

Essential Teamwork Skills: Perspectives of Environmental Geoscience Employers

Samuel Nyarko¹ and Heather Petcovic²

¹Indiana University-Purdue University, Indianapolis

²Western Michigan University

November 23, 2022

Abstract

Geoscience employers have increasingly called for the future workforce (students) to demonstrate competence in non-technical skills, including teamwork. This descriptive qualitative study contributes to ongoing efforts to identify the specific practices, skills, habits, and knowledge that make up these desired teamwork competencies in the geosciences. We collected data from three online focus group discussions centered around teamwork. Focus group participants were hydrogeology and environmental geology employers and team managers from government, private industry, and non-profit organizations in the United States. Using the Marks et al. (2001) teamwork taxonomy model as our conceptual framework, we generated three categories of teamwork skills specific to environmental geoscience teams. First, our data indicate that these employers value team transition skills related to specifying goals, interpreting team tasks, identifying resources, and planning. The second category of desired teamwork competencies included action skills such as metacognition, coordination and mentoring. These skills directly impact successful task completion. The third category captured interpersonal skills such as emotional intelligence, proactive communication, and organization. A fourth category of desired teamwork competencies emerged from data analysis and include ethical skills related to trust, integrity and humility. This study provides a detailed description of teamwork competencies desired by environmental geoscience employers and suggests implications for how to prepare students for this workforce.

Essential Teamwork Skills: Perspectives of Environmental Geoscience Employers

Samuel Nyarko* & Heather Petcovic

ED55
F-
0335

PURPOSE & GOALS

- Geoscience employers have identified the ability to work in teams as an essential non-technical skill (Mosher & Keane, 2021)
- We need to identify what these specific skills are, and how they are enacted in academic and professional employment settings in order to design instruction that helps students learn critical teamwork skills
- This study characterized teamwork process skills essential to the geosciences identified by employers as viewed through the Input-Process-Output (IPO) Teamwork Model (Marks et al. 2001)

METHODS

Participants

	Focus Group 1	Focus Group 2	Focus Group 3
Gender	Female: 1 Male: 4	Female: 1 Male: 3	Female: 1 Male: 2
Position	Snr. Hydrologist, Proj. Manager, CEO, Tech. Leader, Snr. Scientist	Princ. Geologist, Section Head, Vice President, District Supervisor	Proj. Manager, CEO, District Head

Data Collection & Analysis

Three online focus group discussions centered around teamwork

Focus group discussions were audio recorded and transcribed

Developed a priori codes defined within the taxonomy of three teamwork process skills - transition, action, and interpersonal skills

Fourth category of teamwork skills, ethics, emerged from data analysis

Coded text segments representing each category were compiled using NVivo 12

Results interpreted within the Marks et al. (2001) framework

Finalized coding scheme was applied to all focus group transcripts

RESULTS

Transition Skills

Skills that promote team task evaluation and planning

- Mission analysis
- Identification of resources
- Goal specification
- Planning & budgeting

One of the pivotal foundations of being able to move a project forward is being able to identify goals and identify who's doing what.

Action Skills

Skills that directly impact task accomplishment

- Metacognition
- Mentoring & Coaching
- Information synthesis
- Coordination

It's important to mentor, train and educate our team members at the various levels to understand the role that they play.

Interpersonal Skills

Skills that promote the management of human resource interactions within teams

- Emotional intelligence
- Communication
- Organization & time management

That high emotional intelligence of being able to kind of read things in the teams.

Ethics

Skills that ensures moral standards and principles in teamwork

- Trustworthiness
- Humility
- Integrity

You got to be genuine. Because people in your team want to trust whatever you say or do.

DISCUSSION

Teamwork Skills	Identified Teamwork Competency Skills		
	Marks et al., 2001	Mosher & Keane, 2021	Present Study
Transition Skills	Mission analysis; Goal specification; strategy formulation	Goal setting	Mission analysis; Goal specification; Resource identification; Planning & budgeting
Action Skills	Monitoring Progress, Systems, & Team; coordination	Metacognition; Coordination; Coaching; Problem solving	Metacognition; Mentoring; Information synthesis; Coordination
Inter-personal Skills	Conflict management; Confidence building; Affect management	Leadership; Conflict management	Emotional intelligence; Communication; Organization & time management
Ethical Skills	-	-	Trustworthiness; Integrity; Humility

Key finding: In geoscience workforce teams, skills related to planning and evaluation of tasks, metacognitive and coordination skills, mentoring, and interpersonal skills related to emotional intelligence, communication, and ethics are essential for effective teamwork.

IMPLICATIONS FOR EDUCATION

- Employ experiential learning practices such as
 - Role-playing that uses teamwork skills
 - Service-learning techniques that employs structured teamwork among students
- Communicate the importance of teamwork skills to students
- Workforce preparation strategies that teach geo-ethics

*Corresponding author: snyarko@iu.edu