Canyon Journal of Undergraduate Research

Guide for Reflection on Interdisciplinary Problems

Version 3

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Purpose

The purpose of the Guide for Reflection on Interdisciplinary Problems (see page 5) is to provide undergraduate students with an outline of requirements that must be met to write a reflective practice article focused on interdisciplinary problems for the Canyon Journal of Undergraduate Research (CJUR). The Canyon Journal of Undergraduate Research is dedicated to the publication of exemplary faculty-mentored and peer-reviewed research produced by undergraduate students at Grand Canyon University (GCU). The CJUR is multidisciplinary with original, contemporary research in alignment with the Boyer Model of Scholarship. This publication is inclusive of a competitive manuscript selection process that undergoes rigorous peer-review.

The goals of the CJUR are:

- To educate students on conducting quality research, the institutional review board process, scholarly writing, and the publication process
- To encourage students to explore academic areas of interest and to empower them to contribute to the existing body of scholarly knowledge
- To further cultivate and foster the mentorship relationship between faculty and students as they engage in research and the production of scholarly work
- To offer the GCU community an opportunity to engage our scholars in discussions surrounding their scholarly work
- To provide undergraduate scholars with a platform to publish high quality manuscripts which may be foundational to their future educational and career aspirations
- CJUR encourages learners from all undergraduate disciplines such as arts and media, business, education, health care, humanities, social sciences, STEM and theology, and alike to submit for consideration.

The Guide for Reflection on Interdisciplinary Problems (GRIP) provides information about the approximate page length for required sections, section headings, and suggested content for each section for reflective practice articles. Page length will vary, but roughly the recommended range is between 15 pages and 20 pages double-spaced, in addition to references. References of a scholarly nature are required to support general claims in the manuscript, but due to the emphasis on practical knowledge, first

person singular ("I') and plural ("We") are acceptable in many of the sections of the manuscript. Lastly, authors should follow APA style to format their manuscripts.

Understanding Academic Disciplines

There are several academic disciplines from which to draw upon when considering problems of interdisciplinary space. Below is a list of the most common disciplines and some of the branches within each category:

Table 1
Academic Disciplines

BUSINESS	HUMANITIES	NATURAL & APPLIED SCIENCES	SOCIAL SCIENCES
accounting	art	biology	anthropology
economics	history	chemistry	education
finance	languages	computer science	geography
management	literature	engineering	law
marketing	music	geology	political science
	philosophy	mathematics	psychology
	religion	physics	sociology
	theatre	medicine	

Often academic disciplines are thought of in isolation, like a territory, kingdom, silo, or building (Krishnan, 2009). In other words, something with boundaries or borders (Krishnan, 2009). To engage in a study on interdisciplinary problems, it is necessary to consider at least two academic disciplines (table 1) and think about how they are connected and overlap (Jones, 2010; Klein, 1990).

Academic disciplines have six distinct characteristics (Krishnan, 2009):

(1) a particular object of research which might be shared with another discipline
(2) special knowledge which is not shared with other disciplines
(3) distinct theories and concepts
(4) specific terminology/technical language
(5) definitive research methods
(6) are taught at universities/colleges and have academic departments and professional associations

A Brief History of the Interdisciplinary Approach

The interdisciplinary approach to teaching, learning, and research has a long history and is experiential in nature (Henson, 2003). Seminal thinkers of this approach include Socrates (i.e., the Socratic Seminar which stimulates open dialogue based on probing questions and underlying beliefs, views, and opinions), Francis Bacon (i.e., scientific method), John Locke (i.e., blank slate to be filled with experiences), Jean Rousseau (i.e., child-centered, experience-based education), John Pestalozzi (i.e., learner-centered school), and Friedrick Froebel (i.e., world's first kindergarten) (Henson, 2003). In America, the experiential, interdisciplinary approach was influenced by men such as Colonel Francis Parker (i.e., head of first Normal School based on learner-centered methods and techniques), John Dewey (i.e., children have both a psychological and social dimension and life is a continuous renewal of ongoing experiments), and Arthur Combs (i.e., duty and responsibility) (Henson, 2003).

Previous Research that Used an Interdisciplinary Approach

Merging academic disciplines such as business, humanities, natural and applied sciences, and the social sciences is not new in the field of research. Many research studies have been conducted using an interdisciplinary approach. Below is a quick glance at some research which may shed some insight into how to synthesize the overlapping aspects of academic disciplines (Klein, 1990).

- performing arts and social studies: integration and cultural benefits; cognitive enhancement; history and diverse cultures; differentiated instruction (Taylor, 2008)
- chemistry and archeology: Willard Libby's radiocarbon dating (Youngblood, 2007)
- geography and chemistry: Newell's solution to the problem of acid rain (Youngblood, 2007)
- social work and health services: dental hygiene; health services management; collaborative faculty teaching from their expertise (Dyer, 2003)
- finance, entrepreneurship, economics, and engineering: real-world job requirements for engineers (Banerjee et al., 2020)
- humanities and STEM: example - "Introduction to Chemistry" renamed as "Bacon and Gunpowder;" math and chemistry; science and the real-world; art, history, and humanities (Faulconer et al., 2020)

How You Can Conduct Interdisciplinary Research

The interdisciplinary approach requires the synthesis of two or more academic disciplines (Jones, 2010). Schmiedebach and Wegner (2021) pointed out that problems cannot always be solved within the isolation of one academic discipline. Interdisciplinary research integrates ideas from multiple disciplines to solve practical and scientific problems. Interdisciplinary research can be categorized as a form of scholarship of integration. Boyer (1990) stated, there is a "need for scholars who give meaning to isolated facts, putting them in perspective. By integration, we mean making connections across the disciplines, placing the specialties in larger context, illuminating data in a revealing way, often educating nonspecialists, too" (p. 18). It is crucial, therefore, to cross the boundaries/borders of academic disciplines and see the links that are present between the disciplines.

The Interdisciplinary approach to research can take on many forms. The key is to synthesize two or more of the academic disciplines (Table 1) by inquiring about an identified problem suggested by your mentor (or other source, see Table 2), from one of the academic disciplines. A good way to think about interdisciplinary problems is to acknowledge that real-world problems are not easily solved from one disciplinary viewpoint (You, 2017). Interdisciplinary teaching, learning, and researching stimulates "freedom of inquiry, critical thinking, deductive reasoning, and synthetic thinking through integrated education" (You, 2017, p. 67). When investigating an interdisciplinary problem, it is necessary to situate the problem in the context of two or more disciplines. See Table 2 below for suggested sources of a problem of practice.

Table 2
Sources of Problems of Practice

Source	How to Obtain
Mentor or Instructor	• ask a mentor and/or university instructor about practical problems that affect a field of study
Classmates	• recall project-based learning where you collaborated with classmates (Warr & West, 2020) • ask if you have ever "teamed" with another student in a different discipline (Boyer & Bishop, 2015)
Prior Courses	• ponder STEM and/or STEAM programs you have been involved with (Miller, 2018) • think about courses you have taken at your college/university which are in different disciplines and contemplate the connections between the courses
Personal Experience	• observe how issues might be connected across two or more disciplines, even if they do not look the same on the surface • ask questions about controversies that are typical within a discipline and how those controversies connect to another discipline
Literature	• compare, contrast, and synthesize what the different disciplines might say about the problem of practice

Reflective Readiness

Reflective readiness is an integral part of effective reflection, but effective reflection requires certain predispositions. As Greenberger and Or (2022) stated, "readiness refers to having the necessary attitudes to be effective at reflective practice" (p. 292). As noted in the following table, the necessary attitudes according to Dewey (1933/1989) include open-mindedness, wholeheartedness, and responsibility.

Table 3

Attitudes for Reflection

Attitude	Description
Open-mindedness	Open-mindedness "an active desire to listen to more sides than one . . . to give full attention to alternative possibilities; to recognize the possibility of error, even in the beliefs that are dearest to us. They (mental sluggishness, self-conceit, unconscious fears) can best be fought by

	cultivating that alert curiosity and spontaneous outreaching" (Dewey, 1933/1989, p. 136).
Wholeheartedness	When anyone is thoroughly interested in some object and cause, he throws himself into it; he does so, as we say, 'heartily,' or with a whole heart . . . When a person is absorbed, the subject carries him on . . . a genuine enthusiasm [for a subject] is an attitude that operates as an intellectual force" (Dewey, 1933/1989, p. 137).
Responsibility	Intellectual responsibility secures integrity; that is to say, consistency and harmony in belief . . . To carry something through to completion is the real meaning of thoroughness, and power to carry a thing through to its end or conclusion is dependent upon the existence [of responsibility]" (Dewey, 1933/1989, pp. 137–138).

To describe your readiness to reflection requires articulating your orientation to the activity of reflection through the lens of open-mindedness, wholeheartedness, and responsibility. For the purpose of this type of manuscript, open-mindedness means being receptive to gaining a different perspective about your experience, which requires outlining how you are going to stay open to transforming your thinking. Wholeheartedness means being totally committed to the reflection, completely absorbed in the topic. Responsibility means having the will to see the reflection through regardless of whether the outcome is one that was expected, and having the ethical commitment to provide critical insights into one's experience even when the outcomes make one feel vulnerable.

Length*	Section/Heading	Guidelines
1 paragraph	Abstract	Provide an abstract 150 to 250 words in length that describes the scope of your article (write this last)
1-2 pages	Problem of Practice	Overview: Describe the problem of practice
		• Describe the problem of practice for this inquiry (see Table 2 on identifying a problem of practice). • Summarize what prompted the inquiry. • If applicable, describe any preconceived ideas you have about this problem of practice prior to beginning this interdisciplinary inquiry.
1-2 pages	Readiness	Overview: Describe your learning objective and discuss your readiness to reflect.
		• Describe your learning objective. What do you want to understand about the experienced event? • Discuss your readiness to reflect to achieve the learning objective, including your open-mindedness, wholeheartedness, and responsibility regarding the problem of practice. See Greenberger and Or (2022) for guidance.
1-2 pages	Defining the Disciplines	Overview: Describe the disciplines
		• Describe the two (or more) academic disciplines (i.e., Table 1: business, humanities, natural and applied sciences, and social sciences) you are inquiring about. • Define in what way these two disciplines are similar and different (i.e., different knowledge, theories, concepts, terminology, technical language, etc.).
2-5 pages	Defining the Inter-disciplinary Space	Overview: Explore and define the interdisciplinary space.
		• Define the interdisciplinary space with theories, models, and/or scholarly literature. • Specifically, outline how theories, models, and/or scholarly literature from two or more disciplines can be "combined" or "integrated" to form a new perspective on a problem of practice.
2-3 pages	Decision	Overview: Based upon the description of the interdisciplinary space, describe the value of the interdisciplinary perspective on addressing a problem of practice.
		• Make a judgment (decision) about the value of the interdisciplinary perspective on addressing or solving the problem of practice. • Consider providing a decision tree or summary of the process taken to arrive at your decision (potentially providing tables or figures to show this process).
2-5 pages	Reflective Critique	Overview: Provide a critique of the inquiry into the interdisciplinary space
		• Describe how this inquiry transformed your beliefs about the nature of the problem, how it informs your decision making about the current and future state of the problem, and how it could inform other practitioners/researchers with similar problems. • Propose one or more directions for future inquiry about this or similar problems that practitioners/researchers could use to inquire about the topic.
Unlimited	Reference List	Provide a reference list.**

* Length refers to double spaced text in Times New Roman, 12 pt. font. Listed page ranges are only recommendations. Section length for actual manuscripts may vary.

** APA style is required for the entire manuscript.

List of Useful Sources on Reflective Practice

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