

What is the difference between interdisciplinary and monodisciplinary research?

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Abstract: Disciplinarity is the ability to understand a methodology and the capability to obtain and use specialized knowledge. Students typically gain disciplinarity when they choose to focus their studies within a specific concentration. In the case of interdisciplinarity, related to the ability to investigate a problem based on knowledge from multiple disciplines. This paper will examine the benefits of learning about specific knowledge areas to ensure that a student is able to cultivate a skill set that allows them to solve problems that may arise within an interdisciplinary experience.

Keywords: interdisciplinary; monodisciplinary; disciplinarity; interdisciplinarity

Résumé : La disciplinarité est la capacité de comprendre une méthodologie et d'obtenir et d'utiliser des connaissances spécialisées. Généralement les étudiants acquièrent la disciplinarité lorsqu'ils choisissent de concentrer leurs études dans une orientation spécifique. Quant à l'interdisciplinarité, elle est liée à la capacité d'enquêter sur un problème en se fondant sur la connaissance de plusieurs disciplines. Cet article examine les avantages de se renseigner sur des domaines de connaissances spécifiques pour s'assurer qu'un étudiant est en mesure de cultiver un ensemble de compétences qui lui permettent de résoudre les problèmes qui peuvent survenir au cours d'une expérience interdisciplinaire.

Mots-clés : interdisciplinaire; monodisciplinaire; disciplinarité; interdisciplinarité

As fields of research become more and more united, both methodologies and data analysis procedures become widely common to various disciplines and more global therefore interdisciplinary research turn out to be an approach for researchers investigating problems and theories. Interdisciplinary research is research that “integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more discipline or bodies of specialized knowledge” in order to “advance fundamental understanding or solve problems whose solutions are beyond the scope of a single discipline” (Committee on Facilitating Interdisciplinary Research, Committee on Science, Engineering, and Public Policy, 2004, p. 2). The performance of interdisciplinary research is important for the development and evolution of disciplines because the construction of the concepts that undergird disciplines will commonly be associated with a number of different bodies of research.

Links between how it is that different disciplines come to understand phenomena are beneficial for researchers. Scientific discovery and empirical investigation facilitate holistic and comprehensive insight with regard to elements that a mono-disciplinary approach would not uncover (Hall & Sanders, 2015). For this reason, interdisciplinary research is supportive of the development and transformation of different disciplines for the purpose of developing a cohesive solution to problems that researchers seek to investigate.

1. History of Disciplinarity and Interdisciplinarity

Disciplinarity has existed in an informal manner since the beginnings of interdisciplinarity, however disciplinarity did not become formalized until the 1800s. This is primarily because it was only in the 19th century where knowledge clusters began to take the form of disciplinarity, where the construction of disciplines into delineated areas of study began (Szostak, 2012). Disciplinarity began with the categorization

of knowledge in the scope of philosophy and literature in the context of the trivium; the disciplines of logic, grammar and rhetoric. The scope of the construction of disciplinarity at the time was literature; however Plato (427-347 B.C.) sought to shift the paradigm to philosophy. Plato (427-347 B.C.) was not successful in this, with Isocrates influencing compromise where. It was a lack of rationale for the delineation of disciplines that was the reason for Plato's efforts to fail, however Aristotle (384-322 B.C.) was able to design a taxonomy of disciplinarity that effectively organized disciplines into areas of study.

Modern disciplinarity was encouraged in large part by the formalization of higher education. Academic institutions encouraged the formalization of disciplines into fields of research and study based on the belief of how it is that ideas were associated (Holbrook, 2013). The association of theory and research into fields of study is the foundation of disciplinarity as scholars and subject matter experts became the designers of how it is that fields of knowledge and research would be codified and organized.

While disciplinarity and interdisciplinarity are identified as being constructions of modern 20th century approaches to knowledge, disciplinarity and interdisciplinarity have roots in the initial delineations of knowledge clusters into disciplines Barry, Born & Weszkalnys, 2008). The first constructions of knowledge clusters occurred in Ancient Greece, where Greek scholars would use components of different fields of study in order to support the advancement of their own. An example of how this would be done is Greek historians such as Herodotus (484 BC-425 BC), Thucydides (460 BC-395 BC) and Xenophon (430 BC-354 BC) using research methods associated with medicine and philosophy in order to support the recording of historical data and the development of historical understanding. Interdisciplinarity in research was also an integral component of the

development of the Leibniz (1646-1716) construction of universal justice. This is because Leibniz incorporated elements of sociology, political science, philosophy, law, economics and linguistics into a comprehensive understanding of justice.

2. Defining Interdisciplinarity and Disciplinarity

Post (2009) identifies disciplinarity as being the categorization and organization of knowledge, as well as the means by which “knowledge is acquired, confirmed, implemented, preserved and reproduced” (p.751). What this definition of disciplinarity seems to indicate is that disciplinarity is both the development and alignment of knowledge in order to fit the overall agenda of the body of knowledge which has become formalized. Shumway and Messer-Davidow (1993) add to this understanding of disciplines by identifying disciplinarity to “not [be] dependent on mere doctrine and that its authority does not derive from the writings of an individual or a school, but rather from generally accepted methods and truths” (p.202). This is important because it indicates that disciplinarity is dependent on a foundation of the acceptance of a discipline as being valid. So as Post indicates that knowledge categorization and development are the defining characteristics of how disciplinarity operates, disciplinarity also depends on what the people themselves consider to be true and how it is that elements of knowledge should be associated and organized.

Klein (1990) has identified that “the roots of concepts lie in a number of ideas that resonate through modern discourse” (p. 10). What this means is that the development of discipline happens through the identification of concepts and theories which are relevant to one another being codified and categorized through the scope of discourse, hence the development of discipline is inherently interdisciplinary. Klein continues that interdisciplinarity is concludes with “ideas of a unified science, general knowledge, synthesis and the integration of knowledge” (p. 10). Interdisciplinarity is therefore the integration

of concept and theory across different disciplines for the purpose of responding to a specific problem though the synthesis of ideas that would be relevant to specific problems, however would not be common enough to be re-categorized into the development of a new discipline.

3. Categories of Interdisciplinarity

Repko (2007) identified two categories of interdisciplinarity studies. One category being the generalist and the other being the integrationist. The generalist approach to interdisciplinarity is an approach where there is the “interaction of two or more disciplines” (Moran, 2002, p. 16). In this category of interdisciplinarity the notion of integration is not a concern. Opponents of this notion of interdisciplinarity typically note that there is a need for integration when performing interdisciplinary research, and that research within the scope of interdisciplinarity studies should not minimize, obscure or reject integration of different ideas (Repko, Newell & Szostak, 2011).

The integrationist school of thought supports the priority of integration in interdisciplinary studies, and the idea that there is the need for the application of a distinctive interdisciplinary research process with regard to how it is that it operates. Klein and Newell (1997) identify interdisciplinarity through the scope of integrated studies as being a process involved in responding to a question, problem or topic that is too complex for a single discipline, hence the need to draw on the insights present in multiple disciplines in order to create a more cohesive understanding.

4. Arguments in Favor and against disciplinarity

The practice of disciplinarity has both pros and cons. Disciplinarity can support greater understanding of how it is that a problem is influenced by a specific theory or the development of an understanding of how it is that certain approaches to problems will contribute to solutions. Disciplinarity also supports a simple, categorized understanding

of things (Augsburg & Henry, 2009). Disciplinarity supports a researcher describing a phenomenon through the context of the subject matter of a topic in a simple manner. Essentially, disciplinarity supports a simple understanding of the world.

Disciplinarity has limitations. One of the strongest limitations is that it is difficult to understand complex problems through the utilization of a disciplinarity approach (Battiste, Bell & Findlay, 2002). Complex problems with many different aspects tied to them may require a more holistic approach in order to understand how it is that theories affect them and how theories from different disciplines may interact when dealing with problems. In addition, when there is a mono-disciplinary approach taken to a problem, it is difficult to grow theory within the context of understanding the nature of how it is that theory responds to problems. Incorporating multiple disciplines into the response to a problem can support a researcher understanding the theory itself better, possibly supporting new dimensions being formed in how it is that a discipline is delineated from other disciplines.

5. Arguments in Favor and against interdisciplinarity

Possibly the strongest argument for interdisciplinarity is the benefit of understanding the response to problems or issues in a holistic fashion (Sillitoe, 2004). When a mono-disciplinary approach is taken, then the development of theory is stifled and the development of an understanding of how it is that a problem is solved is only within the scope of the discipline studied. An interdisciplinary approach that seeks to integrate theory from multiple disciplines together can support improved understanding of both the problem studied and theory itself. It can also support the transformation of a discipline.

Drawbacks to the application of interdisciplinarity do exist. One drawback that is associated with the application of an interdisciplinary approach is that it can be difficult to determine which theories or

disciplines to draw from when designing an understanding of theory. This can cause what Benson (1998) refers to as conceptual confusion. In addition, a researcher may not be well-read in the subject matter of other disciplines, therefore there may be the need to consult with other scholars when constructing a response to a problem. It is difficult to integrate multiple disciplines because of the lack of understanding that many researchers have in terms of different disciplines. Because of this, it can be difficult to respond to problems in an efficient and effective manner unless there is a team of researchers who are approaching a problem.

6. Reasons for interdisciplinarity

There are multiple reasons for the implementation of interdisciplinarity in the approach that is taken to the study of a topic. One of the primary reasons is that it is an effective means of integrating subject matter from multiple topics in a way that will support the development of fundamentally new knowledge. The product of interdisciplinarity will be a product that is developed by the researcher discovering new knowledge in the context of multiple different academic disciplines. Through interdisciplinarity complex problems can be responded to by research in ways that a mono-disciplinary approach could not uncover. An example of this is in the field of business studies (Bijker, 1997). It is not always enough to study problems of workers through a theoretical lens that is grounded in social science theory, there are times when it is necessary to study problems through the context of sociotechnical theory to understand how technologies and social interactions are affected (Adler & Docherty, 1998). The study of longwall coal mining technologies required the utilization of interdisciplinarity as a means of understanding how it is that technology and sociological theories interact, resulting in a theory that both disciplines share (Trist & Bamforth, 1951).

7. How to do interdisciplinarity

Disciplines exist in order to support the limitation of the theories which researchers and academics should consider in response to problems or phenomena. The boundaries created by disciplines result in the development of a framework that can be applied when performing research and designing the methods by which problem or phenomenon will be studied (Klein, 1990). One means by which interdisciplinary study can overcome this obstacle is through the implementation of an active strategy. Active strategy is a means by which interdisciplinary research can be performed that is supported by the Institute for the Study of Science Technology and Innovation (Tait & Lyall, 2007). This approach requires that there be an open-ended preliminary research phase in which there is the implementation of multiple boundaries onto the study where the focus is on determining the best fit and allowing the results from analysis to be the determining factors in the understanding of the disciplines which will be involved in the study (Dabars, 2008). The outcome from the initial results should be the specification of which issues are tied to the research problem, how it is that the issues interact with the research problem and the nature of how it is that interactions could be modified in such a way that research could support the determination of a solution.

A strong interdisciplinary approach to a problem will require that there be the use of a team of researchers, not just a single researcher. This is because there is the need to pull together a number of people who come from different backgrounds in order to respond to the research question in an interdisciplinary method. Managers of the process of interdisciplinary work should be mindful of language and communication issues that may emerge in the research process. In addition, institutional structures and procedures can be an obstacle in the process, as can divergences in the world views of researchers coming from different disciplines. Managers of the process should

deek researchers who are flexible and creative, with curiosity about the problem and other disciplines. The researchers on the team should be people who have an open mind to ideas that are common in other disciplines, with strong communication skills and the ability to bridge theory and practice, and that researchers are good team workers (Tait & Lyall, 2007).

8. Challenges facing interdisciplinarity

Perhaps the most pervasive challenge which faces interdisciplinarity is the structure of the doctoral education system. While a doctoral education can successfully prepare students to be researchers in their field of study, there is a lack of focus which exists in most doctoral programs with regard to the development of an interdisciplinary approach to the study of phenomena (Golde & Gallagher, 1999). Academic departments are focused mainly on the area of study of the discipline that the student is enrolled in or topical areas that are in close proximity. Students are not prepared for academic study in an integrated interdisciplinary fashion, hence it is difficult for them to perform it. On a related note, students are not exposed to interdisciplinary study in their doctoral programs, and if the idea is broached with advisors, it is difficult to find advisors who are well-versed in the performance of interdisciplinary study. Another challenge is the difference between methodologies for research that exist when performing interdisciplinary research. Understanding the process of creating new knowledge and the difference between methodologies is difficult for researchers who have not been developed in interdisciplinary environments. For this reason, it is difficult for researchers to begin to understand how to approach interdisciplinary work. Finally, it is difficult to uncover intellectual communities where more information on a topic can be uncovered or to find researchers to work with (Nystrom, 2007). The difficulty in finding a research team can be a significant problem for researchers

looking to perform interdisciplinary research, particularly because while a researcher may be a good fit, if they have no interest, then they cannot be easily recruited.

9. The Future of Interdisciplinarity

The future of interdisciplinarity appears to be one where the current paradigm of disciplinary approaches to research being the primary means by which research will be carried out will be transcended as the boundaries and parameters that surround disciplines make it increasingly difficult to investigate the problems that researchers currently face (Pellmar & Eisenberg, 2000). The means by which this will be facilitated already exist, however will increase in use. Current technologies make it easy to communicate with colleagues and co-workers across the globe. The missing piece is a means by which these people are able to identify one another. Electronic publishing and the maintenance of blogs and websites is one means by which this can be done. The use of publications to inform other researchers about what they seek to investigate in interdisciplinary study could be a call for other researchers to reach out to assist in investigation. In addition, it is possible that the development of virtual communities could support the development of an interdisciplinary following for the response to problems that people are facing.

In closing, the use of interdisciplinarity is a benefit for researchers, however it is important that researchers are mindful of how it is that they manage an interdisciplinarity approach. Solutions derived through the performance of interdisciplinary research will be complex, and follow a complex path, however if researchers have a strong understanding of subject matter, they will be successful. The performance of interdisciplinary research can benefit from researchers managing their talents in such a way that it would be possible to apply theory from multiple disciplines in an efficient and effective manner. Interdisciplinarity is difficult in that it relies

on the researchers having an open mind and understanding that there is not one dominant theory that should be used in response to a problem. The response to a problem should take form with there being a holistic approach and each researcher involved understanding the need for integration of theories in response to phenomena. Interdisciplinarity is possible in research, the role of researchers however is to be mindful of the limitations to each discipline that they bring to the table in response to the problems discussed.

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