreciation of the arts and all aspects of creative endeavor.

The *International Journal of Creative Computing* is a quarterly peer-reviewed scientific journal published by Inderscience Publishers covering creativity in computing.

Appendix 2B   Glossary

Cognitive psychology	The study of mental processes such as attention, language use, memory, perception, problem-solving, creativity, and thinking.
Convergent thinking	The ability to find a single correct solution for a given problem.
Creativity	The ability to make new things or think of new ideas. Such ideas should be original and useful.

Crystallized intelligence	The part of intelligence resulting from acquired information; it is most often obtained through education.
Divergent thinking	The ability to think of as many solutions as possible for a certain problem.
Domain	A field or an academic area.

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