Ambient Knowledge

Human Capital Development Strategies for U.S. Economic Competitiveness

Antje Mays, EdD, MBA, MLIS

Ida Jane Dacus Library, Winthrop University

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Beginnings…

- This presentation summarizes dissertation research:
  - MBA / EdD joint degree
- **Title of dissertation:** *Toward the Application of Constructivism and Constructionism to Work-Related Training in Service of Human Capital Development in Postsecondary Education Settings in the United States.*
  - Complete dissertation on Digital Commons and on ERIC.

Purpose of the research

- Educational solutions for business and economic challenges

Overview

- **Problem overview**
  - Skill gap: what is it, and why is it a problem?
  - Skills and knowledge: historical overview
  - Human capital – economic theory
  - Human capital – educational perspectives
  - Human capital challenges in the United States
- **Educational solutions**
  - Constructivism, an early childhood learning theory: "learn by doing"
  - Constructionism , an early childhood learning theory: "learn by making"
  - Constructivism and constructionism: Current practice and core tenets
- **Educational solutions applied to U.S. human capital needs**
  - Focus: postsecondary education settings
  - Learning theories, with applications for college and adult learners

Background

- **Skill gap** = mismatch between skills needed and those in existence.
- **Skill gap in the United States: a cumulative effect**
  - Over 4 decades of automation, production offshoring
  - Shifts toward:
    - Tech-infused smart manufacturing
    - Rise of high-end analytical and creative work
    - Decline in low-to-middle-skilled work.
- **Skills and Knowledge – their importance:**
  - Needed to accomplish existing work
  - Needed to innovate and advance
  - Needed to fulfill human potential, to participate in economy & society

background, ctd

- **Skill needs – some examples:**
  - Literacy & numeracy
  - Grasp of academic foundations
  - Abstract reasoning, analysis, synthesis
  - Interdisciplinary thinking & learning
  - Creativity, spirit of inquiry, learning mindset
  - Work ethic, initiative, etc.
  - Social skills, good citizenship, integrity, etc.
- **Learner-centered theories – why suitable to fostering these skills:**
  - Immersive learning ("doing", "making") -> internalize knowledge, deeper grasp
  - Learners take ownership of growing in skills & knowledge
  - Learners take initiative and collaborate

Limitations of the Study

- Vast differences across career fields
  - -> difficulty in standardizing these learning theories' core tenets across all fields
- Postsecondary career education builds upon academic foundations
  - -> study cannot address remedial strategies at earlier learning points
- Focus on postsecondary settings
  - -> study cannot address remedial education for high-school dropouts

Skills and Knowledge: A Brief History

- Throughout human history:
  - education / training -> skills to prepare people to take up roles
- Over time, shift from roles assigned by birth to meritocracy
- Education / training methods
  - Tutors
  - Schools and universities
  - Craft and trade guilds
  - Apprenticeships
  - Internships
  - Vocational education
  - Technical training
  - (Charland, 2005; Wallis, 2008; Wallis et al., 2010; Wolek, 2004)
- Historical shifts toward social / economic complexity
  - Freedom, discovery, learning (Ferguson, 2011)
  - Education -> preserve knowledge & cultural heritage, equip individuals (Gutek, 1994)

Skills and Knowledge USA: Brief History

- Founding Fathers <-> European Enlightenment
  - Democracy requires educated and enlightened citizenry (Rousseau)
  - Knowledge is the soul of a republic (John Jay, America's first Chief Justice)
  - "In a republican government… the whole power of knowledge is required" (Montesquieu)
  - "To own their own government, people must arm themselves with the power which knowledge gives" (Thomas Jefferson)
  - Each citizen's access to education
    - -> participation in economic and social life of the nation (Beadie, 2010)

skills & knowledge USA, ctd

- Industrialization, urbanization -> civic and vocational education (Brewer, 1933)
- International tensions, Sputnik (Kennedy, 2011; Cavanagh, 2007)
- Competitive vision: "man on the moon… return him safely to the earth" (Pres. Kennedy in Swanson & Dickson, 2012)
  - Increased focus on science and math in 1960s and early 1970s
- 1970s, 1980s: recessions, automation, industry declines, cascade of worker displacements with shifting nature of work (Blinder, 1987; Peck, 2011)
  - Post-2008: growing gap between skills and evolving work (Carnevale et al, 2011)
- Declining education -> risk of social, moral, economic decay (*A Nation at Risk*, 1983)
- flight to suburbs -> erosion of tax base -> underresourced schools -> isolation
- -> talent flight -> economic and educational isolation (Klein et al, 2012)
- US concerns over falling behind among global peers (OECD/PISA; Klein et al, 2012)

skills & knowledge USA, ctd

- Seeking improved outcomes – a few policy measures:
  - Sounding the alarm bell *(A Nation at Risk*, 1983)
  - Educate America Act – "Goals 2000" (1994) – Clinton era
  - No Child Left Behind Act (2002) – G.W. Bush era
  - Race to the Top (2009) – Obama era

Human Capital: economic and social catalyst

- **Human capital theory – the basics:**
- Effective education and training -> key driver of economic health (Davidson, 2014)
- Nations' commitment to education -> economic soundness, citizen well-being (Becker, 1994)

human capital, ctd

- **Positive externalities – in theory:**
- Education -> higher individual achievement -> income growth -> rise in aggregate wealth (Smith, 1776)
- -> rise in quality of life, civic and cultural life (Mill, 2012)
- -> firmer grasp of government policy, stronger citizenship, rule of law and accountability (Dewey, 1916)
- -> public education protects social fabric by ensuring common denominator of knowledge (Friedman, 1962).
- Education has democratizing influence - McMahon (2007) Deep South study
- Strong links between education and nations' economic development and upward mobility (Ramcharan, 2004)

human capital, ctd

- **Positive externalities – in action:**
- **The most advanced nations:**
  - Compulsory education and it's enforcement, high educational participation and attainment rates , high postsecondary attainment rates, low youth unemployment
  - Northern and western Europe, advanced Asia-Pacific, North America (OECD, 2013: World Economic Forum, 2013)
- **Upwardly mobile countries** - rapid growth resulting from aggressive education and training growth:
  - Chile -> Latin America's most advanced economy
  - South Korea -> highly skilled population -> advanced economy
- **OECD (2012) study on natural-resource-rich nations and skill levels:**
- **Natural-resource-rich nations** with commitment to raising populations' skill levels:
  - Oil: Qatar, UAE, Oman -> aggressive education build-up -> economic growth
  - Diamonds: Botswana -> among Africa's most stable societies; highest education/skill levels
- **Business:** the right skill mix helps organizations carry out their missions (Manpower Group, 2013; OECD, 2013)

human capital, ctd

- **Negative externalities: corrosive effects of undereducation**
- Low education - growing skill gaps - economic decline - social and moral decay - undereducated locked into lowest rung (Belfield & Levin, 2007; A Nation at Risk, 1983)
- Low literacy rates, low skills, instability, stunted economic mobility in developing countries (UNCTAD, 2012)
- Brain drain - developing countries, depressed areas in US (World Economic Forum, 2013)

human capital, ctd

- **Negative externalities in action – global findings - business impact:**
- Manpower Group's *Talent Shortage Survey* (2013) – global study
  - 38,000 employers in 42 countries (mostly advanced)
- 34% of employers cite lack of content knowledge, technical competencies, industry certification
- 19% cite lack of professionalism, interpersonal skills, analysis / problem-solving skills
- 43% report reduced ability to serve customers
- 39% report reduced productivity
- 25 % report employee turnover
- 22% report reduced innovation / creativity
- 21% report lower employee morale

human capital, ctd

- **Negative externalities in action – global findings – business / social impact:**
- World Economic Forum – global study
  - *Global Competitiveness Report*'s Executive Opinion Survey (2013):
- 104,000 executives in 148 countries ranging from least developed to most advanced:
- **Key skill shortages:**
  - Inadequate education
  - Inability to innovate
  - Poor work ethic amongst native populations
- Pose risk to business soundness and national economic health

- **Extreme example:**
- Catastrophic shortage in qualified staff forced several Manila hospitals to close (Wescott, 2008)

Human Capital – Educational Perspectives

- **Prepare learners for:**
- Community integration, engaged citizenship
- Social skills, collaboration
- Self-determination
- Employability
- Meritocratic opportunity

(Câmara & McDonagh, 2009; Dewey, 1897, 1915, 1916; Freire, 1970; Froebel, 1895; Montessori, 1912)

human capital – educational views, ctd

- Key skills span cognitive, affective, psychomotor (Bloom, 1956)
- **Current research movements:**
- **21st century skills** - communication, collaboration, communication, creativity, analysis, synthesis (Wagner, 2012)
- **STEM to STEAM** - art education to foster creativity and observation skills, compatible with science (Sousa & Pilecki, 2013)
- **Learning to think, thinking to learn** - spirit of inquiry, lifelong learning (Hofmann, 2008)
- **Employability** - tangible skills & knowledge, social skills, values, citizenship (Critical Skills Survey, 2010, 2012; Schneeberger, 2006; Yorke & Knight, 2006)

human capital – educational views, ctd

- **Global Best practices to elicit needed skills:**
- Stakeholder synergies
- Education-industry partnerships
- Work-based learning
- Strategic skill rubrics as education and training roadmaps (Aamodt & Havnes, 2008; Onsomu et al, 2010)
- Open, flexible study pathways (Davies & Kourdi, 2010; OECD, 2012)
- Proactive in-house talent development strategies (Davies & Kourdi. 2010; Hansson, 2009)
- Teachable-fit recruiting (Manpower Group, 2013)

Human Capital USA: Challenges, Strategies

- **10 employer surveys:**
- 407 responses from SHRM *Critical Skill Needs* (2008)
- 328 SC employers (Nagle, 2010)
- 302 US employers (Hart Research Associates, 2010)
- 2,115 employers (P21's *Critical Skills Survey*, 2010)
- 768 employers (AMA's *Critical Skills Survey*, 2012)
- 1,152 NC employers (*Closing the Gap*, 2012)
- 450 US executives (WEF's Executive Opinion Survey, 2013)
- 670 US executives ((WEF's Executive Opinion Survey, 2012)
- 1,300 US employers (Manpower Group's *Talent Shortage Survey*, 2012)
- 1,000 US employers (Manpower Group's *Talent Shortage Survey*, 2013)

human capital USA, ctd

- National security risks:
  - Undereducation (Klein et al, 2012)
  - Low literacy (OECD, 2012, 2013; TIMSS & PIRLS, 2011)
  - low numeracy (OECD , 2012, 2013; TIMSS & PIRLS, 2011)
  - low technical skills (*Ready, Willing, and Unable to Serve*, 2009)
  - 25% dropout rate – undercredentialed (Klein et al, 2012; *Ready*…, 2009)

human capital USA, ctd

- **Strategies & Strengths:**
- Research base is second to none (OECD, 2012)
- Synergistic initiatives, sensitive to local needs (OECD, 2013)
- **History of targeted policy measures:**
- Needs-based federal funding (Cervantes et al, 2005)
- Vocational / career / technical education & training
  - Smith-Hughes Act (1917)
  - Vocational Educational Act (1963)
  - Vocational Education Act (1963)
  - Carl D. Perkins Vocational Education Act (1984)
  - School-to-Work Opportunities Act (1994)
  - Carl D. Perkins Vocational and Technical Education Act (1998)
  - Carl D. Perkins Career and Technical Education Improvement Act (2006)
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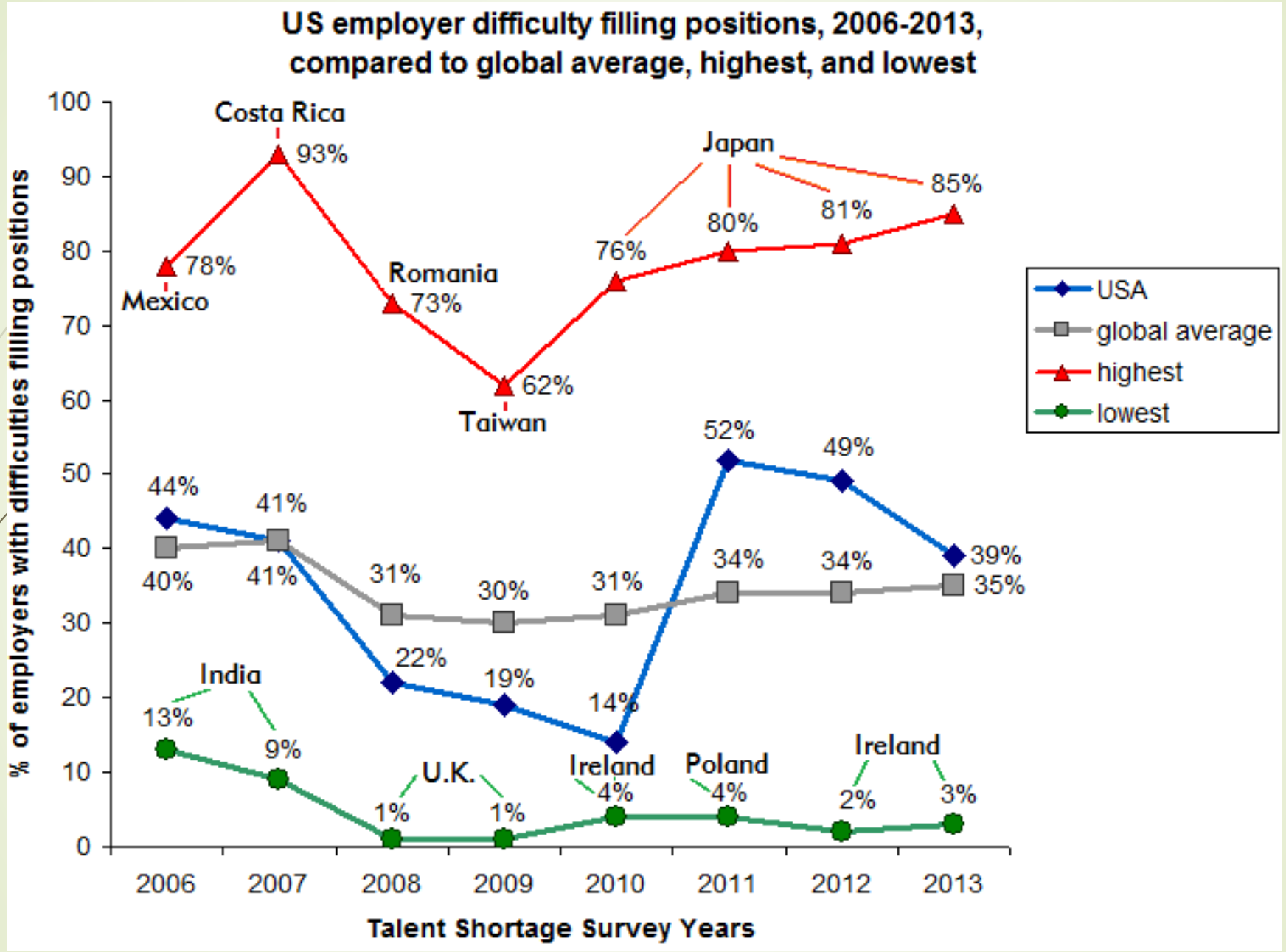


Data Source: *Talent Shortage Survey*. Manpower Group, 2008, 2009, 2010, 2011, 2012, 2013

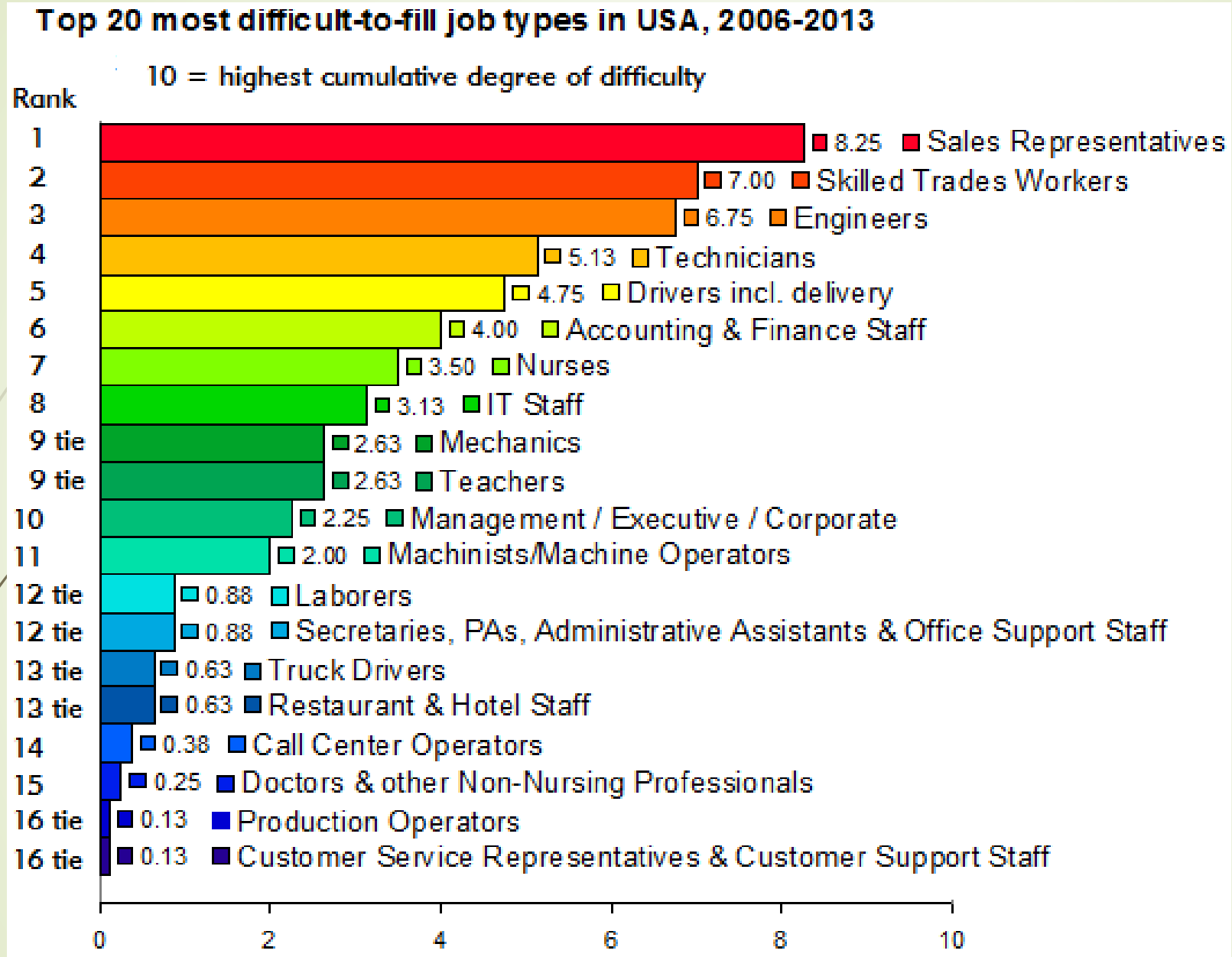
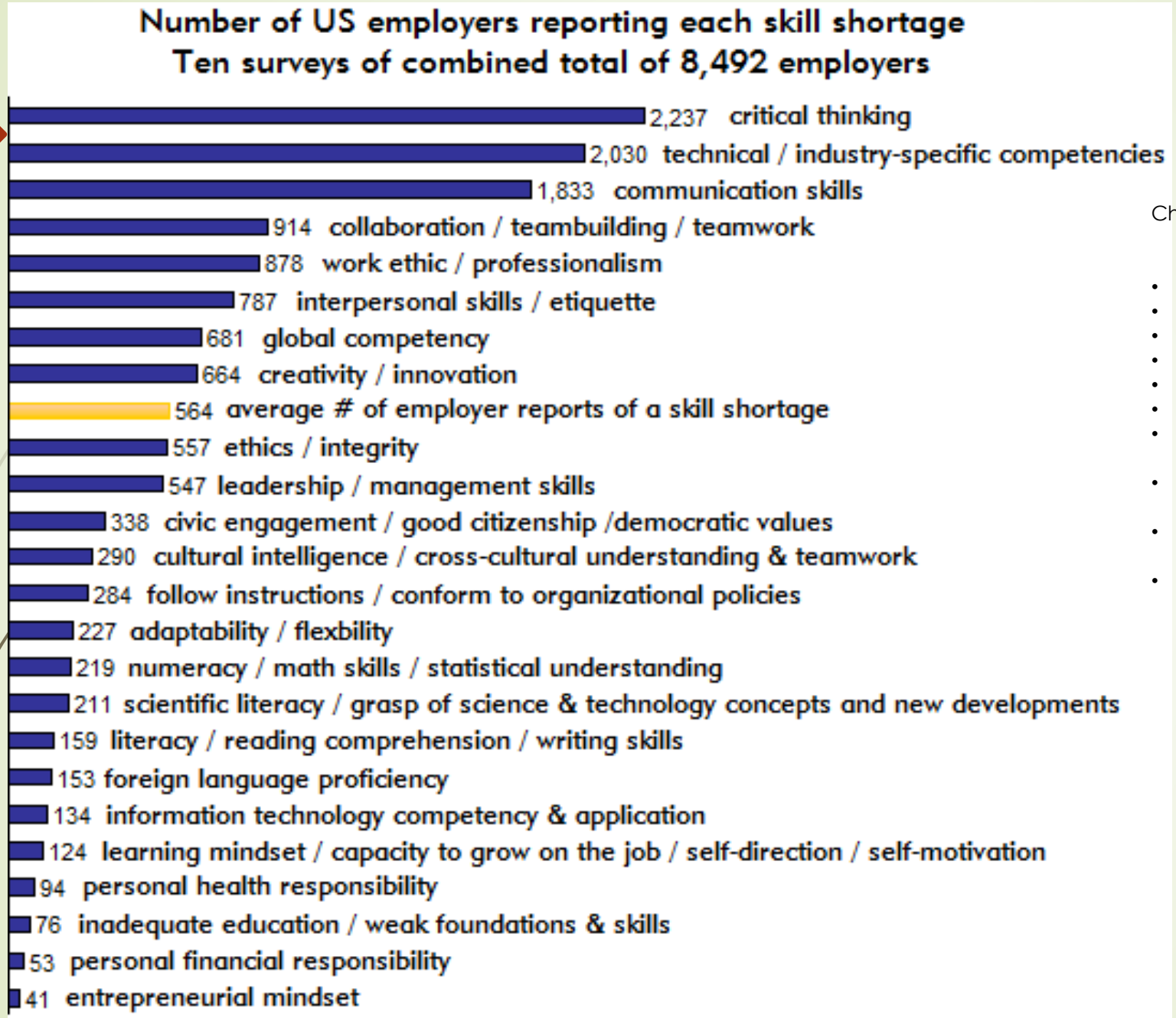


Chart by author.

- Compilation of 2006-2013 data.
- Each year, Manpower Group's *Talent Shortage Survey* identifies the top 10 most difficult-to-fill jobs.
- For each year, rank 1=> heat score 10.
- For composite heat score:
- -> average of all 8 years, 2006-2013
- -> weighted for consecutive years
- -> weighted for recent / distant years

Data Source: *Talent Shortage Survey*. Manpower Group, 2008, 2009, 2010, 2011, 2012, 2013



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Data from 10 employer surveys:

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Constructivism

- **Ancient roots:**
  - Epistemology, philosophy's study of knowledge & perception (LeJeune, 2011; Ültanir, 2012)
  - Socratic dialogue (DePierro et al, 2003), conversation (von Glasersfeld, 1996)
  - Importance of imagination & interdisciplinary synthesis (Vico, 1709)
- **Goals: educating the whole person**
- – moral, social, intellectual, civic (Montessori, 1912; Dewey,1897, 1916; Froebel, 1895)
- **Characteristics:**
  - Active hands-on learning (Bruner, 1977)
  - Inner work of mental mapping of knowledge, "constructing knowledge" (Piaget, 1929)
  - Learning from each other – social learning & collaboration (Vygotsky. 1978; Montessori, 1912)
  - Open-ended discovery, self-guided projects (Chng & Coombs, 2004; Kafai et al, 2008)
  - Teacher is facilitator (Bruner, 1977)
  - Emphasis on intellectually stimulating, psychologically safe environments (Mitra & Dangwal, 2010)
- **Important:**
- Incorporate task failure into learning experience -> instill mastery (Dweck, 2006)

constructivism - examples

- **Montessori's Children's House** (1912)
  - Italian child psychiatrist remodelled a slum tenement in late-19th-century Rome.
  - Repurposed a wing on ground floor with courtyard as preschool for residents.
  - Child-sized furniture, open-ended indoor/outdoor self-guided learning activities.
  - Didactic toys strategically placed.
  - Children learned independence, social skills, collaboration, and achieved mastery on par with wealthier counterparts.
- **Work-based learning** (Huq & Gilbert, 2009)
  - Work-based hands-on practicum placement – companion component to an academic Social Work class.
  - In the workplace, students learned practical application of theoretical classroom learning.
  - In course assignments, students reflected upon their practical work-based experiences. -> Learning deepened.
- **E-learning** (Enonbun, 2010)
  - Interactive tools, peer critique, mutual help -> greater learner confidence (Saab et al, 2005)
  - Professional development: hybrid instruction; online learning communities (Mesh, 2010; Na-songhkla, 2011)
- **Hole in the Wall experiment**: computer with learning resources in Delhi slum and rural India (Mitra & Dangwal, 2010)
  - Open-ended exploration of microbiology resources on the computer.
  - Students learned in self-organizing groups, facilitated by adults.
  - Some students developed strong leadership skills.
  - Learning outcomes compared favorably with structured schools.
  - The social and explorative elements contributed to high learning achievement.

Constructionism

- Rooted in 1960s' beginnings of computer science and computer-aided instruction
  - **Characteristics:**
  - working with high-and low-tech media is used as a tool to internalize knowledge
  - Learn by making
- Children learned how to write computer programs as Math teaching tool - children used Logo to teach each other mathematical concepts(Papert, 1993; Harel & 1990, 1991)
- Computer and media creations as learning and mentoring tool (Yarnall & Kafai, 1996; Kafai et al, 2009)
- Contraptions and science creations as youth rehabilitation tool (Stager, 2001, 2005)

Constructionism - examples

- College capstone course for Education majors: build-a-contraption and reflection (Beisser & Gillespie, 2003)
- 8th grade Geography displays (Grant & Branch, 2005)
- Elementary school code of conduct based on UN Declaration of Rights of the Child (Hower & Covell, 2009)
- College business students' professional code, based on self-guided research and mutual critique within working groups (Willey & Burke, 2011)

Examples rooted in both theories

Methods

- Flipped classroom (Mok, 2014, Roehl et al, 2013)
- Project-based learning (Tamim & Grant, 2013)
- Problem-based learning (Hmelo-Silver, 2013)
- Service learning (Garcia & Longo, 2013)
- Place-based learning (Smith & Sobel, 2013)
- Farm-based learning (Graham, 2012)
- Nature-based learning (Fleming, 2012)
- Outdoor learning (Gray & Martin, 2012)

examples, ctd

- **Initiatives**
- SEED School – Washington DC inner-city boarding school (Whitman, 2008)
- Urban Prepatory Academy – Chicago all-men's prep school (King, 2011)
- Harlem Children's Zone – academic rigor, parents' life skills (Tough, 2008)
- Little Black Pearl Art and Design Academy – Chicago (Phillips, 2014)
- Silver State Industries – Nevada prison rehab program via classic car restoration apprenticeships (Millman,, 2011)

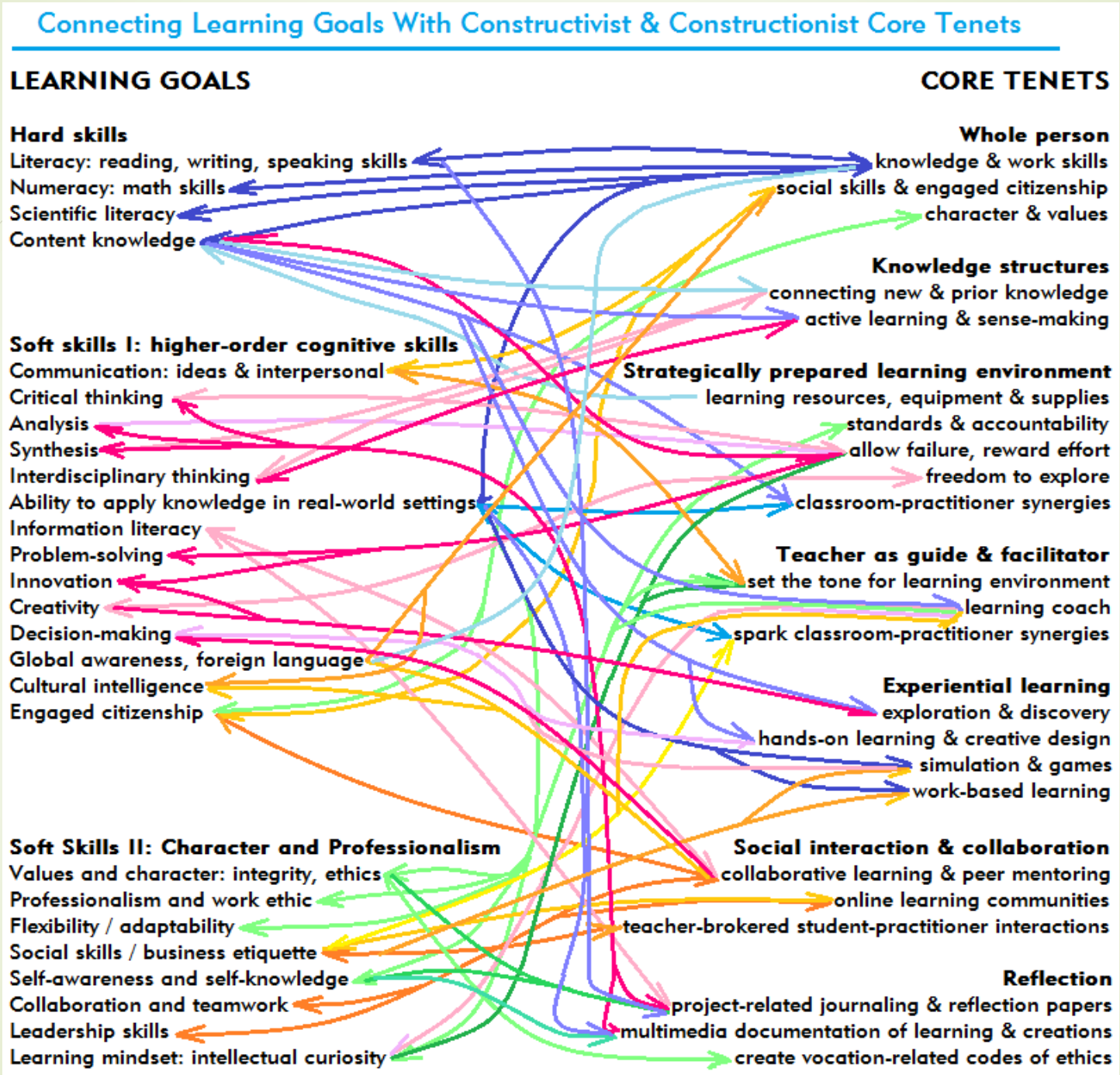
Constructivism & Constructionism: 7 core tenets

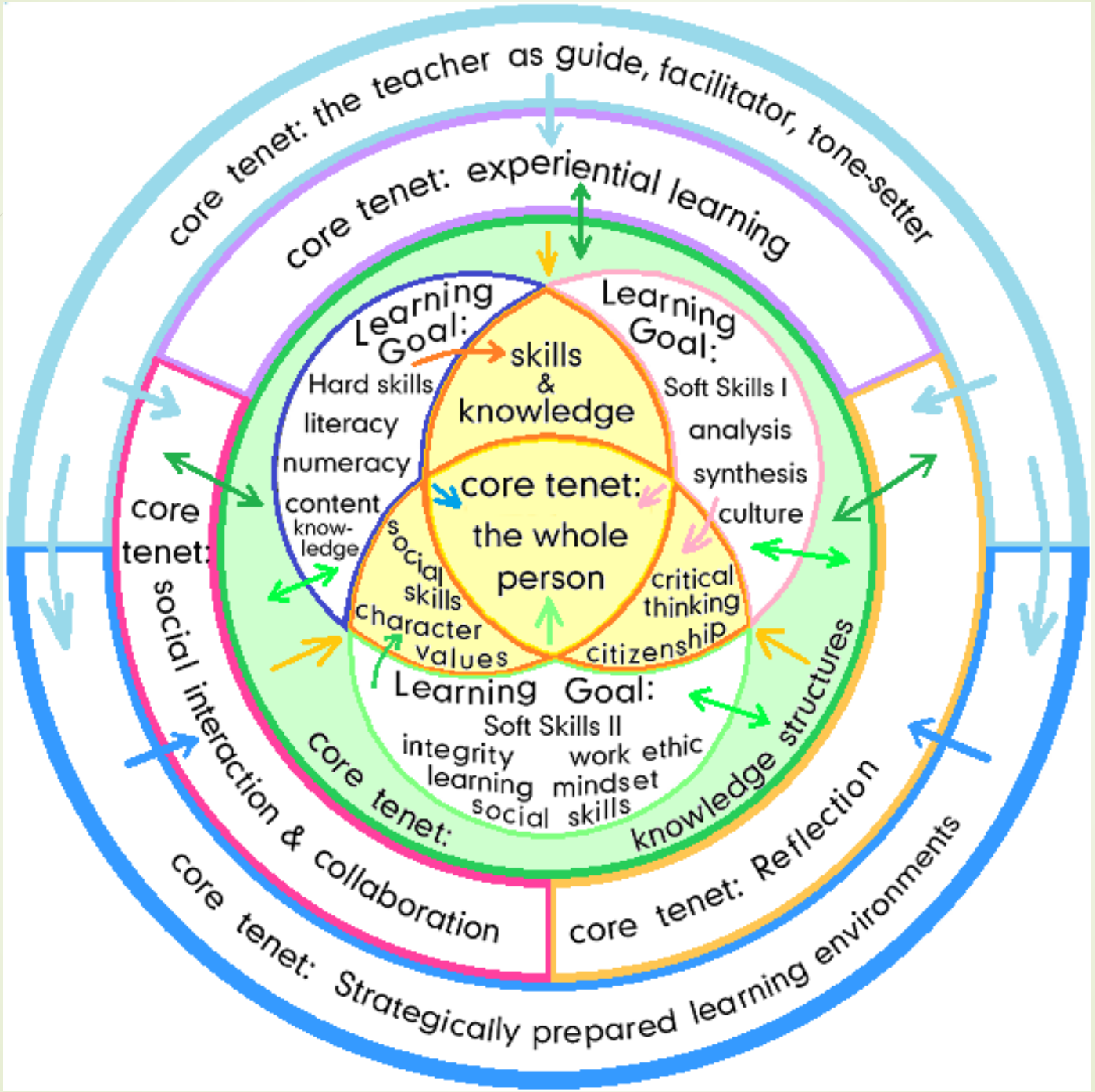
- The whole person (Dewey; Gerver & Robinson; Montessori; Steiner; Wagner)
- Knowledge structures (Montessori; Piaget)
- Strategically prepared learning environments (Montessori; King; Mitra & Dangwal)
- Teacher as expert guide & subtle facilitator (Montessori, 1912; Nikirk, 2012)
- Experiential learning (Bruner; Cetrone; Chng & Coombs; Nikirk)
- Social interaction & collaborative learning (Mesh; Na-solgkhla; Vygotsky)
- Reflection (Howe & Covell; Smith et al; Willey & Burke)

Connecting Learning Goals With Constructivist & Constructionist Core Tenets

LEARNING GOALS	CONSTRUCTIVIST CORE TENETS
Hard skills	**Whole person**
Literacy: reading, writing, speaking skills	knowledge & work skills
Numeracy: math skills	social skills & engaged citizenship
Scientific literacy	character & values
Content knowledge	
	Knowledge structures
	connecting new & prior knowledge
	active learning & sense-making
Soft skills I: higher-order cognitive skills	
Communication: ideas & interpersonal	**Strategically prepared learning environment**
Critical thinking	learning resources, equipment & supplies
Analysis	standards & accountability
Synthesis	allow failure, reward effort
Interdisciplinary thinking	freedom to explore
Ability to apply knowledge in real-world settings	classroom-practitioner synergies
Information literacy	
Problem-solving	**Teacher as guide & facilitator**
Innovation	set the tone for learning environment
Creativity	learning coach
Decision-making	spark classroom-practitioner synergies
Global awareness, foreign language	
Cultural intelligence	**Experiential learning**
Engaged citizenship	exploration & discovery
	hands-on learning & creative design
	simulation & games
	work-based learning
Soft Skills II: Character and Professionalism	**Social interaction & collaboration**
Values and character: integrity, ethics	collaborative learning & peer mentoring
Professionalism and work ethic	online learning communities
Flexibility / adaptability	teacher-brokered student-practitioner interactions
Social skills / business etiquette	
Self-awareness and self-knowledge	**Reflection**
Collaboration and teamwork	project-related journaling & reflection papers
Leadership skills	multimedia documentation of learning & creations
Learning mindset: intellectual curiosity	create vocation-related codes of ethics

Connecting Learning Goals With Constructivist & Constructionist Core Tenets




core tenet: the teacher as guide, facilitator, tone-setter
core tenet: experiential learning
Learning Goal:
Hard skills
literacy
numeracy
content know-ledge
skills & knowledge
Learning Goal:
Soft Skills I
analysis
synthesis
culture
core tenet: the whole person
social skills
character values
critical thinking
citizenship
Learning Goal:
Soft Skills II
integrity
work ethic
learning mindset
social skills
core tenet: social interaction & collaboration
core tenet: knowledge structures
core tenet: Reflection
core tenet: Strategically prepared learning environments


hands-on learning & creative design
simulation & games
Learning Goals:
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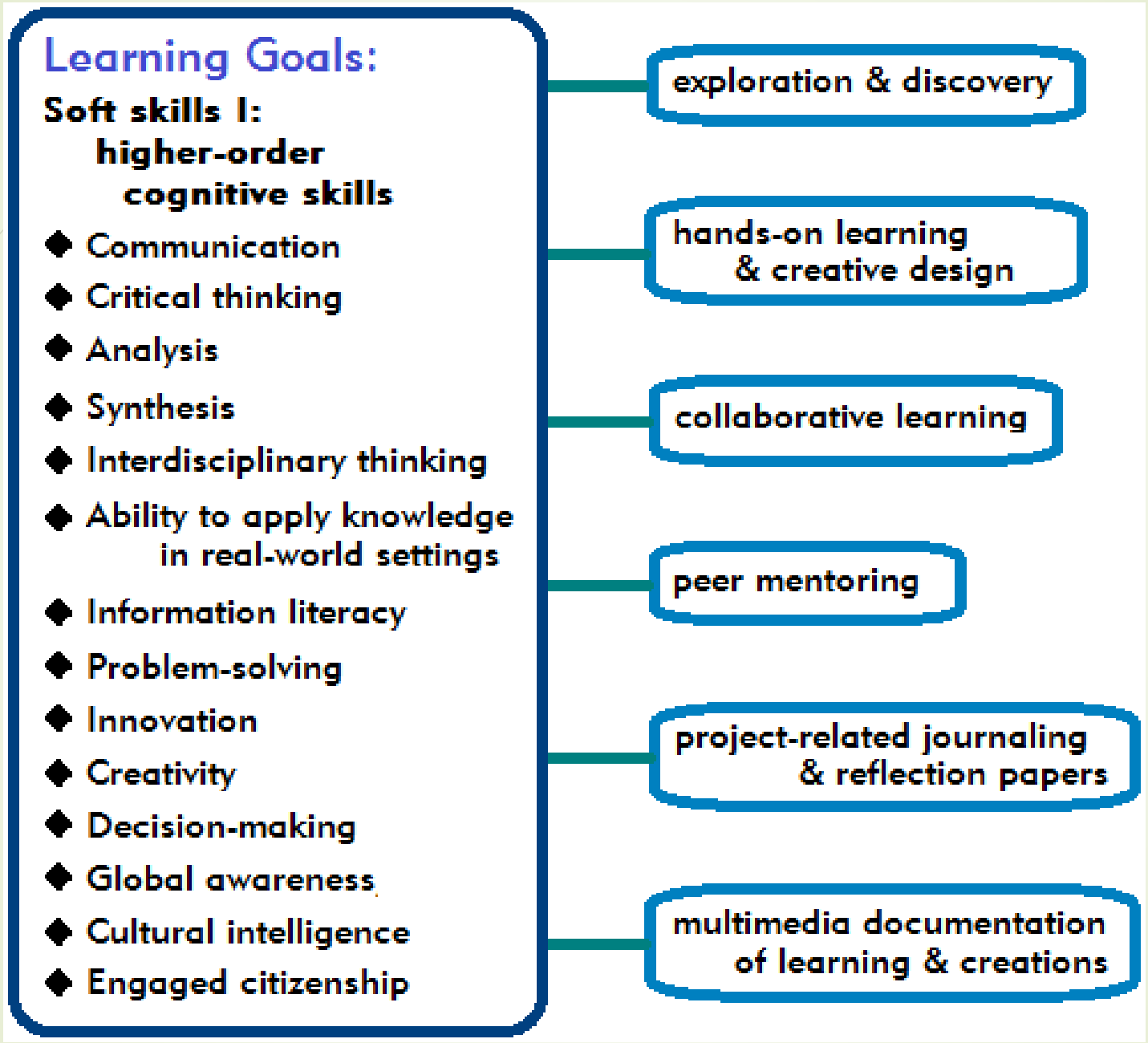
multimedia documentation of learning & creations
project-related journaling & reflection papers

Learning Goals:

Soft skills I:
higher-order cognitive skills

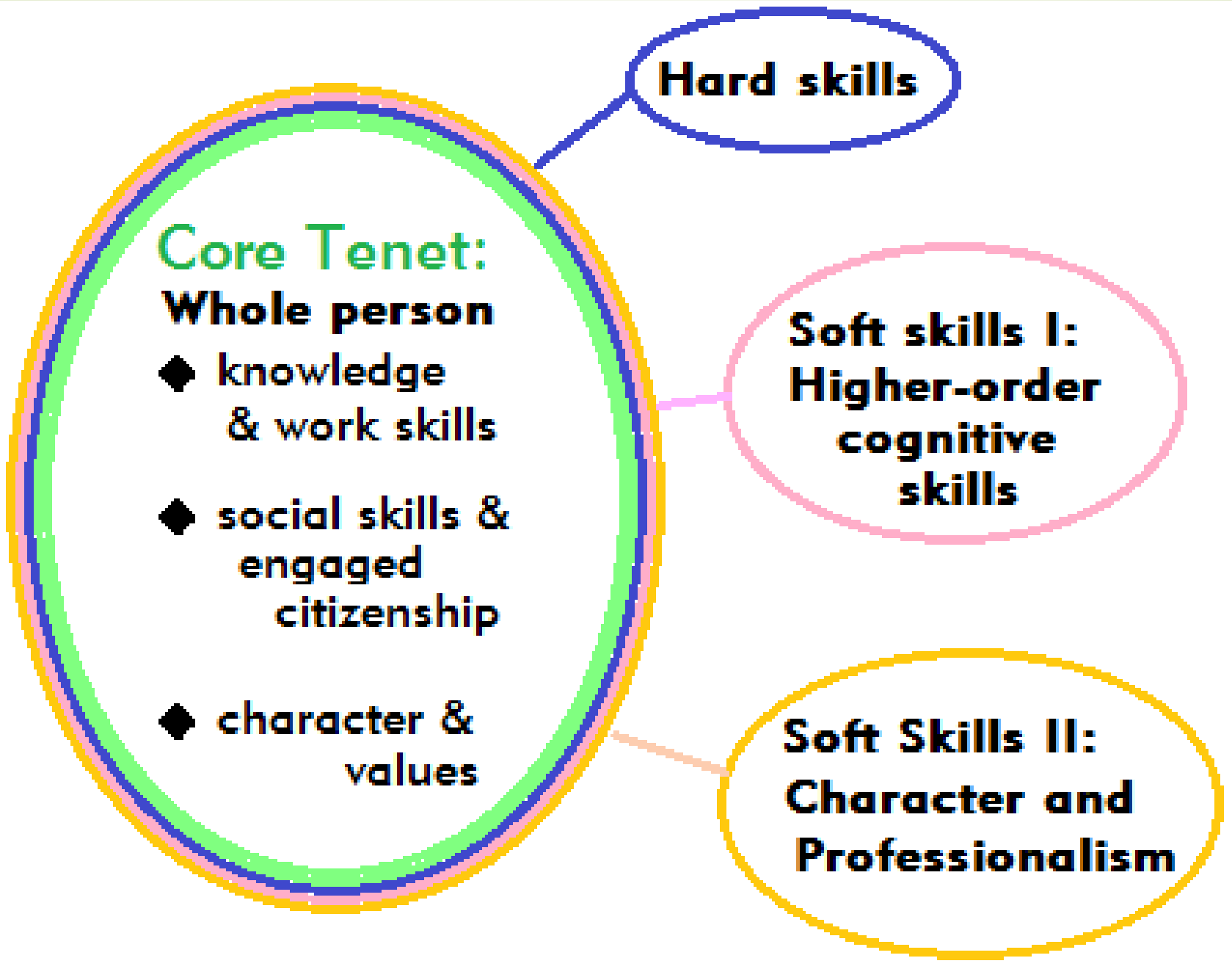
- Communication
- Critical thinking
- Analysis
- Synthesis
- Interdisciplinary thinking
- Ability to apply knowledge in real-world settings
- Information literacy
- Problem-solving
- Innovation
- Creativity
- Decision-making
- Global awareness
- Cultural intelligence
- Engaged citizenship



Learning Goals:

Soft Skills II:
Character and Professionalism

- Values and character: integrity, ethics
- Professionalism / work ethic
- Flexibility / adaptability
- Social skills / business etiquette
- Self-awareness / self-knowledge
- Collaboration / teamwork
- Leadership skills
- Learning mindset: intellectual curiosity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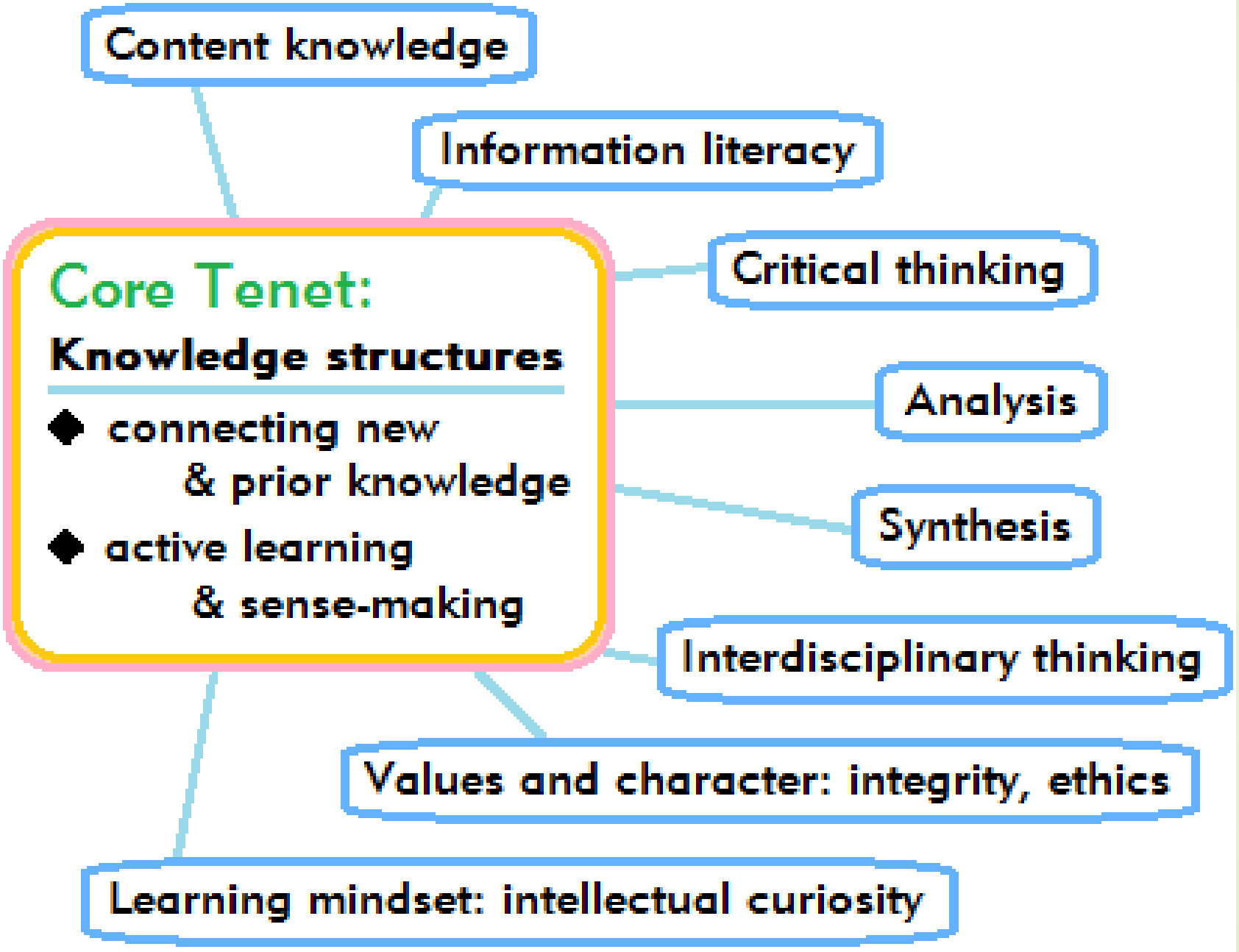
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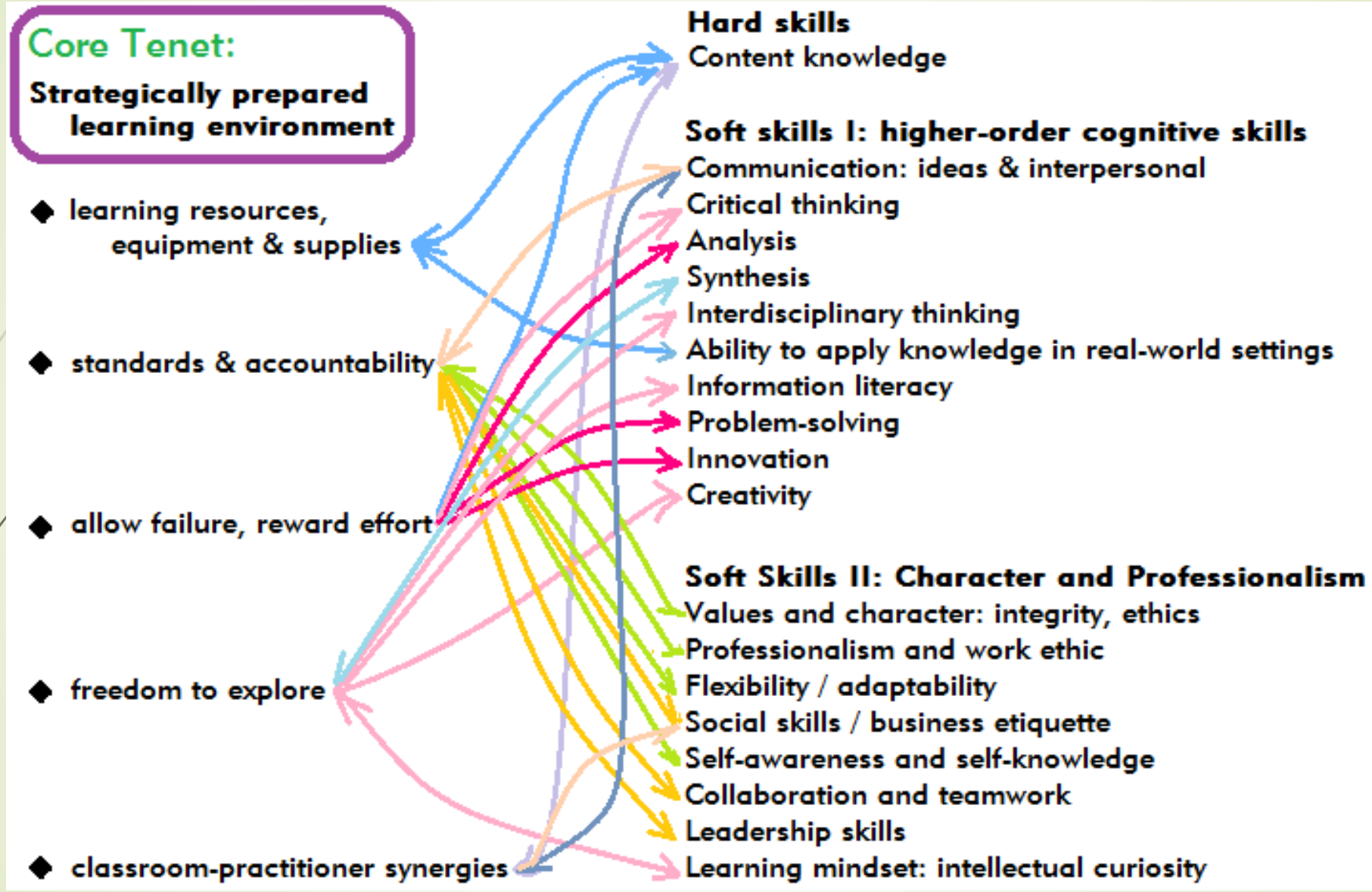
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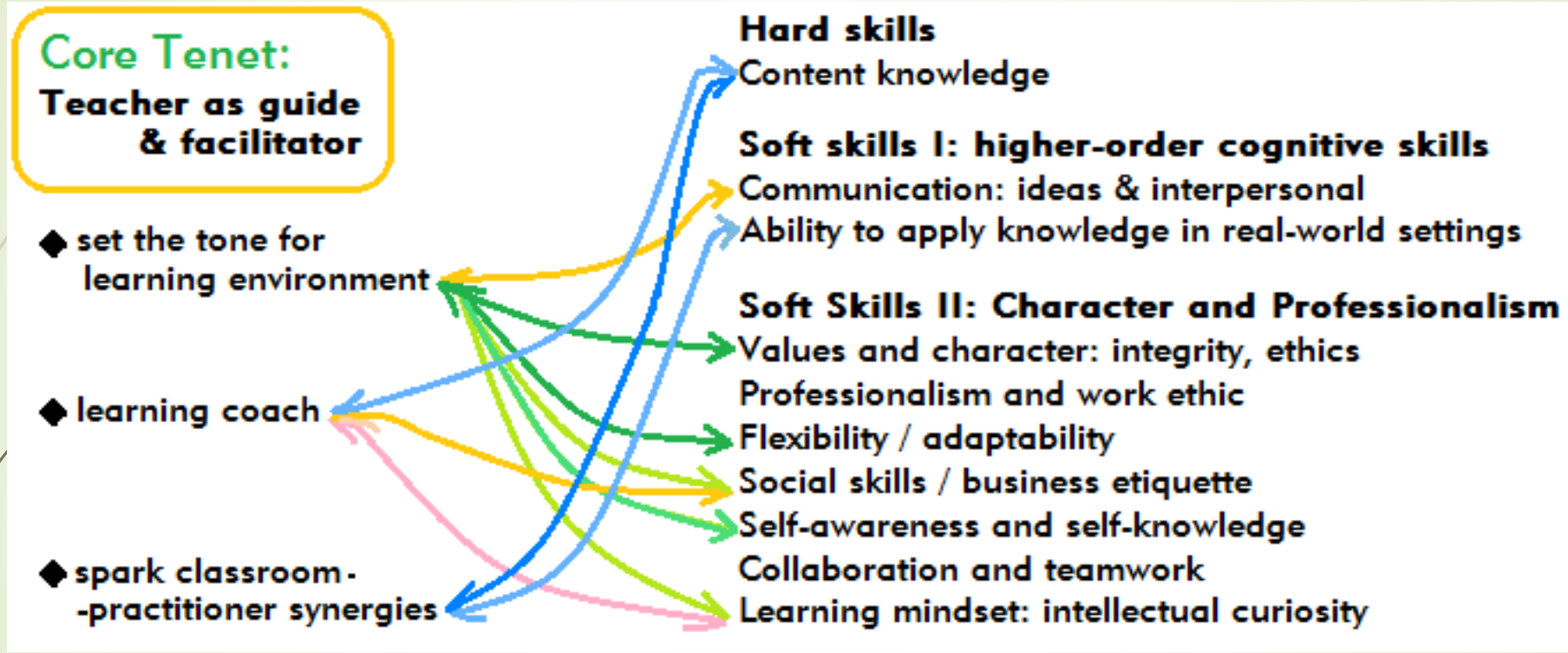
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set the tone for learning environment
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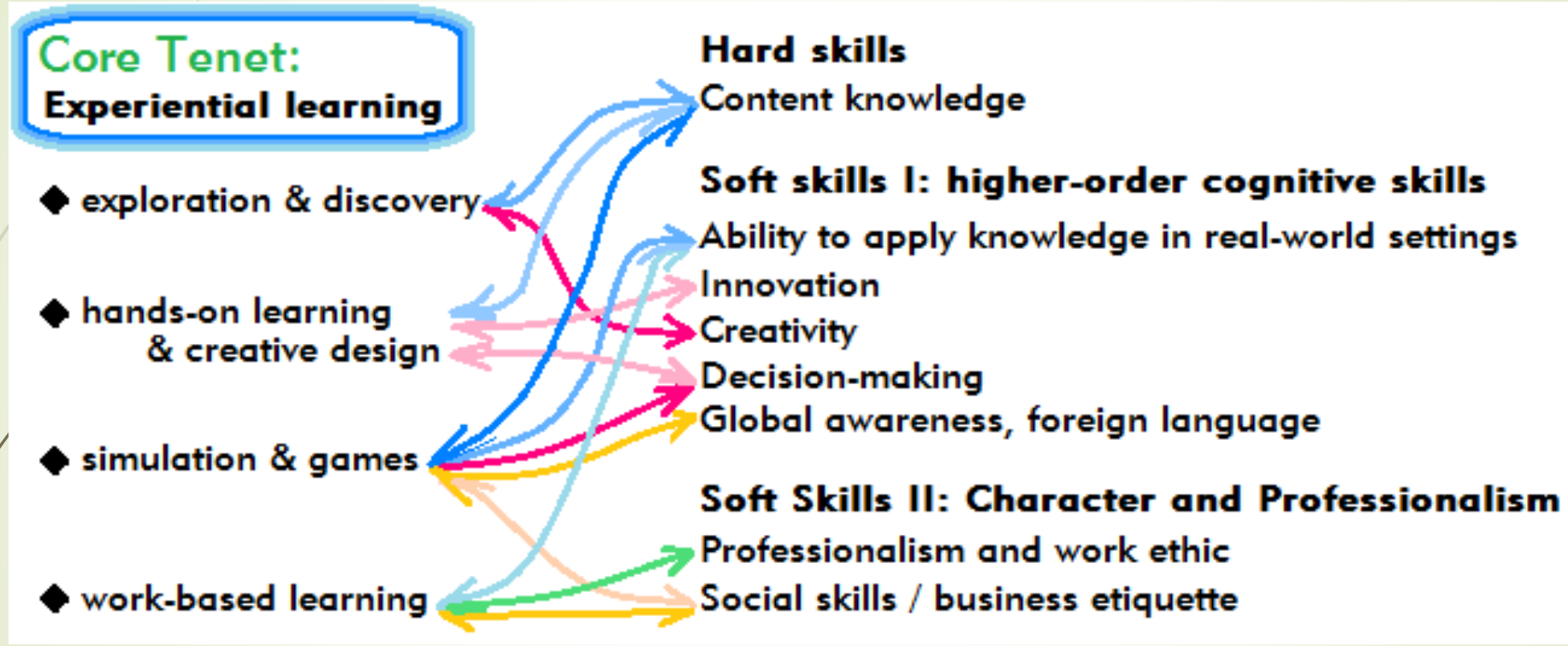
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Experiential learning
exploration & discovery
hands-on learning & creative design
simulation & games
work-based learning
Hard skills
Content knowledge
Soft skills I: higher-order cognitive skills
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Global awareness, foreign language
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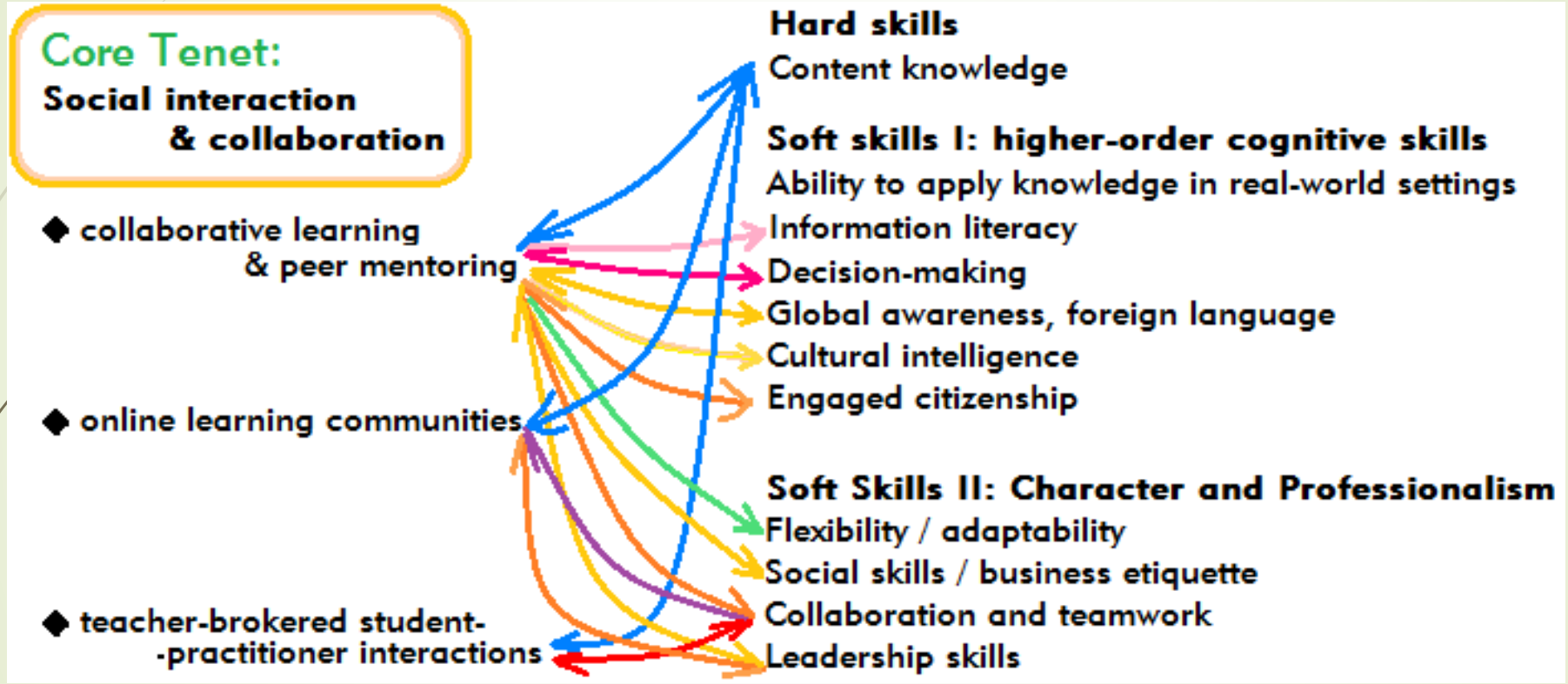
Social skills / business etiquette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& collaboration
◆ collaborative learning
& peer mentoring
◆ online learning communities
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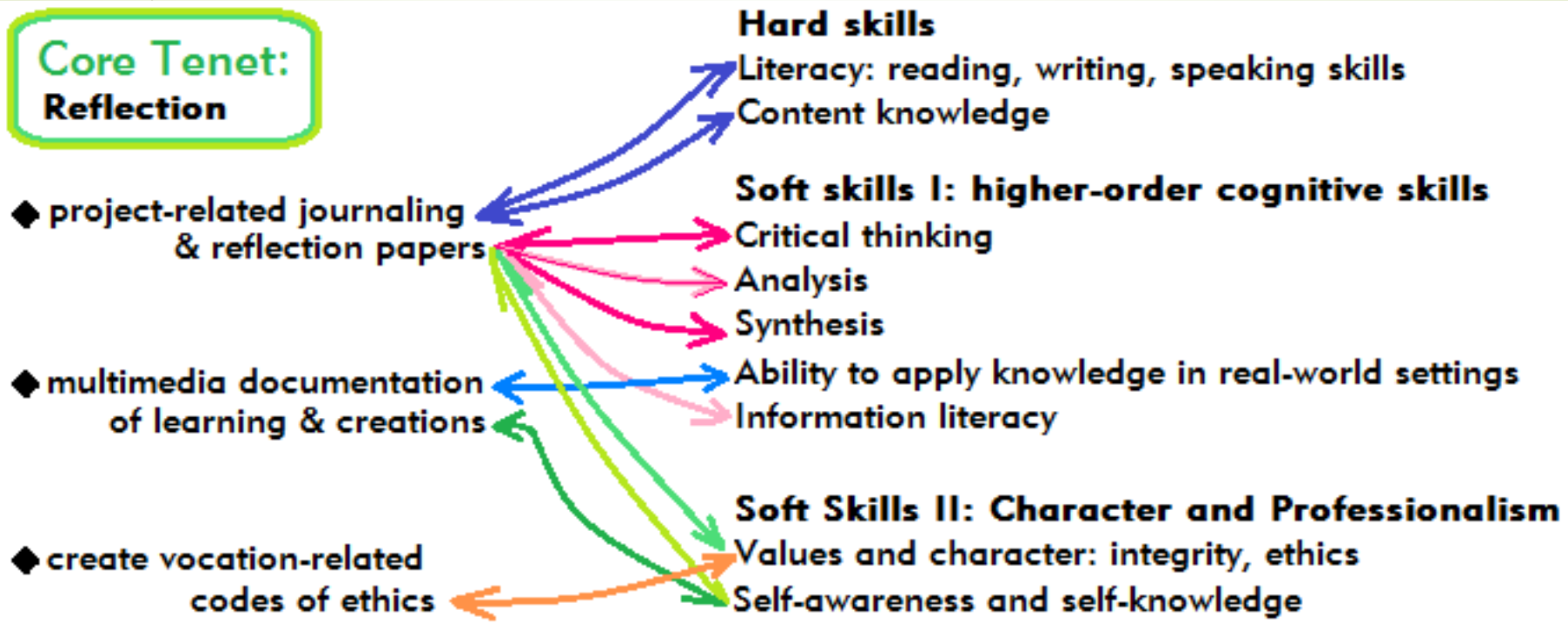
Collaboration and teamwork
Leadership skills


Core Tenet:
Reflection
project-related journaling & reflection papers
multimedia documentation of learning & creations
create vocation-related codes of ethics
Hard skills
Literacy: reading, writing, speaking skills
Content knowledge
Soft skills I: higher-order cognitive skills
Critical thinking
Analysis
Synthesis
Ability to apply knowledge in real-world settings
Information literacy
Soft Skills II: Character and Professionalism
Values and character: integrity, ethics
Self-awareness and self-knowledge

Implications for Future Research

- Develop a model program and pilot program as direct outgrowth
- Apply these core tenets to a specific career field
- Apply these methods to other settings, e.g.:
  - Professional associations
  - Vocational rehabilitation:
    - Government agencies, Non-profit organizations
- Teach pedagogy and knowledge progression to industry trainers
- Curriculum development
- Remedial education
- Help developing countries boost their education and training capacities