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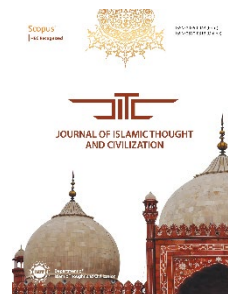
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Interdisciplinary Studies: A Critical Review of the Concept, Paradigm, and Difficulties

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Abstract

Interdisciplinarity constitutes one of the main drivers for the development of scientific knowledge as it contributes instimulating scientific research from different perspectives and methodologies and inreducing the isolation between disciplines. Although interdisciplinarity has become a common trend in scientific and academic circles of universities and research centers in recent years, the concept of interdisciplinarity remains largely controversial. The concept of interdisciplinarity is still fraught with confusion and ambiguity on many levels, including terminology, the model through which interdisciplinarity can be applied, and the methods or criteria through which interdisciplinarity can be detected. In this context, this research engages with the interdisciplinary studies through three main questions closely related to interdisciplinarity. The first question delves into the nature of interdisciplinarity research, scrutinizing prevalent ideas surrounding it. The second question explores proposed models for interdisciplinary research, their criteria, and examines whether a normative interdisciplinary model emerges from the literature. Whereas, the third question focuses on difficulties and opportunities facing interdisciplinary research in academic environments. In an attempt to answer these questions, several researchers from different disciplines participated in writing this research paper, where they engaged critically with the prevailing literature on interdisciplinarity, and presented a comprehensive theoretical review based on three levels of analysis.

Keywords: interdisciplinarity, interdisciplinary research, interdisciplinary studies, , interdisciplinary thinking

Introduction

Interdisciplinarity serves as a key catalyst in advancing scientific knowledge by integrating methodologies, tools, and insights from diverse disciplines into a cohesive framework. This approach proves invaluable in navigating the intricate challenges of the Information Age, offering a unique perspective that amalgamates varying views and styles.¹ As knowledge flourishes across fields and disciplines increasingly intersect, interdisciplinary research emerges as a crucial tool to grapple with the complexities of the modern world. It has demonstrated its effectiveness, notably in addressing

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¹Ortwin Renn, "Transdisciplinarity: Synthesis towards a Modular Approach," *Futures* 130 (2021): 3-5. <https://doi.org/10.1016/j.futures.2021.102744>.

intricate issues like climate change, healthcare, and globalization.² Many argue that the interdisciplinarity represents the future of academic studies, prompting universities to establish interdisciplinary research centers and graduate schools that bridge social and natural sciences.

However, the path of interdisciplinarity is not without its uncertainties. Ambiguity surrounds the very concept of interdisciplinarity as well as the models and standards for its application and detection in curriculum and research. Despite its widespread adoption, interdisciplinarity faces cognitive, methodological, and institutional challenges. Integrating different disciplines often leads to varying cognitive theories, methodologies, and terminologies which present communication, collaboration, and application difficulties. Securing funding and recognition within traditional academic structures further compounds the challenges of interdisciplinary research.

In light of these considerations, this paper undertakes the ambitious task of exploring three fundamental questions pertaining to interdisciplinarity. Firstly, it delves into the concept, unraveling the nature of interdisciplinarity. Secondly, it tackles the models examining proposed models for interdisciplinary research and the criteria guiding them. Finally, it confronts the difficulties facing the interdisciplinary research and the possible opportunities. In order to understand interdisciplinary research, the paper conducts a critical review of relevant literature, employing a descriptive, analytical, and practical method to scrutinize approaches addressing the trio of inquiries.

2. Interdisciplinarity and the Conceptual Inquiry

Researchers assert that interdisciplinarity and integration were fundamental characteristics of all the sciences that flourished within Islamic culture. This pertains to the interdisciplinary relationships among the sciences within Islamic civilization as well as between these sciences and those assimilated from other civilizations.³ In contemporary times, the concept gained significant attention in the mid-twentieth century, leading to a rise in the popularity of interdisciplinary studies.⁴

The term "interdisciplinarity" is a relatively recent addition to academic vocabulary that emerged from the criticisms of excessive specialization and promoting interdisciplinary methods within the sciences.⁵ The word "inter," means "between," and "discipline," indicates a specific area of study. Over the time, this concept has developed beyond its literal meaning.

From a broader perspective, interdisciplinary research serves as a means for individuals or research groups to amalgamate information, data, concepts, and theories from diverse disciplines to achieve a profound understanding and address the intricate problems. The National Academy of Sciences characterizes interdisciplinary research as a cognitive and methodological mechanism for

²Phil Baty, "Interdisciplinary Research is Key to Scientific Discovery. So Why are Universities Reluctant to Cross Disciplines?", *World Economic Forum*, Nov 21, 2023. <https://www.weforum.org/agenda/2023/11/interdisciplinary-science-next-big-breakthrough/> Retrieved on May 29, 2024.

³Mohammed Ben Omar, "Altdākhlīh bayna al-‘Ulūm fī al-Turāth al-‘Arabī al-Islāmī wa-atharuhā ‘alā al-Dars al-Muṣṭalaḥī," [The Intersectionality between Sciences in the Arab-Islamic Heritage and its Impact on the Terminological lesson] *Al Tafahom* 15, no. 55-56, (March 2017): 307-324; Rudhad Ilaina, Nur Ahid, Andika Eko Presetiyo, "Epistemology of Interdisciplinary Research at Islamic Study on State Islamic Religious Higher Education in Indonesia," *Fitrah* 8, no. 1 (June 2022): 1–120.

⁴Ilaina et al, "Epistemology of Interdisciplinary Research," 6.

⁵Adnan Muhammad Qutayt, "Al-Baḥṡ al-tarbawī Baynī al-takhaṣṣūāt : dirāsah ibstymwlwlyh," [Interdisciplinary educational research: an epistemological study] *Mağallāi Al-Baḥṡ Al-Tarbawī* 17, no. 17 (July 2018): 243-300. https://journals.ekb.eg/article_195636_1ebe6dc7beb9ca9fcfcc5b565d0c92e6.pdf

such pursuits.⁶ It is further defined as “a way of obtaining a more integrated perspective on complex issues.”⁷

Jibrīn expands on this definition by describing the interdisciplinary research as the utilization of information, techniques, tools, concepts, and theories from multiple fields by a team or individuals to tackle complex problems.⁸ Additionally, it involves the convergence of two or more disciplines as seen in the combination of medicine and architecture to study public health problems through a research method, fostering interaction between fields and influencing each other's perspectives.⁹

Furthermore, interdisciplinarity is characterized as “studies based on two or more leading fields of knowledge or the process by which some questions are answered, some problems are solved, or a very broad or very complex topic is addressed that is difficult to deal with adequately through a single system or specialty.”¹⁰ It is identified as “a new field of knowledge that arises from the overlapping of traditional academic areas or schools of thought, which is necessary to meet the demands of newly created professions.”¹¹

Experts across the diverse fields assert that interdisciplinary research stands as a key catalyst for both the quantitative and qualitative advancement of knowledge pertaining to various natural and human phenomena that directly influence and get influenced by human life. These phenomena, marked by their heterogeneous nature, encompass multiple overlapping dimensions, posing a challenge for a single discipline to generate comprehensive scientific knowledge about them.¹²

For instance, Malek Bennabi, a prominent modern Muslim scholar believed that interdisciplinarity is essential for studying complex phenomena such as society, culture, and civilization.¹³ He argued that these intricate social and cultural phenomena require an integrated

⁶National Academy of Sciences, *Facilitating Interdisciplinary Research* (Washington DC: The National Academies Press, 2005), 26.

⁷Sunita Kapila, and Robert Moher, *Across Disciplines: Principles for Interdisciplinary Research* (Ontario: International Development Research Centre Policy and Planning Group, 1995), 1.

⁸Malak Bint Mohammad Jibrīn, *Taṭwīr al-Jāmi‘at al-Sa‘ūdīyah fī daw’ Falsafat al-Jāmi‘ah al-Mutajaddidah – Taṣawwur Muqṭarah* [Developing Saudi Universities in Light of the Renewed University Philosophy - a Proposed Vision] (Riyad: Jāmi‘at al-Imām Muḥammad ibn Sa‘ūd al-Islāmīyah, 2018), 34.

⁹Wajeha Thabit Al-Ani, “Faculty Members’ Attitudes Toward Interdisciplinary Studies in the College of Education at Sultan Qaboos University,” *Journal of Arts and Social Sciences (JASS)* 3, no. 7 (2016): 53-67.

¹⁰Markaz al-Abḥāth al-wWā‘idah, *Al-Dirāsāt al-baynīyah Baynīyah* [Interdisciplinary Studies] (Riyad: Jāmi‘at al-Amīrah Nūrah bint ‘Abd al-Raḥmān, 2017), 6.

¹¹Ibid., 6.

¹²Sally W. Aboelela, Elaine Larson, Suzanne Bakken, Olveen Carrasquillo, Allan Formicola, Sherry A. Glied, Janet Haas and Kristine M. Gebbie, “Defining Interdisciplinary Research: Conclusions from a Critical Review of the Literature,” *Health Services Research* 42, no. 1 (2007): 329-346; Rick Szostak, “The Interdisciplinary Research Process,” *Chapters on Interdisciplinary Research and Research Skills*, (2020):12-14.

¹³Badrane Benlhcene, “Malek Bennabi’s concept and interdisciplinary approach to civilisation,” *Intentional. Journal of Arab Culture, Management and Sustainable Development* 2, no. 1 (2011): 55-71. <https://doi.org/10.1504/IJACMSD.2011.044896>

approach to achieve a comprehensive understanding.¹⁴ Consequently, he advocated for an interdisciplinary approach that draws its general principles from various sciences.¹⁵

Contrary to being a passing trend, chance occurrence, or a response to societal demands, interdisciplinary research is seen as a natural evolution of fields as posited by Piaget.¹⁶ Berger identifies five significant factors that contribute to the growing necessity for interdisciplinary approaches in research and education. These include, the advancement of science, requests from students and professors, the demand for professional preparation, societal pressure to study the social environment and its various components, and difficulties concerning the operations of universities.¹⁷ Interdisciplinary studies, once perceived as an intellectual luxury, have transformed into an urgent necessity, impacting academic, institutional, and societal stakes.¹⁸

The notion of interdisciplinary studies gained traction within Western universities during the 1950s as they underwent a re-evaluation of their teaching and research methodologies. This re-evaluation led to a gradual surge in multidisciplinary studies, a momentum that picked up in the mid-1980s and continued to ascend steadily into the twenty-first century, reaching its pinnacle in terms of percentage.¹⁹

In the Muslim world, the focus on integration and interdisciplinarity has expanded since the early 1980s, particularly after the establishment of the International Institute of Islamic Thought. Its philosophy is based on the integration of sciences and the integration in designing curricula to move away from the fragmentation and achieve comprehensiveness.²⁰

While there is a widespread consensus on the importance of collaboration across different fields for knowledge production, those exploring interdisciplinary studies through literature may find themselves navigating a landscape filled with various terms such as “multidisciplinary,” “interdisciplinary,” and “transdisciplinary.” Among these, “interdisciplinary” emerges as the most commonly used term to describe this type of study. Coined by sociologist Louis Kirtz in 1937, its features were defined in the first half of the twentieth century. Notably, Columbia, Chicago, and

¹⁴Malek Bennabi, *Shurūt al-Nahzah*, [The Conditions of the Renaissance] (Damascus: Dār al-Fikr, 1981), 61.

¹⁵Malek Bennabi, *On the Origins of Human Society*, trans. Mohamed T. Mesawi, (Kuala Lumpur: The OpenPress, 1998), 9-10

¹⁶Jean Piaget, “L’*épistémologie des Relations Interdisciplinaires*,” [The Epistemology of Interdisciplinary Relations], in *OCDE, L’interdisciplinarité: problèmes d’enseignement et de recherche dans les universités* [Interdisciplinarity: Problems of Teaching and Research in Universities], (Paris: OCDE, 1972), 133.

¹⁷Guy Berger, “Opinions et Réalités,” [Opinions and Realities], in *OCDE, L’interdisciplinarité: problèmes d’enseignement et de recherche dans les universités* [Interdisciplinarity: Problems of Teaching and Research in Universities], (Paris: OCDE, 1972), 44.

¹⁸Barakat ‘Abd al-‘Azīz, “Al’Shkālīyāt al-Manhajīyah fī al-Dirāsāt al-Baynīyah” [Methodological problems in interdisciplinary studies],” *The Arab Journal for Media and Communication Research (AJMCR)* 12 (2016): 4-5. <https://doi.org/10.21608/jkom.2016.109573>

¹⁹Bruce Brown, “Interdisciplinary Research,” *European Review* 26, no. 2 (2018): S21-S29.

²⁰International Institute of Islamic Thought, *The Islamization of Knowledge: General Principles and Work Plan* (Hendon, VA: International Institute of Islamic Thought, 1989); Omar Kasule, “Integration of Knowledge (IOK) and Textbook Writing for Islamic Universities,” *International Journal of Islamic Thoughts* 4, no. 1(2014): 123-126.

Wisconsin universities in the United States played pivotal roles in presenting influential interdisciplinary studies with primary researchers such as Hutchins, Meiklejohn, and Dewey.²¹

The cognitive intricacies surrounding interdisciplinary studies extend beyond the diversity of terms used and become more pronounced when attempting to define it, as literature presents multiple and varied definitions of interdisciplinarity.²² The growing prominence of interdisciplinary studies in scientific circles has led to increased ambiguity.²³ It has become a subject of scientific research, particularly for social scientists who delve into the factors influencing and the mechanisms regulating the knowledge production process.²⁴

While researchers acknowledge the significance of interdisciplinary studies in education and research, a pressing need arises to establish a unified scientific theory or definitive methodology to guide such studies.²⁵ The lack of consensus among scholars regarding the terminology used to describe interdisciplinary studies significantly contributes to the ambiguity surrounding this phenomenon. This ambiguity can be traced back to inherent epistemological issues in these types of studies.

Epistemological differences give rise to various perspectives on interdisciplinary studies, leading to two main approaches in defining them. The first approach underscores cooperation as the cornerstone of interdisciplinary studies that involves a team of individuals with diverse expertise collaborating on the same research project in exchanging ideas and information.²⁶ The second approach places integration at the forefront, aiming to produce shared knowledge that combines the expertise of team members from different specializations. Through these two trends, it can be discerned that interdisciplinary studies, in all cases, manifest as research and academic relationships between specialists from intertwined scientific specializations who share a common goal or set of plans.

Heckhausen has identified six types of interrelationships within the academic and research fields, representing a networked situation involving a confluence of ideas from different specializations. These types signify a state of networking where various elements and dimensions

²¹Julie Thompson Klein, and William H. Newell, “Advancing Interdisciplinary Studies,” in Jerry G. Gaff and James L. Ratcliff, *Handbook of the Undergraduate Curriculum: A Comprehensive Guide to Purposes, Structures, Practices, and Change* (San Francisco: Jossey-Bass Publishers, 1997), 3-21.

²²Cecile Collinet, Philippe Terral, and Patrick Trabal, *Le travail scientifique Interdisciplinaire: réalités et Contraintes* [Interdisciplinary Scientific Work: Realities and Constraints] (Paris: Université Paris Nanterre, 2014), 7.

²³Creutzer Mathurin, “Aspects de l’interdisciplinarité: essai de reconstitution d’un débat,” [Aspects of Interdisciplinarity: Attempt to Reconstruct a Debate]. In Lucie Gélineau and Carole Mailloux, *L’interdisciplinarité et la recherche sociale appliquée Réflexions sur des expériences en cours* [Interdisciplinarity and Applied Social Research Reflections on Current Experiences] (Montreal: Université de Montréal/Université Laval/Chaire d’étude Claire-Bonenfant Sur La Condition Des Femmes, 2002), 8.

²⁴Patrick Trabal, Cecile Collinet and Philippe Terral, “Faire Preuve d’Interdisciplinarité: Un Mot d’Ordre, Ses Interprétations et Ses Ajustements,” [Demonstrating Interdisciplinarity: A Watchword, Its Interpretations and Its Adjustments], *Terrains & Travaux* 30, no. 1 (2017): 209.

²⁵Simon Laflamme, “Recherche interdisciplinaire et réflexion sur l’interdisciplinarité,” [Interdisciplinary Research and Reflection on Interdisciplinarity], *Nouvelles Perspectives En Sciences Sociales* [New Perspectives in Social Sciences] 7, no. 1 (2011): 59.

²⁶Maurice Payette, “Interdisciplinarité: Clarification des Concepts,” [Interdisciplinarity: Clarification of Concepts], *Interactions* 5, no. 1 (2001): 23.

come together to form an interconnected and integrated unit, blending a precise, specialized outlook with a comprehensive encyclopedic view. The belief in cognitive integration across all sciences is central and considered essential for a proper scientific method in the contemporary era.²⁷

1. Heterogeneous interdisciplinary involves combining encyclopedic activities in teaching.
2. Intrinsic interdisciplinary pertains to specific disciplines that rely on the same analysis tools.
3. Auxiliary interdisciplinary results from the adoption of standard research methods among the disciplines.
4. Composite interdisciplinary approaches entail combining of multiple disciplines in order to address the threats to human survival and find the integrated solutions.
5. Complementary interdisciplinary that emerges among researchers is integrated at the level of scientific theories related to their specializations.
6. Unifying interdisciplinary results from participating in multiple specialties in a specific research topic.

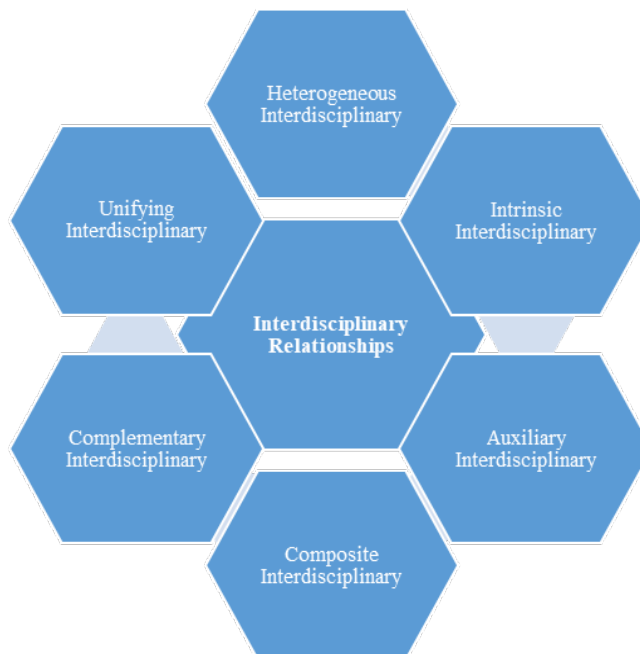


Figure 1. Types of Interdisciplinary Relationships

Interdisciplinary studies should transcend mere connections between different fields. They should be conceptualized as dynamic platforms where various disciplines interact to generate knowledge that surpasses individual boundaries, eliminating the constraints of partial explanations.²⁸

²⁷Heinz Heckhausen, "Discipline and Interdisciplinarity," in Leo Apostel, Guy Berger, Asa Brings and Guy Michaud, *Interdisciplinarity: Problems of Teaching and Research in Universities* (Paris: OECD Publications Center, 1972), 87-89.

²⁸Edgar Morin, *Scienza con coscienza* [Science with Knowledge] (Paris: Fayard, 1982), 127.

Al-Haffār, drawing on the experience in research and education, posits that the interdisciplinary method is not only suitable for theoretical but also for the applied research.²⁹ While Al-Haffār initially referred to environmental education, he recognized the broader application of interconnection between sciences, encompassing humanities, social sciences, and applied sciences. The significance lies in heralding a new methodology that amalgamates all sciences to foster a comprehensive understanding.³⁰

Piaget contributes to this discourse by asserting that interdisciplinary studies involve the collaborative exploration of multiple disciplines to examine their interactions and mechanisms. The overarching goal is to establish a comprehensive and unified approach that considers diverse perspectives, steering clear of narrow viewpoints. This method is crucial for the advancement of research as it recognizes the unity of the subject that is, human beings in all their aspects.³¹

The analysis of this current study reveals that the interdisciplinarity encompasses multiple objectives, serving as a conduit for connecting and integrating knowledge, fostering creativity, integrating diverse scientific fields, and generating novel insights. By merging knowledge from various domains, including specialized areas, intellectual and professional schools, and technical fields, interdisciplinarity yields high-quality outputs grounded in the fundamental and natural sciences.

Creative thinking, another key objective, seeks to cultivate the ability to present issues and incorporate information from multiple viewpoints, challenging underlying assumptions and deepening understanding. Utilizing research and investigation methods from various disciplines is essential for identifying problems and solutions while, transcending the constraints of a single scientific field.

Knowledge integration, a pivotal goal, aims to acknowledge and address disparities among different fields of study, striving for a unified and integrated knowledge approach that surpasses the limitations of individual specialties. The imperative to conduct interdisciplinary studies has become evident, especially in tackling the growing problems affecting knowledge, society, and human civilization. Many of these issues cannot be adequately addressed by a single specialty in isolation but necessitate the interdisciplinary studies with clear visions, modern methods, and qualified researchers to produce new knowledge that effectively solves these complex problems.³²

Despite differing opinions and approaches, a common thread runs through the concept of interdisciplinarity. Its overarching purpose is to connect and integrate different fields of study and ways of thinking creatively, along with transcending the traditional approaches and striving for integration and collaboration.

In spite of the inherent ambiguity surrounding the concept of interdisciplinarity, interdisciplinary studies emerge as the tangible manifestation of scientific research which is a crucial means to address the pressing issues surrounding human life. These challenges extend beyond the realms of natural and human factors with many stemming from the isolationism practiced by the researchers, often driven by the notion of sufficiency and confinement to narrow specializations.³³

²⁹Said Muhammad Al-Haffār, *Taḥqīq al-Tarbiyah al-bi'iyah i'timādan 'alā trābī al-'Ulūm* [Applying Environmental Education based on the Interconnection of Sciences] (Muscat: Maktab al-Tarbiyah al-'Arabī li-Duwal al-Khalīj, 1988), 49-50.

³⁰Ibid., 62-63.

³¹Piaget, *L'épistémologie des relations interdisciplinaires*, 154-172.

³²Markaz al-Abḥāth al-wā'idah, *Al-Dirāsāt al-baynīyah*, 10.

³³Séverine Louvel, "The Impact of Interdisciplinarity on Disciplines: A Study of Nanomedicine in France and California," *Revue Française de Sociologie* 56, no. 1 (2015): 69-97.

Interdisciplinary studies boldly challenge the traditional boundaries among several disciplines. This is a response to the highly specialized and fragmented nature of contemporary science, which frequently relies on reductionist methods. To effectively study complex systems, a revision of these methods is imperative and interdisciplinary approaches have surfaced as a response, offering a means to analyze the multiple dimensions inherent in these intricate systems.

3. Interdisciplinarity and the Model Question

In his exploration of the “Theory of Interdisciplinary Studies,” Newell contends that understanding a phenomenon within a single discipline may be incomplete. Instead, he advocates that viewing the phenomenon as part of a larger system, necessitating analysis from an interdisciplinary perspective. This approach enables researchers to grasp the phenomenon comprehensively within the broader system, considering its interactions with other overlapping components that contribute to its existence. Each discipline, Newell argues, focuses on observing interconnected variables within its realm while, drawing conclusions and deductions based on the cognitive background of the subject.³⁴

Newell emphasizes the consensus that interdisciplinarity is a path to success but acknowledges uncertainty about the necessary steps. While some scholars perceive it as a linear and sequential process, others argue for a more complex and flexible approach. Newell introduces two models, namely Klein's and his proposal. Julie Klein's model, outlined in her study "Interdisciplinarity: History, Theory, and Practice," begins by identifying the problem, recognizing cognitive needs, developing an integrated theoretical framework, formulating research questions, and determining necessary special studies. The subsequent steps involve defining roles within the team, gathering existing knowledge, seeking new information, resolving conflicts through the creation of a shared language, and integrating individual pieces to identify patterns of interconnection and relevance. Klein's model, as described by Newell, represents, “steps or a combination of theory and practice that integrates interpersonal and conceptual issues for interdisciplinary studies.”³⁵

Newell introduced his model, akin to Klein's but delineated it into two distinct stages. The initial stage centers on specialized perspectives, involving the identification of the research problem and the recognition of relevant disciplines and schools of thought. Concepts, theories, and methods from each field are developed and the problem is scrutinized through the lens of each perspective, yielding insights from the diverse disciplines.

³⁴William H. Newell, “A Theory of Interdisciplinary Studies,” *Issues in Integrative Studies* 19 (2001): 21.

³⁵*Ibid.*, 14.

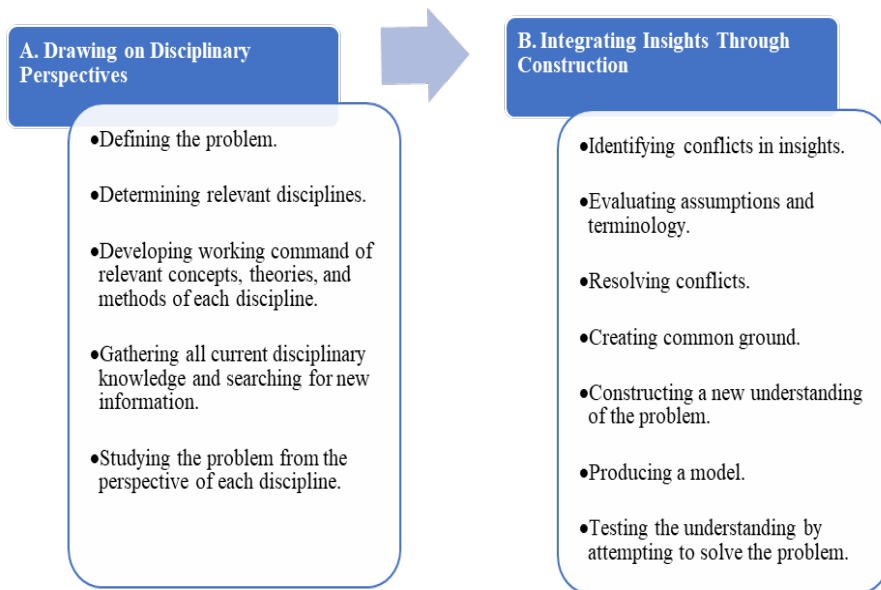


Figure 2. Newell's Model for Interdisciplinary Studies

The second stage focuses on the integration of specialized perspectives into a more comprehensive view. This entails resolving contradictions among different disciplines related to the study's problem, exploring various terms expressed by different fields for the same issue, evaluating assumptions and terminology in the context of the specific problem, and resolving conflicts by working towards shared terms and a set of beliefs. The aim is to establish common ground and foster a new understanding of the problem, ultimately producing a model or form that encapsulates the latest version. The model is then tested through attempts to solve the problem.³⁶

In the development of complex systems where disciplines converge, researchers must establish a rational basis to justify their interdisciplinary approach and delineate the scope of its application. This is crucial due to the inherent complexity of social and human phenomena, necessitating an examination through the lens of "impact and response" rather than the "cause and effect" model that is typically employed in the exact sciences. This shift in perspective allows for a nuanced understanding of the diverse motives and influences within the general societal system, all while ensuring that the question of truth and falsity remains central.

CohenMiller and Patti proposed a five-step approach for creating a theoretical framework in interdisciplinary research. The initial step involves identifying research topics or questions that address complex problems, intentionally overlapping between multiple disciplines. The second step entails identifying concepts within the research topic or interdisciplinary research questions. In the third step, possible fields to study the issue are identified, maintaining specificity and distinction between them. The fourth step involves determining appropriate theories for each discipline's research topic without integrating disciplines or theories. Finally, in the fifth step, basic terms within

³⁶Ibid., 14-15.

the theories across fields are identified and efforts are made to establish a shared language. The process, thus, concludes with the integration of different theories and disciplines.³⁷

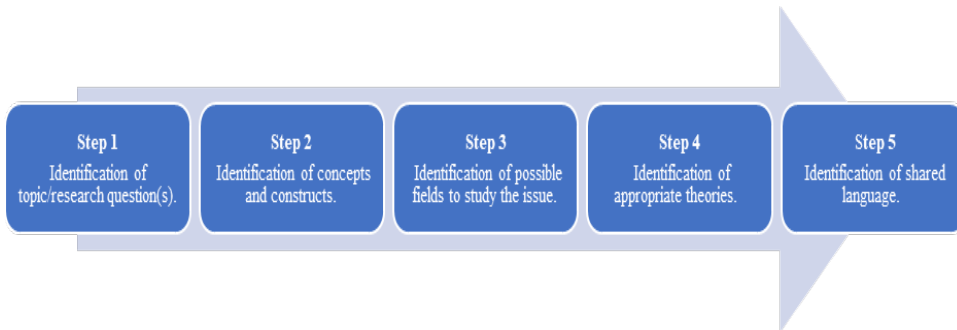


Figure 3. CohenMiller-Patti Model for Developing Theoretical Frameworks for Interdisciplinary Research

To implement this approach, the researchers conducted a “modeling study” focused on doctoral student motherhood/motherhood in academia. Similarly, others have sought to outline practical steps for achieving interdisciplinary research. In their analysis,³⁸ the research team developed four practical steps for carrying out the interdisciplinary research. These steps involve building awareness, integrating perspectives and tools, deepening discussions, resolving differences, seeking common ground, and culminating in an action step where the research team selects and combines disciplinary perspectives, knowledge, and tools to gain new insights.

In contrast, Kapila and Moher argued in their research that there is no one-size-fits-all methodology for interdisciplinary studies. Instead, they proposed guidelines for multidisciplinary research, emphasizing that a deep understanding of disciplines is a prerequisite for interdisciplinarity. The continuous recognition of a common goal, regular communication, consultation, data exchange, interim conclusions among team members, and a steadfast commitment to teamwork are deemed critical in the interdisciplinary process.³⁹

In their study Robertson et al. contend that the nature of the interdisciplinary model varies based on the research question. The approach and methodology of an interdisciplinary study are determined by the questions posed, which should be directly related to the research problem, its significance, or objectives. Such questions play a crucial role in defining the model.⁴⁰

On the other hand, Qumari asserts that there is no singular model for interdisciplinarity. Instead, most researchers focus on the concepts of integration and interaction between different disciplines to achieve an interdisciplinary approach.⁴¹ He introduces a distinction at the intellectual level, emphasizing the difference between systematic and theoretical interdisciplinary thinking. The former

³⁷Anna CohenMiller, and Elizabeth Pate, “A Model for Developing Interdisciplinary Research Theoretical Frameworks,” *The Qualitative Report* 24, no. 6 (2019): 1215-20.

³⁸*Ibid.*, 294.

³⁹Kapila and Moher, *Across Disciplines*, 1.

⁴⁰David W Robertson, Douglas K Martin, and Peter A Singer, “Interdisciplinary Research: Putting the Methods Under the Microscope,” *BMC Medical Research Methodology* 3, (2003): 20.

⁴¹Mohammad Qumari, “Al-Tafkīr al-Baynī : Naḥwa Kasr al-Ḥawājiz bayna al-Takhaṣṣuṣāt?,” [Interdisciplinary Thinking: towards Breaking down Barriers between Disciplines?] *Makalid* 6, no. 6 (2018): 3.

is driven by improving the outcomes of specialized work through interoperability, while the latter aims to create a holistic approach to problem-solving across different fields and inspires new research methods.⁴²

According to Qumari, three approaches emerge in interdisciplinary research. The first one is a conceptual approach, which examines basic concepts or laws predicting the course of phenomena studied in multiple disciplines. Second is an interpretation-centered approach, seeking to explain complex phenomena composed entirely of elements related to various disciplines. And the third is a results-oriented approach, aiming to provide solutions to problems in social, medical, technical, and political fields.

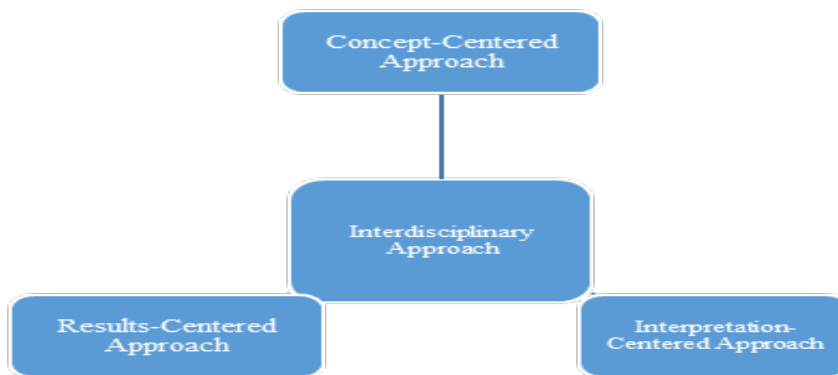


Figure 4. Types of Interdisciplinary Approaches

In the realm of exploring models for achieving interdisciplinarity, Al-Ruwayh's study stands out as a philosophical study on cognitive bridging, encompassing vision, interdisciplinarity starting points, and potential paths. Al-Ruwayh identifies three paths or patterns of interdisciplinarity/bridging, which he terms as exploratory, conciliatory, and transcendental.⁴³

Exploratory bridging involves linking disciplines at the most superficial level, focusing on observations and the development of hypotheses. In the conciliatory bridging path, the connection between disciplines occurs at the level of micro-models and medium-scale theories. Transcendental bridging goes beyond specialized boundaries, connecting paths that transcend technical boundaries, and intellectual and normative systems, thereby reaching beyond mere technological limitations. However, in Al-Ruwayh's study, the most relevant issue that may arise is about the truth claims in each model and how they should be approached.

Raymond Miller, in his research, delves into the historical integration and intersection between the social sciences and humanities when addressing their respective topics. The research positions the specialization as a domain for acquiring a standardized set of principles, guiding researchers' inquiries and the monitoring of facts derived from the potential world.⁴⁴

⁴²Ibid., 5

⁴³Meshari Hamad Alruwaih, "Knowledge Bridging: Vision, Justifications, and Pathways," *Tajseer* 1, no. 1 (2019): 112. <https://doi.org/10.29117/tis.2019.0011>

⁴⁴Raymond C. Miller, "Varieties of Interdisciplinary Approaches in the Social Science: A 1981 Overview," *Issues in Integrative Studies* 1 (1982): 1–37.

Miller adopts the concept of “worldview”⁴⁵ which considers all the disciplines as subfields in the study of a part of the worldview, and there is no specialization required for studying it in its entirety. All specializations attempt to reconstruct the reality of the phenomenon as perceived by specialists, not as it actually is. This is because the terms used do not suffice to explain what the phenomenon entails and there is a significant complexity in the reality. Thus, the degree and type of theoretical integration among disciplines that form the field of structure vary.

Miller stipulates that the field of interdisciplinarity should encompass a group of educators from various knowledge domains, armed with different concepts, methodologies, and data. They continuously engage in communication and integration to shape a collective effort to solve a common problem. This interaction can range from simple idea exchange to mutual integration in organizing concepts, methodologies, data, procedures, research, and education. The interdisciplinary approach stands out for bridging disciplines in addressing problems and phenomena comprehensively, incorporating various perspectives, including life experiences, considerations of common components, and comprehensive organizational concepts resulting from a comprehensive worldview.⁴⁶

On the other hand, Politi's work focuses on highlighting that the majority of those engaged in interdisciplinarity seek ways to establish connections among various sciences. They concentrate on analyzing the forms of institutional barriers that may hinder the integration of disciplines and propose various effective approaches to overcome them. However, he sees this concern as premature because it implies a tacit assumption that interdisciplinarity is accepted.⁴⁷

According to Politi (2019), the interdisciplinary model is still in need of further development to establish a greater agreement on ways and methods to solve the problems. Paradoxically, this lack of consensus renders interdisciplinary studies robust and adaptable in addressing complex issues and navigating the challenges of defining disciplinary boundaries. Therefore, Politi emphasizes that the interdisciplinarity should be regarded as a guiding value for selecting theories and research projects, extending beyond merely changing perceptions of the interdisciplinary approach.

In the quest to unveil the reality of interdisciplinary studies, a study conducted by the Ibn Khaldun Center at Qatar University reveals that, in line with the established traditions in international organizations focused on education and prestigious academic institutions, no standardized model has been identified to ensure the viability of interdisciplinary studies.⁴⁸

This endeavor finds its justification in the necessity posed by the magnitude of cognitive diversity in disciplines and subjects. Different methodological tools are required to shape a cognitive reflection of the various dimensions of reality and the nature of studied problems. The existence of such different dimensions implies a shift from the concept of precise or singular specialization that embodies “fragmented vision” to the idea of intertwined specializations that embody “integrated vision” to achieve a more precise understanding of the interconnected reality. Therefore, integration is the solution.⁴⁹ Since integration is the goal and purpose pursued by interdisciplinarity as a path,

⁴⁵Ibid., 8.

⁴⁶Ibid., 8.

⁴⁷Vincenzo Politi, “The Interdisciplinarity Revolution,” *Theoria* 34, no. 2 (2019): 249.

⁴⁸Latifa Menadi Al-Kaabi, *Al-Namūdhaj Al-Mi'yārī Lilmqrrāt Al-Baynīyah*, [Standard Model for Interdisciplinary Courses] (Doha: Ibn Khaldun Center for Humanities and Social Sciences, Qatar University, 2019), 5.

⁴⁹Ibid., 6.

there must be a specific model "containing standards that ensure the presence of genuine 'integration' between the research subject areas."⁵⁰

The preceding discussion underscores the need for greater expertise among involved parties to adopt the interdisciplinary model as a viable option. The model requires procedural mechanisms that adequately reveal what other research encompasses regarding interdisciplinarity, addressing concerns expressed by the researchers. The diversity of interdisciplinarity paths resulting from theory explains why researchers struggled to establish an essential basis for forming a model. Ultimately, more integration of intellectual starting points and factors among these studies is essential for developing a cohesive interdisciplinary model. Therefore, any attempt to link the contained elements can be seen as a step toward creating a new interdisciplinary model.

4. Interdisciplinarity and the Question of Difficulties and Opportunities

While there is a scarcity of studies addressing the challenges and difficulties in interdisciplinary studies as compared to other related topics, few researches have shed light on such issues. For instance, Bayyūmī explores the challenges faced by social science researchers engaging in interdisciplinary research. Drawing on the perspectives of faculty members at the College of Arts and Social Sciences at Sultan Qaboos University and the college of Arts at Ain Shams University, the study identifies institutional obstacles like severe bureaucracy, a preference for supporting specialized research, and barriers related to publishing and arbitration due to a lack of journals interested in the interdisciplinary research. Additionally, functional obstacles, including the heavy teaching burdens on university professors, are highlighted. These challenges, coupled with the time-consuming nature of interdisciplinary research, contribute to the difficulties in its publication.⁵¹

In their study, Frith and Caniglia challenged the assumption that researchers inherently know how to collaborate within the interdisciplinary teams. The research contends that for sustainable interdisciplinary research, collaboration must be actively learned to address the challenges. By viewing interdisciplinary research collaboration through cognitive, social, symbolic, spatial, and temporal dimensions, the study suggested that these elements may create varying levels of comfort and discomfort for the researchers. Thus, this perspective aims to foster a more systematic understanding of the challenges inherent in collaboration, proposing that learning to collaborate during the work is essential for addressing interdisciplinary research challenges.⁵²

Sivanen and her colleagues identify both structural and conceptual challenges that interdisciplinary research faces. Structural challenges encompass weak and sporadic communication between scientific disciplines, limited institutional incentives for interdisciplinary efforts, spatial and temporal disparities in scientific data between natural and social sciences, limited involvement of social scientists in interdisciplinary projects, and the absence of clear frameworks for integrating social and natural sciences. On the conceptual front, challenges include differing perspectives such as, natural scientists' expectations regarding social science research outcomes, their viewing of social

⁵⁰Ibid., 6.

⁵¹Mohammed Sayid Bayoumy, "Barriers to Interdisciplinary Studies in the Social Sciences: A Field Study," *Journal of Arts and Social Sciences (JASS)* 3, no. 7 (2016): 123–139. <https://doi.org/10.53542/jass.v7i3.1147>

⁵²Rebecca Freeth, and Guido Caniglia, "Learning to Collaborate While Collaborating: Advancing Interdisciplinary Sustainability Research," *Sustainability Science* 15, no. 1 (2020): 247–261.

science counterparts primarily as educators, the influence of social context, and power dynamics within interdisciplinary groups.⁵³

Researchers have sought to address these challenges by proposing practical steps to sustainably promote interdisciplinary collaboration. One notable study, authored by 17 researchers, offers practical advice for emerging researchers, supervisors, senior researchers, and laboratory leaders. The suggestions include developing a field of expertise, learning new languages, maintaining open-mindedness and patience, embracing complexity, collaborating at scale, expanding cognitive boundaries, considering interoperability, fostering an interdisciplinary culture, and advocating for interdisciplinary researchers.⁵⁴

Wear highlighted several obstacles hindering interdisciplinary discourse in his research work. These include the tendency of arbitrators, often rooted in specific disciplines, to dismiss interdisciplinary studies easily. Additionally, challenges arise from difficulties in communicating with different fields that might use similar concepts and terms to convey different meanings. The scarcity of interdisciplinary journals further compounds these challenges.

While previous researches have discussed various difficulties related to the interdisciplinary studies, the current research identified additional challenges based on the personal experiences of the researchers in this field. These challenges can be categorized into two main groups. The first group discusses the difficulties related to researchers, pertaining to the researcher's efforts, which can be addressed through scientific objectivity, ethical research practices, and deepened study. However, the other group focuses on the difficulties related to institutions, which necessitate institutional efforts and cannot be overcome solely by the researcher's individual efforts.⁵⁵

4.1. Difficulties Related to Researchers

Following are the several difficulties related to researchers.

1. The difficulties due to ideological biases of the researchers include the ideological and cultural tendencies of disciplines that refuse to cooperate with the opposite orientations. For instance, the difference of ideology between the capitalist and socialist economy depicts this kind of difficulty. There are also differences in the total existential visions adopted by the researchers, which express somewhat divergent intellectual models so that it is difficult to converge them, such as the monotheistic vision with the atheistic vision.
2. Formative difficulties include the weak scientific composition of the researchers who research topics that intersect with more than one discipline because there is not enough opportunity to delve into the details of the issues faced by each field.⁵⁶ It also includes the weak capabilities of the researchers and the skills necessary to conduct interdisciplinary studies, which is an obstacle to the progress of interdisciplinary studies.

⁵³Leila Sievanen, Lisa Campbell, and Heather M. Leslie, "Challenges to Interdisciplinary Research in Ecosystem-Based Management," *Conservation Biology* 26, no. 2 (2012): 315-323.

⁵⁴Rachel Kelly, Mary Mackay, Kirsty L. Nash et al, "Ten Tips for Developing Interdisciplinary Socio-Ecological Researchers," *Socio-Ecological Practice Research* 1 (2019): 149-161.

⁵⁵David N. Wear, "Challenges to Interdisciplinary Discourse," *Ecosystem* 2 (1999): 299-301.

⁵⁶Mohammad Taher Ibn 'Āshūr, *Alīs al-Subḥ bi-Qarīb* [Isn't Morning Near?] (Cairo: Dār al-Salām, 2006), 73.

3. The psychological difficulties that arise from the competition among researchers of various disciplines and those looking at each other with a superior view.⁵⁷ This challenge usually happens among the researchers in the disciplines of natural sciences and the fields of the social and human sciences.
4. Leadership difficulties in interdisciplinary studies stem from the competition among researchers in assuming the leadership roles, the incapacity of a leader to effectively coordinate among the team members, and the lack of a suitable balance within the team. This imbalance may result in discomfort for some researchers, prompting them to focus on a specialized research.

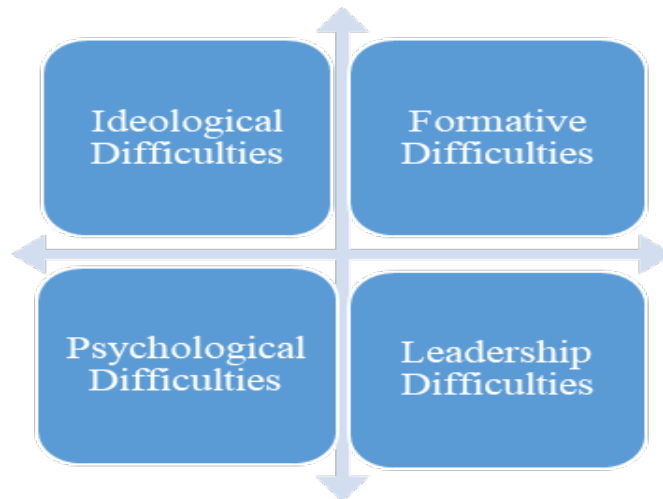


Figure 5. Difficulties Related to Researchers

4.2. Institutional Difficulties

These difficulties are divided into the following subgroups.

1. Epistemological difficulties stem from various factors, including the absence of standardized terminology relied upon by the researchers in composing interdisciplinary studies. This gap is evident even in the vocabulary used to denote the stages and levels of "integration." Few studies proposed that interdisciplinary, multidisciplinary, and transdisciplinary studies are essentially synonymous, with interdisciplinary studies being the most prevalent term.⁵⁸ Several studies, while claiming to adopt an interdisciplinary approach, may exhibit a preference for the research methods of one discipline over the others, potentially leading to the suboptimal practical outcomes.⁵⁹ The execution of interdisciplinary research poses difficulties due to variations in research methods and tools employed across different disciplines. Moreover, researchers may lean heavily on their specialization and expertise, potentially distancing the study from true interdisciplinarity and aligning it more closely with a discipline-specific approach. In contrast

⁵⁷Ali Al-Qurayshī, *Tawfīn al-'Ulūm fī al-Jāmi'āt al-Islāmīyah* [Localization of Sciences in Islamic Universities] (Doha: Waqfīyat al-Shaykh 'Alī ibn 'Abd Allāh Āl Thānī lil-Ma'lūmāt wa-al-Dirāsāt, 2008), 192.

⁵⁸Maura Borrego, Lynita K Newswander, "Definitions of Interdisciplinary Research: Toward Graduate-level Interdisciplinary Learning Outcomes," *Review of Higher Education* 34, no. 1 (2010): 61–84. <https://psycnet.apa.org/doi/10.1353/rhe.2010.0006>

⁵⁹Sievanen et al, "Challenges to Interdisciplinary Research": 299.

to technical studies, certain specialized techniques and tools may prove unsuitable for the interdisciplinary research.

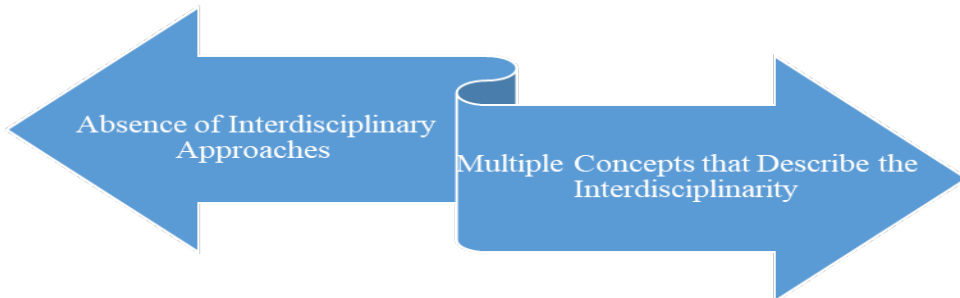


Figure 6. Epistemological Difficulties to Interdisciplinary Research

2. **Difficulties of the Establishment :**These include several obstacles, such as the complexity of administrative and official procedures in universities and research centers dealing with the interdisciplinary studies. This leads to the decreased researcher motivation to pursue such work. The difficulty of promoting research belonging to several disciplines in some universities makes it more difficult to evaluate them and one of the researchers expressed that they are official machinations with prior knowledge or otherwise.⁶⁰ In addition, specialized studies are encouraged more than the interdisciplinary studies in the academic structure. Graduates of interdisciplinary studies often face difficulty in finding work environments that cater to their unique skill sets due to their interest in multiple disciplines. This can often be perceived as a weakness in practical results, as they may require additional training to perform specific tasks. Therefore, they need to acquire more skills to become suitable for specific job roles as the lack of institutions that adopt interdisciplinary projects and programs hinders the progress.

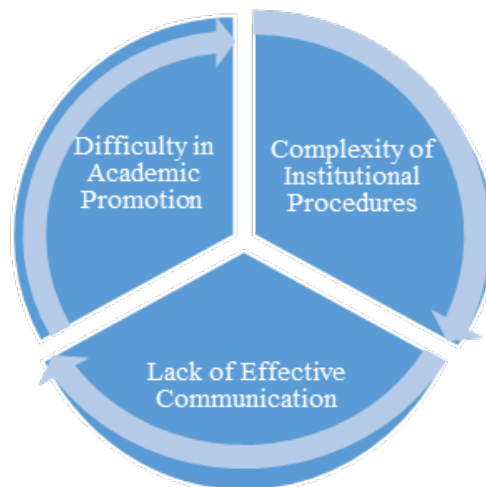


Figure 7. Difficulties in Establishing the Interdisciplinary Research

⁶⁰Solomon B. Levine, "Interdisciplinary Approach in Social Sciences," *Social Sciences* 31, no. 2 (1956): 77. <https://www.jstor.org/stable/41884433>

3. **Funding Difficulties:** Interdisciplinary studies often require the involvement of specialists from different fields, which leads to the increased financial costs for funding and evaluation. This is unlike the studies that are based on a single discipline. Furthermore, the arbitration of interdisciplinary research may require arbitrators who specialize in the same fields as the researcher, which further increases the cost of arbitration.
4. **Communicative Difficulties:** Interdisciplinary misunderstandings and mutual misjudgments create communicative obstacles, either in defining concepts or determining the scope of a topic. These difficulties may stem from the differences in perspectives or the failure to establish a common language among the researchers across various disciplines. Overcoming such hurdles necessitates a concerted effort to forge a shared vocabulary, ensuring a common understanding among all members of the research team, regardless of their disciplinary backgrounds. Ineffective communication within each specialization or scientific sector further complicates the interoperability process. Different universities, colleges, or departments often have distinct procedures and policies for authorization and funding, leading to potential incompatibilities. This lack of alignment weakens the communication between researchers from diverse institutions, resulting in a fragile network of relations among them.

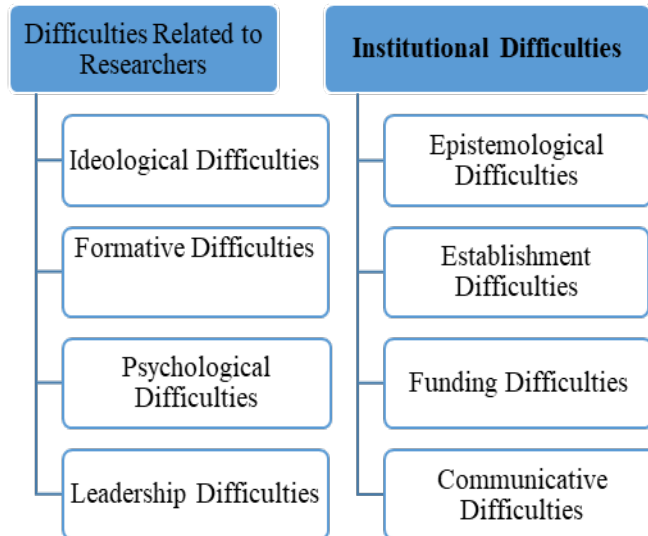


Figure 8. Summarizes the Difficulties of Interdisciplinary Studies

5. Conclusion

Interdisciplinary as a phenomenon in scientific research expresses an urgent need imposed by several factors related simultaneously to the shifts in the philosophy and methods of science and the changes in human societies. Interdisciplinarity is one of the main drivers for developing knowledge, as it contributes to stimulating research and reducing isolation between disciplines. However, this research study concluded the following results desuved after examniation of the monetary clash with the interdisciplinarity.

At the concept level, this theoretical study identifies four main ideas directly related to the interdisciplinarity when employed in scientific research. Firstly, the term has a lot of ambiguity and confusion, as the several vocabulary words that used to express it have been observed and this can be attributed to the problems of an epistemological nature associated with the phenomenon it describes. Secondly, “interdisciplinarity” refers to the collaboration of two or more scientific

disciplines to produce knowledge that integrates and bridges between these disciplines. This integration varies depending on the relationship between them within the framework of a joint research project. Moreover, interdisciplinarity as a phenomenon in the field of research, expresses an urgent need imposed by several factors related simultaneously to the shifts in the philosophy and methods of science and the changes in human societies. Fourthly, interdisciplinarity is one of the main drivers for developing knowledge, as it stimulates research and reduces isolation between the disciplines.

Moreover, the study reveals that the need for a mature interdisciplinary model and the differences in definitions are due to the defective perception of the models. This is not surprising considering the subject's novelty and relatively recent entry into the intellectual arena compared to the research within disciplines. The field requires further accumulation of knowledge before its significant features can be formed.

Interoperability in academia faces various difficulties that are broadly classified into difficulties related to the researchers and difficulties related to the institutions. These difficulties are likely to persist and can only be overcome by enhancing researchers' scientific competence, eliminating ideological prejudices unrelated to scientific objectivity, overcoming psychological biases specific to specializations, and fostering constructive interaction between researchers from different fields. In addition, scientific institutions should prioritize understanding the content and feasibility of interoperability.

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data associated with this study will be provided by the corresponding author upon request.

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Bibliography

- Abd al-'Aziz, Barakat. “Al’Shkalyāt al-Manhajīyah fī al-Dirāsāt al-baynīyah” [Methodological Problems in Interdisciplinary Studies]. *The Arab Journal for Media and Communication Research (AJMCR)* 12 (2016): 4-9. <https://doi.org/10.21608/jkom.2016.109573>
- Aboelela, Sally W. et al. “Defining Interdisciplinary Research: Conclusions from a Critical Review of the Literature.” *Health Services Research* 42, no. 1 (2007): 329–346.
- Al-Ani, Wajeha Thabit. “Faculty Members’ Attitudes toward Interdisciplinary Studies in the College of Education at Sultan Qaboos University.” *Journal of Arts & Social Sciences (JASS)* 3, no. 7 (2016): 53–67.
- Alruwaih, Meshari Hamad. “Knowledge Bridging: Vision, Justifications, and Pathways.” *Tajseer* 1, no. 1 (2019). <https://doi.org/10.29117/tis.2019.0011>
- Baty, Phil. “Interdisciplinary Research is Key to Scientific Discovery. So Why are Universities Reluctant to Cross Disciplines?.” *World Economic Forum*, (November 2023). <https://www.weforum.org/agenda/2023/11/interdisciplinary-science-next-big-breakthrough/> Retrieved on May 29, 2024.

- Bayoumy, Mohammed Sayid. "Barriers to Interdisciplinary Studies in the Social Sciences: A Field Study." *Journal of Arts and Social Sciences (JASS)* 3, no. 7 (2016): 123–139. <https://doi.org/10.53542/jass.v7i3.1147>.
- Ben Omar, Mohammed. "Altdākhyh Bayna al-'Ulūm fī al-Turāth al-'Arabī al-Islāmī wa-Atharuhā 'alā al-Dars al-Muṣṭalahī" [The Intersectionality between Sciences in the Arab-Islamic Heritage and its Impact on the Terminological Lesson]. *Al Tafahom* 15, no. 55-56 (March 2017): 307–324.
- Benlahcene, Badrane. "Malek Bennabi's Concept and Interdisciplinary Approach to Civilisation." *Intentional. Journal of Arab Culture, Management and Sustainable Development* 2, no. 1 (2011): 55–71. <https://doi.org/10.1504/IJACMSD.2011.044896>
- Bennabi, Malek. *On the Origins of Human Society*. Trans. by Mohamed T. Mesawi. Kuala Lumpur: The Open Press, 1998.
- . *Shurūt al-Nahzah* [The Conditions of the Renaissance]. Damascus: Dār al-Fikr, 1981.
- Berger, Guy. "Opinions et Réalités," [Opinions and Realities], in OCDE, *L'interdisciplinarité: problèmes d'enseignement et de recherche dans les universités* [Interdisciplinarity: Problems of Teaching and Research in Universities]. Paris: OCDE, 1972.
- Borrego, Maura., and Lynita K. Newswander. "Definitions of Interdisciplinary Research: Toward Graduate-level Interdisciplinary Learning Outcomes." *Review of Higher Education* 34, no. 1 (2010): 61–84. <https://psycnet.apa.org/doi/10.1353/rhe.2010.0006>
- Brown, Bruce. "Interdisciplinary Research." *European Review* 26, no. 2 (2018): s21–s29.
- Collinet, Cecile., Philippe Terral, and Patrick Trabal. *Le Travail Scientifique Interdisciplinaire: Réalités et Contraintes* [Interdisciplinary Scientific Work: Realities and Constraints]. Paris: Université Paris Nanterre, 2014.
- Freeth, Rebecca., and Guido Caniglia. "Learning to Collaborate While Collaborating: Advancing Interdisciplinary Sustainability Research." *Sustainability Science* 15, no. 1 (2020): 247–261.
- Al-Ḥaffār, Saïd Muhammad. *Taṭbīq al-Tarbiyah al-bī'iyah i'timādan 'alā trābṭ al-'Ulūm* [Applying Environmental Education based on the Interconnection of Sciences]. Muscat: Maktab al-Tarbiyah al-'Arabī li-Duwal al-Khalīj, 1988.
- Heckhausen, Heinz. "Discipline and Interdisciplinarity." in Leo Apostel, Guy Berger, Asa Brings and Guy Michaud. *Interdisciplinarity: Problems of Teaching and Research in Universities*. Paris: OECD Publications Center, 1972.
- Ibn 'Āshūr, Mohammad Taher. *Alīs al-Subḥ bi-Qarīb* [Isn't Morning Near?]. Cairo: Dār al-Salām, 2006.
- Ilaina, Rudhad., Ahid Nur, and Andika Eko Presetiyo. "Epistemology of Interdisciplinary Research at Islamic Study on State Islamic Religious Higher Education in Indonesia." *Fitrah* 8, no. 1 (June 2022): 1–20.
- International Institute of Islamic Thought, *The Islamization of Knowledge: General Principles and Work Plan*. Hendon, VA: International Institute of Islamic Thought, 1989.
- Jibrīn, Malak Bint Mohammad. *Taṭwīr al-Jāmi'āt al-Sa'ūdīyah fī daw' Falsafat al-Jāmi'ah al-mutajaddidah – Taṣawwur Muqtarah* [Developing Saudi universities in light of the renewed University Philosophy - a Proposed Vision]. Riyadh: Jāmi'at al-Imām Muḥammad ibn Sa'ūd al-Islāmīyah, 2018.

- Al-Kaabi, Latifa Menadi. *Al-Namūdhaj Al-Mi'yārī Lilmqrrāt Al-Baynīyah* [Standard Model for Interdisciplinary Courses]. Doha: Ibn Khaldon Center for Humanities and Social Sciences, Qatar University, 2019.
- Kapila, Sunita and Moher, Robert. *Across Disciplines: Principles for Interdisciplinary Research*. Ontario: International Development Research Centre Policy and Planning Group, 1995.
- Kasule, Omar. "Integration of Knowledge (IOK) and Textbook Writing for Islamic Universities." *International Journal of Islamic Thoughts* 4, no. 1 (2014): 123–126.
- Kelly, Rachel et al. "Ten Tips for Developing Interdisciplinary Socio-Ecological Researchers." *Socio-Ecological Practice Research* 1 (2019): 149–161.
- Klein, Julie Thompson., and William H Newell. "Advancing Interdisciplinary Studies." in Jerry G. Gaff and James L. Ratcliff, *Handbook of the Undergraduate Curriculum: A Comprehensive Guide to Purposes, Structures, Practices, and Change*. San Francisco: Jossey-Bass Publishers, 1997.
- Laflamme, Simon. "Recherche interdisciplinaire et réflexion sur l'interdisciplinarité." [Interdisciplinary Research and Reflection on Interdisciplinarity]. *Nouvelles Perspectives En Sciences Sociales* [New Perspectives in Social Sciences] 7, no. 1 (2011): 59.
- Levine, Solomon B. "Interdisciplinary Approach in Social Sciences." *Social Sciences* 31, no. 2 (1956): 76–81. <https://www.jstor.org/stable/41884433>
- Louvel, Séverine. "The Impact of Interdisciplinarity on Disciplines: A Study of Nanomedicine in France and California." *Revue Française de Sociologie* 56, no. 1 (2015): 69–97.
- Markaz al-Abhāth al-Wā'idah. *Al-Dirāsāt al-Baynīyah* [Interdisciplinary Studies]. Riyad: *Jāmi'at al-Amīrah Nūrah bint 'Abd al-Raḥmān*, 2017.
- Mathurin, Creutzer. "Aspects de l'interdisciplinarité: essai de reconstitution d'un débat." [Aspects of Interdisciplinarity: Attempt to Reconstruct a Debate]. In Lucie Gélineau and Carole Mailloux, *L'interdisciplinarité et la recherche sociale appliquée Réflexions sur des expériences en cours* [Interdisciplinarity and Applied Social Research Reflections on Current Experiences]. Montreal: Université de Montréal/Université Laval/Chaire d'étude Claire-Bonenfant Sur La Condition Des Femmes, 2002.
- Miller, Anna Cohen., and Elizabeth Pate. "A Model for Developing Interdisciplinary Research Theoretical Frameworks." *The Qualitative Report* 24, no. 6 (2019): 1215–1220.
- Miller, Raymond C. "Varieties of Interdisciplinary Approaches in the Social Science: A 1981 Overview." *Issues in Integrative Studies* 1 (1982): 1–37.
- Morin, Edgar. *Scienza Con Coscienza* [Science with Knowledge]. Paris: Fayard, 1982.
- Newell, William H. "A Theory of Interdisciplinary Studies." *Issues in Integrative Studies* 19 (2001): 21.
- Payette, Maurice. "Interdisciplinarité : Clarification des Concepts." [Interdisciplinarity: Clarification of Concepts]. *Interactions* 5, no. 1 (2001).
- Piaget, Jean. "L'épistémologie des Relations Interdisciplinaires," [The Epistemology of Interdisciplinary Relations], in OCDE, *L'interdisciplinarité: problèmes d'enseignement et de recherche dans les universités* [Interdisciplinarity: Problems of Teaching and Research in Universities]. Paris: OCDE, 1972.
- Politi, Vincenzo. "The Interdisciplinarity Revolution." *Theoria* 34, no. 2 (2019): 249.

- Qumari, Mohammad. "Al-tafkīr al-Baynī : Naḥwa Kasr al-Ḥawājjiz bayna al-Takhaṣṣuṣāt?" [Interdisciplinary Thinking: towards Breaking down Barriers between Disciplines?]. *Makalid* 6, no. 6 (2018): 3.
- Al-Qurayshī, Ali. *Tawfīn al-‘Ulūm fī al-Jāmi‘āt al-Islāmīyah* [Localization of Sciences in Islamic Universities]. Doha: Waqfiyat al-Shaykh ‘Alī ibn ‘Abd Allāh Āl Thānī lil-Ma‘lūmāt wa-al-Dirāsāt, 2008.
- Qutayt, Adnan Muhammad. "Al-Baḥṭh al-Tarbawī Baynī al-Takhaṣṣuṣāt: Dirāsah Ibṣṭymwlwjyh." [Interdisciplinary Educational Research: an Epistemological study]. *Maḡallat Al-Baḥṭh Al-Tarbawī* 17, no. 17 (July 2018): 343–300. https://journals.ekb.eg/article_195636_1ebe6dc7beb9ca9fcfcc5b565d0c92e6.pdf
- Renn, Ortwin. "Transdisciplinarity: Synthesis towards a Modular Approach." *Futures* 130 (2021): 3–5. <https://doi.org/10.1016/j.futures.2021.102744>.
- Robertson, David W, Douglas K Martin, and Peter A. Singer. "Interdisciplinary Research: Putting the Methods Under the Microscope." *BMC Medical Research Methodology* 3, (2003): 20.
- Sievanen, Leila., Lisa Campbell, and Heather M Leslie. "Challenges to Interdisciplinary Research in Ecosystem-Based Management." *Conservation Biology* 26, no. 2 (2012): 315–323.
- Szostak, Rick. "The Interdisciplinary Research Process." *Chapters on Interdisciplinary Research and Research Skills*, (2020).
- Trabal, Patrick., Cecile Collinet, and Philippe Terral. "Faire Preuve d’Interdisciplinarité: Un Mot d’Ordre, Ses Interprétations et Ses Ajustements." [Demonstrating Interdisciplinarity: A Watchword, Its Interpretations and Its Adjustments]. *Terrains & Travaux* 30, no. 1 (2017): 209.
- Wear, David N. "Challenges to Interdisciplinary Discourse." *Ecosystem* 2 (1999): 299–301.