



The Role of Appreciation in the Development of Interdisciplinary Teamwork Skills

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Abstract

Interdisciplinary teamwork is essential in addressing complex, global challenges such as climate change, technological advancement, and social inequality. However, effective collaboration across disciplines is often hindered by communication barriers, methodological differences, varying ways of thinking, cultural disparities, and biases. This paper examines these challenges and proposes that fostering appreciation for the unique contributions of each discipline can mitigate these obstacles. Appreciation enhances mutual respect and understanding, promoting more effective and inclusive collaboration.

The paper introduces three methods to cultivate appreciation in interdisciplinary teams: The world without my academic discipline which encourages reflection on the value of each discipline; the method Sieve reflection, which helps participants reflect on the interdisciplinary process and the contributions of each discipline to the final outcome; and Interdisciplinary candy distribution, which enables team members to express gratitude towards others. These methods foster interdisciplinary team competence by deepening participants' understanding of how each field contributes to solving complex problems.

By incorporating these methods, educators and team leaders can foster appreciation across disciplinary boundaries. Fostering appreciation for diverse perspectives and methodologies not only mitigates the challenges of interdisciplinary collaboration, but also encourages innovation, mutual respect, and a more holistic approach to problem solving. Ultimately, this paper argues that appreciation is critical to creating inclusive and effective interdisciplinary teams capable of addressing the multifaceted problems of the 21st century.

Keywords: Interdisciplinary teamwork; Interdisciplinarity; Interdisciplinary learning; Appreciation; Challenges; Higher Education; Methods

Introduction

In today's increasingly complex and interconnected world, the challenges we face –ranging from climate change and global health crises to technological advancements and social inequalities – are multifaceted, requiring solutions that transcend the boundaries of any single discipline [1]. Addressing these challenges effectively necessitates a collaborative approach that integrates diverse perspectives, expertise, and methodologies [2-7]. As such, interdisciplinary

teamwork has become essential, not only in professional environments but also in the broader context of societal problem-solving. Higher education institutions play a critical role in preparing students for the demands of the modern workforce. Yet, traditional educational models, often siloed within specific disciplines, are no longer sufficient to equip graduates with the skills necessary to navigate and contribute to complex, real-world scenarios [8-11]. Interdisciplinary teamwork fosters critical thinking, creativity, and

innovation by encouraging students to draw upon and synthesize knowledge from various fields. It cultivates a holistic understanding of issues, enhances interdisciplinary competences [12], and promotes innovation [13]— both highly valued in today's dynamic job market [3,14].

Moreover, as industries increasingly prioritize collaborative and interdisciplinary approaches to problem-solving, there is a growing expectation for graduates to be proficient in working within diverse teams. Higher education institutions must therefore evolve to offer curricula and experiences that emphasize interdisciplinary collaboration, ensuring that students are well-prepared to meet the challenges and opportunities of the 21st century [15,16].

In addition to the advantages associated with interdisciplinary collaboration, there are also a number of challenges inherent to this approach. The existence of different professional languages, cultures, working methods, and interests frequently gives rise to interdisciplinary conflict. The present paper puts forth the proposition that the fostering of interdisciplinary appreciation may serve to mitigate the aforementioned challenges by way of supporting mutual respect and understanding. The initial section of this paper addresses the typical challenges encountered in interdisciplinary teamwork. Secondly, we delineate the potential function of appreciation in alleviating these challenges. Thirdly, three methods are presented: the world without my academic discipline, the sieve reflection method, and interdisciplinary candy distribution. These enable team members to reflect on disciplinary contributions by both their own discipline and other disciplines, thus developing interdisciplinary appreciation across different academic fields. Finally, conclusions are drawn to support educators and team leaders in designing successful interdisciplinary teamwork environments by enhancing students' or team members' interdisciplinary teamwork skills in appreciation.

Challenges in Interdisciplinary Teamwork

Interdisciplinary teamwork, while valuable for addressing complex problems, presents several challenges that can hinder its effectiveness. These challenges often stem from differences in professional languages, methodologies, ways of thinking, cultural backgrounds, and inherent prejudices and stereotypes among team members.

Communication: Communication barriers are one of the most common obstacles in interdisciplinary teams [17,18]. Each discipline often has its own specialized language, jargon, and terminology, which can lead to misunderstandings or misinterpretations among team members [19]. Additionally, different disciplines may prioritize different aspects of communication, such as the precision of data in scientific fields versus the narrative emphasis in the humanities [20,18]. These differences can make it difficult for team members to effectively share ideas, understand each other's contributions, and collaborate efficiently.

Methodological Differences: Interdisciplinary teams frequently encounter challenges related to the varying methodologies employed by different academic fields [21,22]. Each discipline typi-

cally has its own set of research methods, analytical tools, and standards of evidence. For example, the natural sciences methodology emphasizes empirical data and experimentation, while fields like sociology might rely more on qualitative analysis and case studies. These methodological differences can create friction when team members attempt to integrate their findings into a cohesive whole, as they may struggle to reconcile different approaches or agree on what constitutes valid evidence.

Differences in Ways of Thinking: Team members from different academic disciplines are likely to be in different "thought worlds" [23]. Academics who studied any given discipline for a long time develop a tendency to address all problems and situations with the dominant logic paradigm of that particular discipline. This includes how they process information [23,24] and how they interpret processes, novel situations, opportunities and challenges [25]. For instance, engineers may focus on practical, solution-oriented approaches, while philosophers might emphasize theoretical considerations and ethical implications. These divergent cognitive styles can lead to conflicts in problem-solving approaches and decision-making within the interdisciplinary team. When members prioritize different aspects of a problem or approach it from fundamentally different angles, it can be challenging to find common ground and work towards a unified solution.

Cultural Differences: Different academic cultures can further complicate interdisciplinary teamwork. Academic cultures vary significantly across disciplines, with different expectations regarding collaboration, hierarchy, and work habits [26]. For example, some fields may value individual achievement and competition, while others emphasize collaboration and collective success. Additionally, the academic cultural backgrounds of team members can influence their communication styles, attitudes towards authority, and expectations for group dynamics. These differences can lead to misunderstandings, miscommunication, and conflict within the team.

Prejudices and Biases: Prejudices and biases are another significant challenge in interdisciplinary teamwork. Team members may hold preconceived notions about the value or validity of other disciplines, often based on stereotypes or a lack of understanding [27]. Exemplary, Engineers are often perceived as pragmatic, unacademic, and technocratic, yet they are also regarded as enthusiastic and creative. Historians are frequently depicted as patient, bookish individuals, while physicists are commonly viewed as intelligent, yet they are also seen as introverted, incomprehensible, and narrow-minded. These biases can lead to a false expectation, lack of respect, and a reluctance to fully engage with or integrate the contributions of other disciplines. Overcoming these prejudices is essential for fostering a truly collaborative and productive interdisciplinary team.

In summary, interdisciplinary teamwork is fraught with challenges related to communication, methodological differences, ways of thinking, cultural backgrounds, and biases. Addressing these challenges requires intentional efforts to foster mutual understanding, respect, and appreciation among team members, enabling them to work together effectively towards common goals.

Appreciation and Interdisciplinary Teamwork Skills

Appreciation plays a critical role in mitigating the challenges of interdisciplinary teamwork by fostering respect, understanding, and collaboration among team members [28-31]. By valuing the unique contributions of each discipline, team members can overcome communication barriers, methodological differences, divergent ways of thinking, cultural disparities, and biases. Appreciation for interdisciplinary teamwork manifests in various forms. These include a general appreciation for the value of other academic disciplines, an appreciation for the unique perspectives and insights they offer, an appreciation for the opportunity to learn from and engage with other academic disciplines, an appreciation for their contributions to interdisciplinary teamwork, and an appreciation for the interdisciplinary approach itself.

Nikitina [31] emphasizes that developing an appreciative attitude towards other discipline-based “stories” and frames of reference is essential for becoming interdisciplinary competent. This competence involves not just a general understanding of different disciplines but a deeper comprehension of how each element within a discipline contributes to its insights into complex problems. A qualitative collection of experiences with interdisciplinary projects by Epstein [29] outlines appreciation as a personal competency for interdisciplinary work. Lattuca et al. [30] further highlight that appreciating different disciplinary perspectives is a key aspect of interdisciplinary competence. Individuals who value exploring topics outside their expertise and enjoy considering how various fields approach the same problem are better equipped to recognize the limitations of a monodisciplinary education. This recognition is crucial for understanding what can be “borrowed” from other disciplines when tackling complex issues and questions, thus enhancing collaborative problem-solving. Research by Claus and Wiese [28] underscores that appreciation and interest in other disciplines are foundational components of interdisciplinary competence. They found that these elements share a common motivational underpinning, with appreciation encompassing the valuation of diversity and the serious consideration of different approaches and methods. These attitudinal prerequisite eases collaboration by creating an environment where diverse contributions are respected and integrated. Moreover, Misra and colleagues [32] demonstrate the importance of fostering appreciation for interdisciplinary collaboration as a valuable learning experience. Their study revealed that students who engaged in interdisciplinary work reported broadened perspectives on science, an openness to new possibilities, and an enhanced ability to approach problems from multiple perspectives. This experience not only enriched their understanding but also sparked a strong interest in future interdisciplinary research and collaborative projects.

Appreciation can be essential for overcoming the inherent challenges of interdisciplinary teamwork. By cultivating an attitude that values the contributions of all disciplines, teams can reduce communication barriers by encouraging respect for different terminologies, fosters openness to diverse methodologies, allowing for

the integration of varied research approaches [33]. Appreciation can also support reconciling differences in ways of thinking, cultural differences, and premature prejudice by promoting openness to new possibilities. Additionally, valuing the contributions of all disciplines involved can create a more inclusive and effective interdisciplinary team environment. In short, fostering appreciation enhances interdisciplinary collaboration by promoting understanding, respect, and inclusivity.

Methods to Enhance Interdisciplinary Appreciation

Enhancing appreciation is critical for fostering effective collaboration and innovation within interdisciplinary teams. To this end, several methods have been developed with the aim of enhancing participants’ comprehension of the value that each discipline contributes to the collective endeavor. One such method, the world without my academic discipline, encourages participants to reflect on the unique contributions of their own field. Another approach, the Sieve reflection method, facilitates the evaluation of the interdisciplinary process by enabling participants to reflect on the generation and integration of ideas, thereby highlighting the contributions of each discipline to the collective outcome. Lastly, the Interdisciplinary candy distribution method offers a creative way for participants to express gratitude toward members of other disciplines, reinforcing mutual respect and appreciation within the team. Collectively, these methods can contribute to a deeper understanding and appreciation of the diverse perspectives and expertise that drive successful interdisciplinary collaboration.

The world without my academic discipline: Effective interdisciplinary collaboration hinges on mutual appreciation among team members from diverse academic backgrounds. The specific content, methodologies, and prior findings within each discipline are frequently unfamiliar, hindering the ability to fully comprehend the value of each discipline. While one may possess a general understanding of the subject matter in another discipline, the intrinsic value of that discipline to society or to the individual may not be immediately apparent. This is where the method The world without my academic discipline [34] can prove invaluable.

As an initial step, all team members engage in independent reflection. The objective is to envision a world in which their respective disciplines have never existed. This world is visualized individually by the participants. The participants may choose to illustrate relevant elements of their world or to describe them using keywords. It is often beneficial to record or write down the elements of the world that would not exist today without the discipline in question and then to cross them out. This process of reflection and creativity can be supported by the following questions:

- What are the most significant socially relevant achievements of my field of study?
- How would humanity live, think, and work today if these achievements had not existed?
- What things would be missing from everyday life if the findings or inventions of my discipline had not existed?

- What would the world of science look like today if my discipline or the findings of my discipline had not existed?
- What difficulties or relief would people have today without my discipline?
- What problems (including ethical ones) might not have arisen or become visible without my discipline?

Subsequently, the participants' visualizations are displayed in the room. All participants now have the opportunity to look at the worlds of the other participants, ask and answer questions. At this juncture, the instructor may facilitate a plenary discussion. The following questions may prove beneficial:

- What was new to you or surprised you?
- What can be added in the individual worlds?
- Which world would you most like to live in?
- Which world would you not want to live in at all?

The method the world without my academic discipline allows participants to engage in reflection and communication regarding the added value of their own discipline. Additionally, it facilitates an understanding of the essential disciplinary objects of other disciplines, fostering appreciation for these concepts.

Sieve reflection: Following the completion of the joint interdisciplinary work process and the subsequent generation of a joint interdisciplinary and integrated result, it is not uncommon for team members to be uncertain as to the provenance of specific content, given the multiplicity of disciplinary inputs. In the context of the variety of perspectives, methodologies, models, and theoretical frameworks inherent to the various scientific disciplines, it is not uncommon for individuals to become overwhelmed and lose sight of the bigger picture. The creation of interdisciplinary solutions necessitates a certain degree of autonomy. Conversely, this process can occasionally result in a lack of structure and coherence [35], which can be addressed through the use of the sieve reflection method [34]. The phenomenon of profession-centrism, defined as the overestimation and overvaluation of one's own discipline [36], can also result in team members failing to actively perceive and underestimate the input of other disciplines in interdisciplinary work. It is therefore crucial to reflect on the process of idea generation and the interdisciplinary, integrated result in terms of its origin and composition following the joint work.

In the sieve reflection method, a metaphorical sieve is employed to distinguish between the contribution of one's own discipline and that of another to the joint result, facilitating a more detailed examination of the latter. The following reflection questions may prove beneficial in this context.

- What would the result have been if there had been no input from the other discipline?
- What ideas would we not have come up with without the input from the other discipline?

- Which elements of the result can be attributed to the other discipline?
- Which ideas were developed today based on content that was taught by members stemming from another discipline of the team?
- Which new methods stemming from other disciplines were learned today that could be linked to the team's approach?

When answering these questions, participants should consider both their own ideas and those of the interdisciplinary group, especially the contribution by members of other academic disciplines. This distinction supports a holistic view of the innovative interdisciplinary learning and work process.

Interdisciplinary candy distribution: Another method to foster interdisciplinary appreciation is interdisciplinary candy distribution [34]. Following the joint working session, the team members engage in a reflective process to evaluate their collective efforts. Each individual considers the knowledge gained from the other discipline, the aspects of the other discipline that were particularly intriguing, and the explanations provided by the other discipline that were especially effective. There is a large bowl of sweets in the middle of the room. Everyone takes as many sweets as they want. Everyone goes around the room at the same time and gives their "compliments" or "thank you" in the form of a sweet to a representative of the other discipline. The following questions may prove useful in formulating a suitable compliment or expression of gratitude.

- What have I learned from my colleagues in the other discipline?
- From whom did I gain a new insight today based on the content that they taught me?
- From whom did I learn something new today?
- With whom did I engage in effective interdisciplinary communication?
- Which individual demonstrated the ability to effectively integrate disparate disciplinary perspectives?
- With whom did I experience successful interdisciplinary cooperation?
- Which individual introduced me to a novel methodological approach today?
- Who made me, or my discipline feel particularly valued?
- Who offered a novel perspective today, whether pertaining to my own discipline, another discipline, or a specific topic?

Since representatives of a discipline often identify very strongly with their own discipline [37], appreciation of one's own discipline is often also understood as appreciation of one's own person. Compliments regarding interdisciplinary behavior - whether in communication or cooperation - can act as a reinforcement of this behavior and thus strengthen the interdisciplinary team in its cooperation.

Conclusion

In today's interconnected world, interdisciplinary teamwork is essential for addressing complex global challenges. However, the effectiveness of such collaboration is often hindered by communication barriers, methodological differences, divergent ways of thinking, cultural disparities, and biases. As this paper demonstrates, fostering appreciation for the unique contributions of each discipline is crucial in overcoming these obstacles. Developing an appreciative attitude allows team members to respect diverse perspectives, methodologies, and cultural backgrounds, leading to more effective and inclusive collaboration.

By employing methods such as The World Without My Academic Discipline, Sieve Reflection, and Interdisciplinary Candy Distribution, educators and team leaders can cultivate appreciation within teams. These methods help participants reflect on and recognize the value of their own and others' disciplines, thus enhancing interdisciplinary team competence. Ultimately, fostering appreciation not only mitigates the challenges of interdisciplinary teamwork but also promotes innovation, mutual respect, and successful collaboration, preparing students and professionals to effectively tackle the multifaceted problems of the 21st century.

Recommendations

We recommend the application of the method The world without my discipline at the beginning of interdisciplinary teamwork. This supports the awareness of other disciplines' relevance right from the start. The methods Sieve reflection and Interdisciplinary candy distribution function best after an interdisciplinary team work session. Following the collaboration, all team members can reflect on their newly acquired understanding of the contributions of other academic communities to the joint working results. The Interdisciplinary candy distribution method allows team members to express gratitude for the contributions of other disciplines through the distribution of gifts that recognize the value of interdisciplinary collaboration. This approach often leads to a sense of personal recognition and appreciation among team members. In contrast, the sieve reflection method tends to prioritize the working process and the professional contributions of individual team members. Both aspects are important in interdisciplinary appreciation, as academics are both individuals and representatives of their respective academic disciplines.

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Conflict of Interest

No conflict of interest.

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