Interdisciplinarity; Out of Semantic Confusion in Iran

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Abstract

Background: The concept of interdisciplinarity that we recognize today, was initially formed in 1920 in the United States. During this period, the United States Social Science Research Council expressed its interest in interdisciplinary research. Interdisciplinarity is a multidimensional word with various meanings and interpretations. It is considered as the newest unknown critical, educational, and organizational concept in the modern academic environment. In this study, we defined interdisciplinarity and the characteristics of the underlying concepts to present an analytical definition of the concept of interdisciplinarity.

Methods: Walker and Avant's concept analysis method was used. This method is a systematic approach often used for analyzing relatively new concepts. In order to obtain and extract the applications of interdisciplinarity and its defining characteristics, we searched different databases and used keywords. Five main domains that form the defining structure of interdisciplinarity were emerged. Those domains include nature, integration, method, goal, and levels of interdisciplinarity.

Results: We identified five domains major of " interdisciplinarity: "nature," "integration", "method", "goal", and "levels" of interdisciplinarity. Based on the defining attributes a definition is formulated for the concept of interdisciplinarity.

Conclusion: This study, achieving a simple and elegant concept, resolved the differences between the different perspectives in this field and helped us design the theoretical and practical model.

Keywords: DEFINITION, CONCEPT ANALYSIS, INTERDISCIPLINARITY, WALKER AND AVANT'S METHOD

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Introduction

Interdisciplinarity is an international concept. In the 1970s, the Organization for Economic Co-operation and Development (OECD) stated that this approach is necessary in education and research in order to meet the complex needs of today's society and named various interdisciplinary activities (1). In recent decades, the interdisciplinary approach is the main reason for the shift from the traditional approach to higher education. This approach has informed researchers and those active in higher education about the limitations and weaknesses of staying within the boundaries of a specific discipline and enabled them to go beyond those boundaries. Although the history of interdisciplinary research in its novel form dates back to several decades, the evaluation of its theoretical bases has been scattered and scarce. On the other hand, despite the existence of many definitions for interdisciplinarity, after several decades, there is no clear consensus on its definition among its followers and critics. The root meaning of interdiscilinarity has various implications and differentiates goals

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and situation (2).

Interdisciplinarity is defined in various ways, is a multidimensional word with several meanings, and exposed to various interpretations. Julie Thompson Klein associates it to an archipelago that encompasses a set of definitions (3). Despite many efforts to define the meaning and concept of interdisciplinarity, it is still the most serious unknown critical, educational, and organizational word in novel academic settings (4). Therefore, what should be done in face of different and sometimes contradictory viewpoints? The various interpretations of this word has led to ambiguities regarding its definition (2). Currently, conceptualizing interdisciplinarity is like putting a mismatched puzzle together; mismatched in the sense that various meanings and viewpoints exist.

The goal of this study was to define and conceptualize the concept of interdisciplinarity in order to reach a more accurate definition with higher research and scientific applicability. A clear analysis of interdisciplinarity can enrich existing knowledge theories about interdisciplinarity and present a suitable conceptual framework for developing interdisciplinarity in medical sciences.

Materials and Methods

As far as Walker and Avant (2005) are concerned, concept analysis is the first and a good step to both understanding logical thinking related to terms and definitions and using them in theory development. This method, which is a formal, linguistic exercise; determine defining attributes of concepts used in theory development and research. Through this, understanding the phenomena under discussion is promoted as well as communication is encouraged (5).

In this study, in order to clarify the concept of interdisciplinarity and determine its dimensions, we used Walker and Avant's concept analysis. This study was done in 2017. This approach has eight stages including identifying the concept, determining the

purpose of analysis, defining the concept and its uses, determining the critical attributes, constructing the cases, identifying borderline, related and non-related cases, identifying the antecedents and consequences, and defining the empirical referents (5).

Initially, to discover the different uses of interdisciplinarity, current literature was searched using Google Scholar with keywords such as "conceptualization", "interdisciplinarity", and "definition" from 1995 to 2016. Both Persian and English texts were searched. As a result, 4026 initial sources were obtained. To delete non-related sources, the titles were screened, deleting 3510 sources. Ultimately, 516 sources were listed for second screening. During the second stage of screening, the abstracts were checked and 330 sources that included research types such as case reports were deleted and 186 articles that emphasized on the concept were included in the third stage of analysis. At this stage the full text of the articles were accurately checked and 155 articles were deleted, leaving 31 sources with conceptual definition of interdisciplinarity or high citation rates. Figure 1 shows the search strategy and its stages.

Identifying the Concept

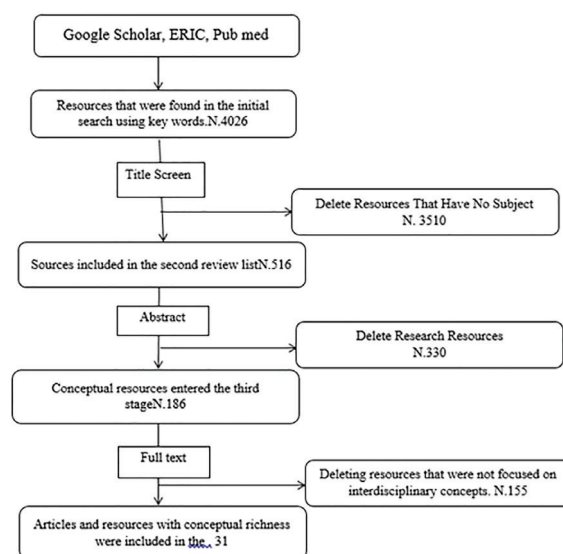Walker and Avant believe that interdisciplinarity is an important concept that is increasingly

Figure 1: Search strategy flowchart

used, emphasized, studied and assessed and the more it is analyzed the clearer it becomes (5). Interdisciplinarity was used because of its extensive use and increasing importance.

Determining the Objectives of Analysis

There are many reasons for analyzing the concept. The purpose may be to examine the internal structures of a complex concept and identify its constituent elements (5).

The concept of interdisciplinarity is one of the concepts, from which various interpretations are derived. By clarifying the concept of interdisciplinary, a common understanding will be formed for users of this concept leading to concept development.

Results

The Uses of Concept

Walker and Avant believe that depicting the overall view and the applications of the studied concept and a richer understanding of the concept will result in the validation of the defining characteristics of the concept (5). Following a detailed and repeated study of literature, various fields related to the definition of interdisciplinarity were identified. Although these domains were primary, the field of definitions continued to be corrected by several revisions in the context of content analysis. Then, sentences and phrases that were helpful in discovering the use of the concept were identified from the references studied, and written in a relevant table and coded. This process was performed for all selected references. To check and refer quickly, a summary table was devoted to the same reference.

The summary of the perceived concepts, derived from the literature review is provided in the below.

➢ Interdisciplinarity approaches are only studied through complex systems.

➢ interdisciplinary studies clearly use several disciplines.

➢ Integration of two or more disciplines' characteristics (knowledge, concepts, etc.) is required in interdisciplinarity studies.

➢ The goal of interdisciplinarity is Solving a problem, Checking out an issue, Answering a question, Maintaining a better understanding, Explaining an objective, Producing a new product

➢ Through the way of interactions between disciplines, different levels of interdisciplinarity arise such as "multi-discipline", "interdisciplinarity", "transdisciplinarity", etc.

In the end, the functional concepts were determined in five domains, including "nature," "integration", "method", "goal", and "levels" of interdisciplinarity, which formed our definition structure as: interdisciplinarity is a nature [....] which is merged with [....] through (method) [....] at the levels of [....] with the goal of [....]).

Definition of Each of the Functional Fields of the Concept

1. The nature of "interdisciplinarity"

It refers to the nature of objects and things; each of these objects have several characteristics. The nature of interdisciplinarity is expressed differently in the studies: as a procedure, instrument, approach, methodology, etc (3).

2. Content of integration in "interdisciplinarity"

The goal of integration is the unification of knowledge and creating interactions between the variables of each field with variables of other fields. It seeks to cross the limits of the boundaries between disciplines and discover the reality. We face a multidimensional problem or situation in real life, but do not ask what part of mathematics, science, or art, etc. it is; we just try to solve the problem from various available references and acquire the necessary knowledge and skills. The conditions of interdisciplinary actions provide the background for activities aimed at integration (6).

3. The method of Integration in "interdisciplinarity"

Mere combinations of different researchers

from diverse disciplines with different professional and academic degrees do not form interdisciplinarity. We can have an interdisciplinary work, when knowledge, theory, and epistemology of various disciplines be integrated, or, in other words, the content of integration be combined with a range of appropriate methods such as mutual recognition, common discourse, collaboration, etc (7).

4. The goal of "interdisciplinarity"

The multi-dimensional realities show that any single-disciplinary insight cannot solve the problems in the real world; therefore, that discipline should be connected to other aspects and disciplines. Although there are different knowledge disciplines and compete with each other, they will complement each other in the unifying interdisciplinary approach to allow the researcher to gain deeper knowledge, more complete understanding, and comprehensive understanding from the studied phenomenon and be responsive for multidimensional issues (8).

5. The levels of interdisciplinarity

Interdisciplinary approaches focus on three subjects: (1) the degree of interaction that exists among people of multidisciplinary associations; (2) the degree of interactions between knowledge agencies of various specific disciplines; (3) the common purpose, problem, or issue that is an incentive for collaboration. These conditions provide the performance of interdisciplinary work for actions with different levels of integration, and create different levels of multidisciplinarity, interdisciplinarity, and transdisciplinarity (9).

Determining the Representative Attributes

There are **attributes** often used when discussing the concepts that play a key role in differentiating different concepts (5).

At this point, the expressions and sentences extracted from the texts, obtained in the previous step, underwent the process of abstraction that resulted in the acquisition of

traits and potential characteristics defining the concept. And the characteristics with the common sense were identified and placed in their own classes; then each class was given a more abstract term that included the meanings of those attributes and characteristics, which are essentially the same as the main attributes of the concept summarized into categories and subcategories as shown in Table 1.

Testing the Necessity of Characteristics of the "Interdisciplinarity" Concept

Walker and Avant believe that the best analyses are those that minimize the number of these attributes (5).

So, at this point, in order to determine the most suitable representative attributes, the necessity and adequacy test were used; the analysis of the necessity test completes the process of determining the attributes at this stage (35).

The reasons for omission of attributes, in the absence of which, the analytical concept of interdisciplinary faces no defect in formation and definition of the concept, are presented in Table 2.

➢ After the necessity and adequacy test, the attributes of the interdisciplinarity concept were reduced to the following:

➢ Interdisciplinarity with nature: Approach

➢ With integration: Methodology, Concepts, Procedures, Epistemology, theories and knowledge

➢ Methodological: mutual recognition, interaction, collaboration, common discourse, and multidisciplinary analysis

➢ By goal: answering a question and solving a real problem, which was not solvable by one discipline or addressing an issue that is too extensive or complex. Deeper or a more comprehensive understanding

➢ At levels: disciplinarity, multidisciplinarity, interdisciplinarity, and transdisciplinarity

Figure 2 demonstrates the components of the interdisciplinarity.

Table 1: Conceptual attributes of interdisciplinarity in the main domains of interdisciplinarity (The definitions of each representative attributes)

Domains	Characteristics	Definition
Nature of interdisciplinary		
	Procedural	Process, step by step progress to reach the goal. From a systemic perspective, a process is what changes the input into the output. Newell believes that interdisciplinarity has systemic and procedural nature (10).
	Instrumental	Interdisciplinary is a tool to achieve a unity from multiple disciplines. Interdisciplinarity transforms disciplines into tools for discovering an issue, a problem, or an idea (11).
	Approach	The approach tells us which direction to move our plans. To understand the various aspects of any phenomenon, we should have the necessary skills for problem-solving, decision-making, and teamwork. Interdisciplinarity is a solution that helps us achieve a new understanding of the phenomenon and a new solution to complex issues and life's needs by cooperation and accompany of different disciplines (6).
	Methodologic	Interdisciplinarity tries to provide the interaction and links between different disciplines and various sciences by methodological pluralism, using common language and expression (8).
	Conceptual	Interdisciplinary has a conceptual nature; that is, one discipline includes issues and questions that cannot be answered. These questions can only be answered with the help of integrating concepts, cognitive organization, organizing the information and knowledge from different disciplines (12).
	Philosophic	The science of Philosophy is the prerequisite of understanding interdisciplinary. Considering the identified approaches in philosophy, different dimensions of interdisciplinarity can be determined as following: ontology, epistemology, methodology, and axiology (13).
	Ideology	Interdisciplinarity helps increase the understanding, memorizing, and application of general concepts. With the development of viewpoints, perspectives, and multiple values, it combine the beliefs and ideas of disciplines to provide us with a more comprehensive worldview about the mutual global interactions (6).
Content of integration in "interdisciplinarity"		
	Intuitions	Intuitions or insights mean understanding the subjects' roots. Different and diverse views exist between and within disciplines and/or some researchers may be committed to specific epistemological views that causes bias. Thus, in interdisciplinarity, it is tried to integrate and approach the disciplinary views to find a useful way to recognize the truth (6, 10).
	Data	Data are the significant raw material that we achieve for recognition and understanding of each concept, by research methods. Data are the main elements of information (14).
	Information	Information are summarized data, grouped, stored, refined, and organized, so that they can be significant. Information are valuable when they are gathered and prepared for a specific dimension, a specific person, a specific purpose and a specific time (14). In interdisciplinary research, integration of information and technology is a key issue, by which integration takes place around new compounds (15, 16).
	Knowledge	Knowledge is defined in the Oxford dictionary as the knowledge of familiarity, awareness, or understanding of a person, such as facts, information, explanations, or skills that are understood and discovered through experience or training. Knowledge refers to the theoretical or practical understanding of a subject. Knowledge is divided into separate disciplines and each knowledge structure produce specific research and educational outputs. To understand the solution for a multidimensional problem, theoretical and practical knowledge and experiences of two or more disciplines are combined (2, 17, 18).

Technique	Technique, in a given technical culture, refers to a set of methods based on scientific knowledge. In each area, technique is the smallest unit of learning a skill. In interdisciplinarity, the techniques of different disciplines are integrated and used in combination (18).
Methodological	Methodology is the tool for recognition of each science. In general methodology is related to the production of knowledge, regulating research laws, and common language between researchers of a scientific field. Interdisciplinary methodology is expected to organize the relationship between disciplines or combine methods of reasoning, descriptive, normative, and abductive interpretations (13).
Concepts	Concept is a term used to describe a phenomenon or a group of phenomena. A concept gives us a summary of the thoughts about a phenomenon or group of phenomena. Naming a concept can act as a research tool for us (19).
	One of the necessary conditions for interdisciplinary work is when an issue cannot be addressed using an academic discipline; therefore, in order to reach a solution, we require the concepts of at least one other discipline (6, 15).
Epistemology	Any Paradigm is based on specific hypotheses in ontology, epistemology, and methodology. In interdisciplinarity, the disciplinary views are connected. So, in this connection, reliability and value of multiple methods of knowledge should be considered.
	Therefore, interdisciplinarity is the integration of epistemological or pluralistic methodology, the method of understanding and participation in research and innovative and common studies (20).
The theories	The theories are systematic, explicit, and organized set of propositions, related to the basic questions of a discipline, which is associated with a whole meaning. Theories have concepts that are related to the phenomena of the scientific discipline. The relation of these concepts with each other form the theoretical propositions. In interdisciplinarity, theories of different disciplines are combined for a particular purpose (15, 21, 22).
Thinking	Thinking is a mental work and is considered when a person faces a problem and wants to solve it. At this point, an attempt to solve the problem begins in mind; this mental effort is called thinking. Klein believes that the integration of thinking in interdisciplinarity is the common point of learning, which has the ability to ask questions about complex issues, to identify knowledge sources for integration, how to communicate and understand comprehensively (22).
Terms	Terminology means the study of specialized words and terms in a particular area. When we talk about the terminology of law science, we mean that a set of specific words or public terms of law science gain specialized meaning. bestanswer.info/ In interdisciplinarity, the interactions between the terms, at least two or more disciplines, occur for joint communication and attempt to solve a problem (15).
Procedure	Procedure, in terminology, means way, method, procedure, and function scheme. Procedures and methods are closely linked and are even considered equal to each other. Some experts separate them and agree that any procedure includes a number of ways. In interdisciplinary, the procedures of disciplines are integrated (15).

The method of Integration in "interdisciplinarity

Mutual recognition	By integrating two or more disciplines, mutual understanding and consensus can be achieved. From the view point of communication and participation, consensus is a sociopsychological construct, for which the individuals should reach an intersubjective consensus.
	The four main tools for integrating through mutual recognition have been identified, as follows: (1) mutual understanding through communication, (2) integration of theoretical concepts (3), integration of models (4), and integration of methods (23).

Interaction	Interaction is the communication between two or more individuals or groups. Real behavior is a function of continuous, interactive and multidimensional processes between the individual and the situations faced. From Wikipedia In interdisciplinarity, the interactions between people, by establishing relationship and link between several disciplines, not only the integration and efficacy increases, but also provides the ability to eliminate the distances and free space between sciences and meeting the social needs, as a functional knowledge, for which interaction in working group is essential (23).
Coordination	Coordination includes sharing information, resources, and responsibilities; so that they often involve both time and space in achieving a goal. Each party can play its part in supporting a mutual goal. In group work, coordination is in the implementation of a project or assembling something, and is not creating something new (24).
Cooperation	Cooperation means that people share resources and information to achieve a common goal (24). In interdisciplinarity, integration occurs by the collaboration created among group members to solve a common problem and mutual trust (23).
Collaboration	Collaboration is working together to create something new, individuals or groups with a common goal and vision, and seek a solution that goes beyond their limited vision by eliminating their differences (24). In interdisciplinarity, information, data, methods, concepts, or theories of two or more disciplines are used to solve problems, questions or complex issues, for which purpose group work and participation are required (23).
Combination	It is a kind of partnership that crosses the boundaries between the disciplines and no boundaries are visible. In other words, by combination, we mean the removal of the distance between different disciplines, which have different concepts of knowledge, data collection, and their validity (25).
Common discourse	In interdisciplinarity, "common discourse" is a method between experts of disciplines and different knowledge fields, which purposively cross the epistemic and methodological boundaries, using language function, establishing communication between social beliefs and interaction in the social position, so that considering the new necessities and needs, the new cognitive fields, methods, and tools can be achieved to recognize or understand the issues (26-29).
Epistemological Pluralism	Epistemological pluralism talks about no epistemic preference of types of beliefs to the other; different disciplines have different knowledge epistemology or theory. Not preferring a discipline or an epistemological view leads to a more comprehensive understanding of issues. Linking the perspectives of disciplines need to engage more actively with the norms and processes of science in the development of interdisciplinary research, which is known as epistemological pluralism (20).
Analysis	Analysis is a set of small parts to better understanding. In other words, analysis, can also be data analysis to get a more complex result (30).
Networking	Networking is an organized way to establish a connection between individuals, whose relationship is formed with specific goals and objectives (31). It can be hoped that with a more active integration of knowledge, ideas, research methods, techniques/training resources, a new form of cooperation is formed between the individuals and groups of network that causes thematic focus and solves the problem (32).
Pluralism Methodology	Interdisciplinarity, in addition to pluralism epistemology, implies a kind of pluralism epistemology and methodology. In interdisciplinarity, the possibility of diverse and nonspecific interpretations is considered an obvious issue. On the one hand, the epistemological and methodologic boundaries of each discipline is opened; on the other hand, disciplinary sciences also cross from one discipline to the other (8, 25).

Goal of Interdisciplinarity

Answering a question and solving a real problem not solvable by one discipline	Repko considers the goal of interdisciplinarity as the process of answering a question, solving a problem, or examining an issue that is so broad or complex that it cannot be properly investigated by one discipline (21, 22).
Paying attention to an extensive or complex issue	Klein considers the goal and focus of interdisciplinarity to address extensive or complex issues (2, 18).
Upgrading the fundamental understanding	Klein and Newell have considered one of the goals of interdisciplinarity as promoting fundamental knowledge (2).
Creation of a new knowledge	Tress and colleagues consider the goal of interdisciplinarity, which involves the integration of several unrelated academic fields, as the production of new knowledge and theory and the achievement of a common research objective (25).
Deeper and more comprehensive understanding	Stock, Burton, and Teres et al. consider the goal of interdisciplinarity as creating a more comprehensive perspective to discover a solution to a problem or an issue (9, 25, 33).
Increase the cognitive ability	Veronica Boix Mansilla consider the goal of the interdisciplinarity as the cognitive promotion (such as explanation of a phenomenon, solving a problem, creating a product, or the designing new questions) (22).
Creating a new product	
Explaining a phenomenon	
Designing a new question	

Levels of Integration of interdisciplinarity

Disciplinary	At this level of integration of disciplines, there is no interdisciplinary integration. However, the boundaries of disciplinary are dynamic and variable, and research in this field is carried out with common aspects and a particular purpose, or to answer a specific research question (25).
Multidisciplinarity	At this level of integration of disciplines, each discipline examines the subject or problem from its point of view and the integration of results and multi-disciplinary findings on an issue or problem, occurs with maintaining boundaries of disciplines without formation of new theories (25).
Interdisciplinarity	At this level of integration of disciplines, the integration of several unrelated academic disciplines take place with a systemic approach, focused on crossing boundaries of disciplines to generate new knowledge and theory and to achieve a common research goal (25).
Transdisciplinarity	This level of integration of disciplines, not only involves the integration of several disciplines, but also researchers from academic and non-academic disciplines such as managers, and the general public, in other words, transdisciplinarity involves the within-science collaboration between different disciplines and fields, and the collaboration between science and society to address the social problems, and enable mutual learning processes between science and society (25, 34).

Table 2: Reasons for lack of necessity for some of the attributes

Nature	
Procedural	The nature of the process refers only to the practical dimension of interdisciplinarity.
Instrumental	The instrumental nature of interdisciplinarity refers only to the organization of practical work, and its elimination creates no defect in analytic definition.
Methodological	The methodological nature of interdisciplinarity varies depending on the type of selection and the levels of integration.
Conceptual	The conceptual nature of interdisciplinarity involves the organization of information and cognitive aspect, which is the prerequisite for interdisciplinary work.
Philosophic	The philosophic nature of interdisciplinarity refers only to fundamental concepts, not the relationships between variables in different disciplines.
Ideological	The ideological nature of interdisciplinarity is a set of beliefs and ideas that create a new worldview. By eliminating it, there would be no defect in analytical definition and creation of interdisciplinarity.
Integration	
Intuitions	There is not always integration of intuitions in interdisciplinarity. For example, in multidisciplinarity, we do not integrate intuitions.
Data	Data integration is not an essential feature of interdisciplinarity.
Information	Integration of information does not necessarily happen in interdisciplinarity.
Techniques	The integration of techniques is not always done in interdisciplinarity.
Terms	Integration of terms is not obligatory at different levels of interdisciplinarity.
Thinking	Integration of thinking occurs at high levels of interdisciplinarity and interdisciplinarity is created in its absence.
The method	
Cooperation	The cooperation method does not arise at all levels of interdisciplinarity.
Coordination	The coordination method does not arise at all levels of interdisciplinarity.
Combination	The combination method does not occur at all levels of interdisciplinarity.
Epistemological pluralism	The method of epistemological pluralism is not obligatory in the creation of interdisciplinarity.
Networking	The networking method usually occurs at the level of transdisciplinarity.
Methodological pluralism	Methodological pluralism does not always occur in the creation of interdisciplinary.
Goal	
Promoting basic understanding	Promoting basic understanding does not necessarily occur in interdisciplinarity.
Creating new knowledge	Creating new knowledge will only arise when the existing disciplinary knowledge is not capable of confronting the new challenge and this goal will not occur at all levels of interdisciplinarity.
Increasing the ability of understanding	Increasing the ability of understanding is not always required, for example, in a few disciplines, this goal will not be achieved.
Creating a new product	We will not always have creation of a new product in interdisciplinarity.
Explaining a phenomenon	Explaining a phenomenon does not always happen in interdisciplinarity.
Designing a new question	Designing a new question does not always occur in interdisciplinarity.

Model Case and the Substitutes

A model sample is a pure example of the studied concept and should have all the distinctive characteristics (5).
"Poverty elimination" is considered an example of a model for the concept of interdisciplinarity. The World Economic Forum reported the status of poverty in 82 developing countries of the world, in a report based on 2012 statistics. According to this report, Iran's poverty ranked
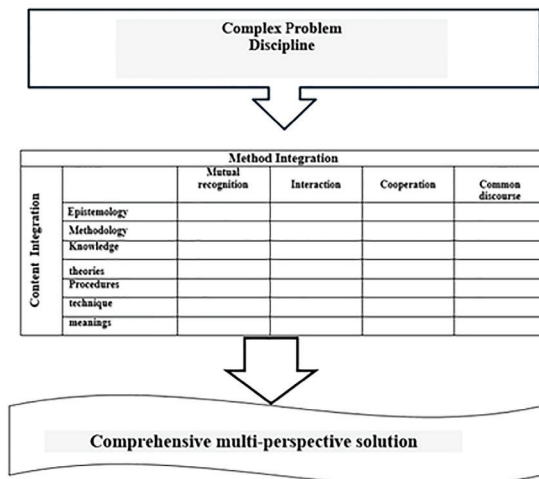
Figure 2: A Conceptual Model for Interdisciplinarity

58th among 85 developing countries in the world. According to the national official statistics and latest surveys, 11% of Iran's population were below the absolute poverty line and 30% below the poverty line.

The President stated in his the first news conference after the 2017 election: "We will eradicate absolute poverty by 2021". This target has been one of the most important economic concerns of the country over the past decades; accordingly, the President ordered that a working group in the program management and budget management organization be formed under the supervision of various academic departments (economist, sociologist, politician, anthropologist, psychologist and health specialist) to create the appropriate solution and mechanisms to reduce poverty. At the first working group meeting in November 2017, each of the participants in the working group expressed, defined, and solved poverty from the view of their expertise. For example:

Mr. A. as an economist:

The perception of poverty in his view included failure to meet the basic needs and life requirements such as food, clothing, housing, health, lack of necessary income to buy basic and essential supplies, and considered the solution to poverty by reducing the government's intervention in the economy, reduced restrictions in the business sector, reduced inflation, fair distribution of income, and the alignment of revenues and expenditures.

Mr. B. as a sociologist:

He described poverty as a complex and unequal problem in distribution of valuable social resources such as wealth, power, science, dignity, reputation and respect, and considered the mechanism of solution proportionate to the dimensions and levels of the social system, social and political modernization.

Mr. C. as a politician:

Poverty is defined as the condition in which democracy, political participation, and the law do not effectively take place in the country that leads to the loss of the limited economic resources and the appropriation of wealth in the hands of the rich; so that the poor have neither voice nor place in the society. And considered the appropriate solution as the activism of the parties and creating a healthy competitive environment between political groups.

Mr. D. as an anthropologist:

Poverty limits all human development efforts and causes lack of individual communications, social inequalities and civic participation, resulting in ruling of the power-seeking and money-saving culture. To reduce poverty, he suggested preventing the conquest of politic culture, and adherence to ethical principles and religious beliefs.

At the end of the first working group session, the members concluded that, if participants consider the issue with a specialist viewpoint, undoubtedly, the systemic identity of the issue and multi-dimensionalism of poverty will be neglected, which will cause harm, interruption and discontinuity of the concept of poverty. Therefore, in order to approach the opinions of specialists of different disciplines and to understand the relationship between the above mentioned concepts, the adoption of an interdisciplinary approach can be constructive, so that participants would lead the negotiation and continue work in the workgroup by avoiding their ideological stance. To reach the viewpoints of specialists in other fields and

understand the relationship between the stated concepts, interdisciplinarity approach could be constructive so that the participants distant themselves from their ideological perspective and proceed in the work group.

For this reason, the following suggestions were put forward as the agenda for the upcoming meeting:

1. The working group accepted that the issue of poverty was complex and multidimensional

2. The working group adopts the transtheoretical approach to eradicate poverty in the country.

3. This working group was committed to design an interdisciplinary glossary for greater knowledge about other disciplines.

4. The working group agreed to use a wide range of methods, including common research methods in the fields of economics, sociology and anthropology, to summarize information on the current state of poverty in the country.

Table 3: Case comparison with the interdisciplinary concept definition characteristics

Row	Example	The main domains	Representative characteristics	Confirming the qualification
1	Poverty has a complex and multidimensional approach	Nature	Complex approach	✓
			Multidimensional approach	✓
			Systematic approach	✓
2	The working group uses a wide range of methods, including common research methods in the fields of economics, sociology and anthropology to sum up information on the current state of poverty in the country.	Integration	Epistemology	✓
			Methodology	✓
			Technique	
	Providing Poverty Guideline with the help of prominent professors from different disciplines to summarize, synthesize, and transfer knowledge about poverty from the perspective of other disciplines.		Knowledge	✓
	The adoption of the theoretical approach as an approach to eradicate poverty in the country		Theory	✓
	Designing an interdisciplinary glossary for further understanding with the view of other disciplines		Concepts of different disciplines	✓
3	Creating a forum for interaction and critical discourse with the cooperation of various experts to organize the National Dialogue on Poverty Reduction.	Methodology	Mutual recognition	✓
			Interaction	✓
			Cooperation	✓
	To promote, form, and understand the concept of poverty in the country, the Poverty Reduction Conference will be held.		Common discourse	✓
			Multidimensional analysis	✓
4	Knowledge reorganization Based on new interactions and exchanges between disciplines.	Levels	It creates a spectrum of multidisciplinarity to transdisciplinarity.	✓
5	To explain, analyze, and illustrate the issue of poverty, concerns and priorities must be considered from the perspectives of various disciplines and any action to develop a poverty eradication policy package in the country should be taken following the development of a comprehensive view and vision towards the issue of poverty.	Goal	Innovating multidimensional and comprehensive solution	✓

5. The working group accepted to prepare the Poverty Guideline with the help of professors from different disciplines to summarize, synthesize and transfer knowledge about poverty from perspectives of different disciplines.

6. The working group, accepting the differences of different fields' view on poverty, agreed to provide a forum for critical discourse and view exchange in cooperation with various experts, and thus organize poverty by this national dialogue.

7. The working group agreed to set up a Poverty Reduction Conference to promote, formulate and understand the concept of poverty in the country.

Therefore, the interactions between the working groups provides the basis for creativity. The members of the working group obtain a new understanding and perspective of the issue and reach a mutual understanding of the issue. This new understanding is considered as a tool for presenting the new solution. Among the various solutions, the group present a new solution that could be one of the selected ones or a combination of different solutions.

In the following section, the selected model is compared in the Table 3 in details with the functional fields and features of the interdisciplinary concept.

Walker believes that we can expand our understanding of the concept by studying some of the similar or different concepts. These characteristics include borderline, related, and contrary (5).

Borderline Examples

Borderline examples are examples that include some and not all of the characteristics of the concept. Cross-disciplinarity can be considered a borderline case of interdisciplinarity concept. For example, a group of economists addressed the issue of poverty reduction to explain the concept of poverty problem. One of the experts proposed the solution of using the conventional method in the field of nursing, named "conceptual analysis". In

this economical approach, it is not necessary to study the nursing discipline, and to solve your problem, the concept analysis method will be used, which is borrowed from the nursing field. So the introduced example is a borderline model that incorporates some of the characteristics of the concept.

Related Examples

These examples are those that lack the defined characteristics of the concept and are similar to the intended meaning. This similarity causes mistakes in the definition of the concept.

Translational studies use the findings of basic science to promote human health and social welfare. In the field of medicine, the purpose of translational research is to apply the findings of fundamental research in the clinical field (36). For example, in translational research, one integrates basic science with clinical science within a discipline. Translational research can be considered a related example that is similar to the intended concept, but does not include the characteristic of the concept nor merges disciplines.

The Contrary Examples

The contrary cases, in fact, "do not have the characteristics of the concept". The contrary cases are usually very useful to the analyst and their differences are clear from the original concept.

If we focus on the poverty reduction only from the aspects of social disasters, we will need social science professionals such as social planning, welfare and social and cooperation, anthropology, who will all use knowledge, concepts and methods within a scientific field. Therefore, intradisciplinarity is an approach that does not have all the representative characteristics and is therefore considered a contrary example.

7. Identifying the precedents and antecedents

The precedents are those events that must precede the emergence of the concept and antecedents are events that have to occur after the emergence of the concept (5).

The precedents of the interdisciplinarity concept include complex problem and discipline, and the antecedents include comprehensive multidimensional solution.

8. Definition of experimental references

Walker and Avant believe that experimental references are categories and divisions of a phenomenon; in their presence, the occurrence of a concept can be observed. These references are the answer to the question of how to identify or measure the representative characteristics of the concept in the real world (5).

Using rich reports of SciVal, designed in four areas of overview, benchmarking, collaboration and reporting, the research function of a researcher, organization, country, region, journal, research group, and etc. can be evaluated.

For example, an interdisciplinary assessment of "research function" by studying cross-citation analysis, as a very important criterion of scientometrics, depicting the thematic structure of different disciplines and creating the emergence of new scientific disciplines through the discovery of interdisciplinary citation relationships, can be introduced as an experimental reference.

Definition of Interdepartmental Analysis

Interdisciplinarity is an approach aimed at creating a more comprehensive understanding for facing a question or a complex and extensive problem in the real world through the integration of epistemology, methodology, knowledge, theory, discipline, technique, and concepts of different disciplines arising through mutual knowledge, interaction, collaboration, common discourse, and multi-dimensional analysis. Interdisciplinarity, in terms of the degree of integration and generalization, is placed within a multiplicity, inter, and transdisciplinarity.

Discussion and Conclusion

Based on Walker and Avant's model, the concept of interdisciplinarity was addressed for a comprehensive and clear understanding. The definitions of previous conceptualizations of interdisciplinarity, despite attention to the integration of different disciplines, did not consider the content and method of integration. Our understanding of this analysis is based on the fact that the concept of interdisciplinary has two integrational dimensions in content and in different methods. These two dimensions are completely interdependent and require combination and synthesis of comprehensive perceptions to solve complex and multidimensional problem in the real world. Depending on the application of the multidisciplinary approach and the degree of interaction and communication between them, they can take different forms. The concept of interdisciplinarity lies in a range of merely combining disciplines to full removal of the boundaries between disciplines.

This study, achieving a simple and elegant concept, resolved the differences between the different perspectives in this field and helped us design the theoretical and practical model.

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