Workshop methods for interdisciplinary teaching

Center for Interdisciplinary Education, University of Oslo

Max Drains Dahl and Fruna Alami

Abstract

This research paper maps and describes workshop methods which can be applied in interdisciplinary settings, such as Design Thinking and fishbowl exercises.
In addition to describing methods in detail, the paper assesses their application to interdisciplinary education, drawing on previous research. It also highlights the limitations of the methods. Through this exploration, the paper presents pedagogical strategies that promote interdisciplinary proficiency. These insights contribute to reshaping traditional teaching methods, emphasizing the potential of workshops to enhance interdisciplinary competence in students.

Introduction

In today's rapidly evolving world, the boundaries between academic disciplines are becoming less distinct. As traditional silos no longer alone can face global challenges and complex problems, the significance of effective interdisciplinary teaching is crucial. Today's graduates should not only possess depth in their respective fields, but also have the ability to move between different subjects. The result of this is a holistic approach which is important to confront multifaceted issues.

Interdisciplinary teaching stands as a response to fulfil this requirement, offering a new way of teaching that goes beyond traditional teaching. It forges pathways for engagement between students from various academic fields, helping them handle real-life scenarios that require different viewpoints and expertise. This methodology encapsulates a significant paradigm shift, acknowledging that today's challenges require a combination of ideas and competence from different domains.

This paper delves into the realm of interdisciplinary teaching, focusing on presenting workshop methods from research literature. Through an exploration of practical approaches, we want to uncover how these methods can help develop interdisciplinary proficiency in students. By mapping and describing these techniques, we aim to contribute to the ongoing discourse surrounding interdisciplinary education and its role equipping students to confront the demands of both present circumstances and future endeavours.

Design Thinking

What is Design Thinking?

Design Thinking is a non-linear and iterative process inspired by how designers solve problems, and is a method often used in teamwork and problem-solving work (Han, 2022). The process involves understanding and defining problems, considering stakeholders' interests, making assumptions, redefining problems, and creating solutions that are prototyped and tested. To adopt a designer's mindset, it's often necessary to integrate knowledge and skills from diverse fields. This is because designers often address complex problems that transgress traditional disciplinary boundaries.

In short, Design Thinking is usually structured to contain five phases (Wolniak, 2017). These are *Empathize, Define, Ideate, Prototype,* and *Test*. We will explain these stages further.

Stage 1 – Empathize. This stage is about empathizing with users and stakeholders, in order to better understand their needs. Thus, the team identifies the attributes of the individuals for whom the product is intended by conducting thorough observations, interviews, or surveys. During this phase, it's important to set aside one's own assumptions about the problem to ensure an authentic and unbiased understanding of users and their requirements.

Stage 2 – Define. The team should then analyze the information gathered in stage 1, identify the most important insights, and use this information to pin down and clearly formulate the users' needs. Based on this, one should draw up a brief of the requirements of the situation. It is important in this stage not to move too quickly into concretization as this might lead to the team working on solutions that are known to them. Instead, the team can ask themselves questions such as "Do you understand what the client is asking for?" and "Do you agree on the definition of terms?" in order to make sure the solution will properly meet the situation and the users' needs (Wolniak, 2017).

Stage 3 – Ideate. Then the aim is to generate as many ideas as possible. Using techniques such as brainstorming, the teams should consider even the most improbable suggestions and refrain from critique (Wolniak, 2017). Then they can select the best idea based on the information they have. It will become apparent whether the project description is sufficient and whether any aspects of the situation were ill-defined.

Stage 4 – Prototype. During this phase, the teams should engage in experimentation with their built-up knowledge and construct one (or multiple) prototypes of the proposed solution. The main aim of the prototype is to visually communicate the solution to the users, and thus the team can check whether the solution aligns with the requirements of the users.

Stage 5 – Test. In the final stage, the team should test the prototypes by presenting them to the original users. The aim is to evaluate how effectively the product operates within its intended environment. If the prototype is found to not meet all requirements, the team should use this information to define these further problems which again can be implemented in a new prototype and retested.

Research on Design Thinking and Interdisciplinarity.

Using Design Thinking in interdisciplinary workshops can help students understand each other's points of view and overcome disciplinary barriers (Allabarton, 2022). Design Thinking can be used in interdisciplinary education by creating teams of students from different disciplines who together solve practical real-world problems. Throughout the process, students learn how to work across disciplines, while also mastering the application of Design Thinking as a method for generating innovative solutions. Given the rise of increasingly complex challenges, proficiency in Design Thinking and similar innovative approaches has gained significant relevance. For this reason, such competence is also becoming more sought after by employers. Teaching students Design Thinking will therefore give them career capital, as well as enable them to address complex problems in the future. In a study exploring the student/tutor relationship in design pedagogies across different disciplines, Shreeve & Batchelor (2012) found that the teachers also experienced design-based tutoring with multidisciplinary student groups as beneficial, as such an approach led to more creative thinking around the educators' own home discipline. Thus, the educators were themselves exposed to new perspectives, opinions, and understandings.

Criticisms against Design Thinking

An article published in Harvard Business Review, Natasha Iskander argues that the main issue with Design Thinking is that it is fundamentally conservative – it is "at its core, a strategy to preserve the status quo (…)" (Iskander, 2018). Rather than being as innovative as people make it out to be, Iskander argues that Design Thinking stems from an earlier problem-solving method called the "rational-experimental" approach to problem solving. A shared feature of these approaches is that they turn problem-solving into a "rarified practice" which is available only to those who follow a specialized methodology (Iskander, 2018).
The Design Thinking process further privileges the designer by positioning her as the "instrument which turns messy ambiguity into the clean lines of an elegant solution" (Iskander, 2018). The inarticulateness of the initial input is thought to exempt her from accountability for her design choices. Additionally, there is the obvious problem of designer subjectivity in the "empathize" stage. As this subjectivity is unnamed, however, the Design Thinking process "signals that the designer, as a creative visionary, is somehow suspended above the fray of bias, blind spots, and political pressure" (Iskander, 2018).
By rarifying the problem-solving practice and privileging the designer, the Design Thinking process protects and serves the powerful, rather than the people who truly need service. It

limits participation in the design process to a non-representative population, which again hinders truly innovative solutions. For these reasons, Iskander argues, it is poorly suited as a method for approaching the complex problems we face today.

Another critique comes from Lee Vinsel, who argues that Design Thinking might give students "an unrealistic idea of design and the work that goes into creating positive change" (Vinsel, 2018). They might believe that through the Design Thinking methodology they are solving real-world problems or creating innovative design. In actuality, however, students develop no specific expertise, and they thus gain "creative confidence without actual capabilities" (Vinsel, 2018). This can lead to a discrepancy between students' understanding of users' needs on the one hand, and users' actual needs on the other, and can thus result in "solutions" that are unfit for the problem at hand.

Fishbowl Method

What is the Fishbowl Method?

The Fishbowl Method represents a discussion technique aimed at fostering meaningful and interactive dialogues in educational and professional settings. The method evolved as a strategy for discussing literature, involving a circular arrangement where inner-circle students engage in discussion while the others observe (Priles, 1993). Currently, the method is employed to create an interactive setting which can enable interdisciplinary learning.

As a teaching approach, the method encourages active participation and attentive listening in discussions. At the core of the method is its *format*. Participants are divided into two circles – an inner circle and an outer circle. The terminology "fishbowl" draws its inspiration from the analogy of observing fish within an aquarium, in a manner not unlike one group of students observing another smaller group (Brozo et. al, 2007). Individuals within the inner circle actively partake in discussions pertaining to the subject, while those situated in the outer circle adopt a receptive stance, where they listen and prepare questions and comments for the discussants (Brozo et. al, 2007). Regular rotation of these roles is implemented to guarantee active involvement of every student in discussing, listening, and posing inquiries. A facilitator is chosen to guide the conversation, which in an educational setting can be a teacher or a selected student.

There are different ways of conducting a fishbowl discussion. However, some components are crucial to ensure the efficacy and integrity of the process. Brozo (2007), proposes a series of steps involved in the implementation of the Fishbowl Discussion method:

Step 1 -Topic Selection. Start with identifying the topic of discussion. If the goal is to enhance interdisciplinary learning, one should choose a topic that spans across multiple academic fields, where discussion encourages a holistic exploration of complex phenomena.

Step 2 -Peer Discourse. Ask individual students to engage in conversation about the topic with a nearby peer. In this way, students can collaboratively explore the subject before the formal discussion begins.

Step 3 - Fishbowl Format Introduction. Demonstrate the format and expectations of fishbowl discussion. Choose a smaller group with 4-5 participants to sit in the inner circle. The remaining students assemble in the outer circle.

Step 4 - Inner Circle Dialogue. Initiate the discourse by directing the assembled discussants in the inner circle to engage in intra-group dialogue concerning the viewpoints previously articulated during the peer discourse.

Step 5 - Outer Circle Observation. Tell the participants in the outer circle to listen to the participants in the inner circle. They should take notes or write down questions to discuss after the discussion.

Step 6 – Duration. Allow the discussants approximately five minutes for their discussion in the inner circle, intervening only if the discussion dies. Ensure active involvement and a regular rotation of speaking opportunities.

Step 7 - Post-Discussion Analysis. After the small group is done talking or if it's paused, invite the rest of the students to share their thoughts about what they heard during the discussion. They can also ask questions to the people who were talking.

Step 8 - Sequential Repetition. Bring together a new group of students who want to join the discussion or rotate out some of the participants in the inner circle. Repeat the fishbowl method until everyone has participated in the inner circle.

Research on Fishbowl and Interdisciplinarity.

The existing literature on the interaction between Fishbowl discussions and interdisciplinarity is limited. There are however some articles that explore the concept of interdisciplinary learning through the lens of fishbowl discussions. An article by Hofrenning and colleagues (2020) examines the utilization of fishbowl discussions as a means of fostering meaningful dialogue between mathematics and partner disciplines. The article

presents fishbowl discussions as a tool for transcending disciplinary boundaries and promoting collaborative exchanges between the disciplines. This academic exploration illuminates the potential of fishbowl discussions to bridge the gap between diverse fields of knowledge, where a key finding in the article is that the fishbowl discussions helped faculties to see and think beyond their own disciplinary silos and encouraged better communication across disciplines (Hofrenning et al., 2020).

A paper exploring teaching an interdisciplinary class in Urban Charter High School, used Fishbowl discussions to discuss women's equality in the United States (DiCamillo & Bailey, 2016). In the article, two educators collaborated to teach an interdisciplinary English and US history class to eleventh-grade students. The interdisciplinary curriculum improved student engagement and deeper understanding of complex issues (DiCamillo & Bailey, 2016). The Fishbowl discussion method was a part of their teaching approach to discussing women's equality. Even though some of the students' comments showed they did not understand all of the issues discussed during the Fishbowl discussions, students' final essays highlighted that they gained a stronger understanding of the issue of women's equality after completing this assessment.

Criticisms against the Fishbowl method

The fishbowl technique as seen can create interactive discussions with active participation from students. However, there are some recorded problems with the method. A paper discussing the limitations of the Fishbowl method highlights some of the implications of the method (Young, 2007). One of the limitations identified is that students within the inner circle feel pressure as they are constantly in the spotlight, resulting in discomfort and inhibiting their active engagement (Young, 2007). Another problem discussed is that students are hesitant to judge their classmates in the post-discussion analysis because they're afraid of getting criticized and worried that others might judge them too.

An additional consideration is the importance of students taking part in Fishbowl discussions. But for students to get involved, they need to have some understanding of the different topics being discussed. If students don't know much about the subjects being discussed, they might struggle to add meaningful contributions to the conversation. This has the potential to damage the dialogue and inhibit the exploration of different subjects, which can compromise the intended benefits of the method.

Project-Based Learning and Problem-Based Learning

Project-Based Learning (PjBL)

Project-based learning is a learning method that organizes teaching around practical projects or tasks (Solis, 2022) The aim is to give students a more active and engaged learning experience. Students engage with authentic problems, enhancing the method's effectiveness. The method gives students the opportunity to explore, investigate, collaborate, and solve problems. This provides them with a better comprehension of the topic and offers them firsthand experience of functioning in a professional environment. Project-based learning can find applications in various educational settings and is a highly versatile approach that can be adapted to match one's workshop requirements.

Kraicik & Blumenfeld (2005) define project-based learning (PjBL) as a situated and inquiry-based educational approach, based on the "constructivist finding that students gain a deeper understanding of material when they actively construct their understanding by working with and using ideas" (p. 318). While definitions of PjBL vary, Blumenfeld and colleagues (1991), argue that its two essential features of projects are 1) being driven by a question or problem and 2) resulting in the production of products.

How to Use Problem-Based Learning

In practice, PjBL can take a variety of forms. One model proposed by Papandreoun (1994, as cited in Pham, 2018), which is similar to other models (eg. Stoller, 2002) illustrates the process of project work in six steps: *Step 1 Preparation*: The project topic is introduced to and discussed among the students; *Step 2 Planning:* The teachers and students determine their research approach and assign roles; *Step 3 Research:* Students gather information; *Step 4 conclusions:* Students draw conclusions based on data analyses; *Step 5 Presentations:* Students present their final product(s) to the rest of the class; *Step 6 Evaluation:* The teacher(s) assess and give feedback on the students' process.

Project-Based Learning in Interdisciplinary Education

One challenge with interdisciplinary education is that students can struggle to draw connections between and integrate different forms of knowledge (van Someren et al. 1998, as cited by Helle et al., 2006). Helle et al. (2006) suggest that this might be because of students' lack of relevant or adequate models of representation. Referencing a study by Boshuizen and Wiel (1998, as cited in Helle et al., 2006), the authors suggest that *cases* can bridge different forms of representation. Through active participation in project work, students can "see and feel the reality to which difficult concepts and interactions are related" (Helle et al., 2006, p.

294). The connections between disciplines are thus drawn necessarily, as a consequence of the nature of the problem at hand, rather than constructed for the purpose of interdisciplinarity. Blumenfeld et al. (1991) likewise argue that projects can connect subject matters, presenting "an expanded, rather than narrow view of subject matter". (p. 372).

Criticism against Project-Based Learning

In "Peer Evaluation in Blended Team Project-Based learning; What Do Students Find Important?" by Lee and Lim (2012), project-based learning is described as "social loafing". Projects often result in a "smart" student who handles most of the work and makes a quality end product with little collaboration with the rest of the team. The whole point of a project is teamwork (Lee & Lim, 2012). The grade on the end product is not representative of the collaboration and the group engagement, leading to misinformation about the students' competence.

Problem-Based Learning (PBL)

Problem-based learning (PBL) is an educational approach originally developed in the 1950s as a way of preparing medical students for problem-solving in clinical settings (Jonassen & Hung, 2012). It has since been adopted for use in education more broadly. As its name suggests, the method structures learning around *problems*, which should be "authentic" and "ill-structured" (Jonassen & Hung, 2012, p. 488). In this way, learning mirrors the complexity and messiness of the real world. Further, it is student-centered, self-directed, and self-reflective, so the students must initiate and take responsibility for their own learning (Jonassen & Hung, 2012, p. 489).

How to use Problem-Based Learning:

Jonassen and Hung (2012) describe the PBL process as typically involving four steps. In the first step, groups of students (of five to eight) "encounter and reason through the problem" (Jonassen & Hung, 2012, p. 489), narrow it down and define learning goals. They allocate activities and tasks to individual students. The second step consists of self-directed study, where students complete their allocated assignments and prepare presentations for the rest of the group. In the third step, students share their findings and generate new hypotheses based on their collective insight. Finally, in the fourth step, which typically lasts a week, students "summarize and integrate their learning" (Jonassen & Hung, 2012, p. 489).

Problem-Based Learning in Interdisciplinary Education:

Looking at the intentions and principles of both PBL and interdisciplinary education, Stentoft (2017) found that there was a significant overlap between the two perspectives. While disciplinary knowledge remains a central part of interdisciplinary education, the disciplines cannot structure it or be part of its "scaffolding of learning" (Klein, 2006, as cited in Stentoft, 2017). Problem-based learning, which is structured around problems rather than disciplinary paradigms, seems well-suited as an alternative for facilitating interdisciplinary education. Another article suggests that PBL is "interdisciplinary by its very nature" (Vandenhouten et al., 2017), as real-life problems themselves transgress disciplinary boundaries, thus requiring students to integrate perspectives and knowledge from different disciplines to come up with solutions. The authors reference a study by Tomkinson (2011, as cited in Vandenhouten, 2017) which found that faculty and students "broadened their interdisciplinary thinking and enhanced their ability to work in teams" (Vandenhouten et al., 2017) when involved in a PBL activity addressing sustainable development.

Criticism against Problem-Based Learning

Dolmans et al. (2005) describe some challenges that are often faced when implementing PBL in educational practice. A major issue appears when problems are "too well-structured, too close-ended and too simple" (Dolmans et al., 2005), which hinders active construction of knowledge. Such problems are often not realistic and do therefore not prepare students for real-life problem solving. Further issues arise when tutors are too directive in the learning process, or, alternatively, too loose or absent from it, as well as from dysfunctional student groups (Dolmans et al., 2005). The authors note that these problems are interconnected, such that one may cause or augment another.

The Difference Between Project-Based and Problem-Based Learning

Problem-based and project-based learning share many characteristics. They are both active, student-centered, and inquiry-based approaches to learning, based on constructivist ideas (Brundiers & Wiek, 2013; Kraicik & Blumenfeld, 2005; Schmidt et al., 2011). This, in combination with their similar-sounding names, both of which are often abbreviated to PBL, can lead to a confusion of the two approaches. We therefore wish to include a short exploratory section on the relationship between them, which is based largely on the findings of Brundiers & Wiek (2013).

Brundiers & Wiek (2013) argue that PBL and PjBL focus on similar key features, with their differences amounting to differences in emphasis. They present a model of differences and commonalities between the two approaches, in which the differences relate to *outcomes*; PBL aims at creating deeper understanding and theory building, while PjBL aims at case-specific understanding and practical products, *main activity*; PBL mainly consists in an inquiry of problematic situation, whereas PjBL centers on the production of applicable results, *organizing principle;* which for PBL is the learning tutorial and for PjBL project management, and, finally, *self-directed learning;* PBL is "fully student-centered in a loosely pre-defined setting", whereas PjBL is "student-centered in a pre-defined project frame" (Brundiers & Wiek, 2013). Commonalities between the two approaches are that they both "engage students in real-world tasks", are "student-centered" and organized into "small-group work", "simulate professional situation[s]", involve "processing multiple information sources", emphasize "formative and performance-based evaluations", and that the teacher acts as "facilitator and resource-guide", (Brundiers & Wiek, 2013).

It is important to note that this model presents PBL and PjBL as parts of a continuum. They refer to Donnelly and Fitzmaurice (2005), who argue that "in practice, it is likely that the line between project- and problem-based learning is frequently blurred and that the two are used in combination and play complementary roles" (p. 89, as cited in Brundiers & Wiek, 2013), as well as Bereiter & Scardamalia (2003, as cited in Brundiers & Wiek, 2013) who "found that today's modified forms of problem-based and project-based learning overlap in important areas" (Brundiers & Wiek, 2013, p. 1728). These arguments might justify, or at least demystify, the common collapsing of project- or problem-based learning into the single abbrivation PBL (eg. English & Kiskantas, 2013; Kolmos, 2009) Further, one might consider combining these approaches when implementing student-centered and inquiry-based learning activities, paying particular attention to the activity's intended *outcomes* and its *main activity*, as well as its approach to *student-centered* and *self-directed learning*, in order to apply the appropriate tools from each approach.

Critique of Minimally Guided Education Approaches:

Kirschner et al. (2006) argue that *minimally guided* educational approaches such as PBL and PjBL, in which students themselves construct knowledge rather than being given it, ignore both "(…) the structures that constitute human cognitive architecture" (p. 75) and the empirical evidence which suggests that guided educational approaches are more effective and efficient. The authors trace the origin of minimally guided instruction in constructivism, and

they argue that, while the constructivist view of learning is correct, the "instructional consequences suggested by constructivists do not necessarily follow" (Kirschner et al., 2006, p. 76). This is because learners are able to construct more easily acquired and accurate representations of knowledge when they are given complete information than they do when they are given only partial information. Moreover, the constructivist approach may result in too much focus on methods and processes, and not enough focus on content knowledge, or in an erroneous equating of these two different aspects of learning. The authors argue that it is not until students have built up enough knowledge to "provide internal guidance", that the benefits of external guidance begin to recede (Kirschner et al., 2006, p. 75).

Other Methods

The Jigsaw Method

The Jigsaw method is a pedagogical approach recognized for promoting collaboration and active learning. The method is particularly well-suited for educating about the significance of discussing ethical practices (Wood & Dixon, 2011). The method is based on stakeholder analysis and can serve as a useful tool for presenting diverse perspectives and facilitating discussions on complex themes. As the jigsaw method is a highly cooperative model, it is also well-suited for interdisciplinary education (DeZure, 2010). DeZure (2010) further marks that the jigsaw model can be a good model for introducing students to interdisciplinary issues as it breaks complex problems into more manageable pieces and presents them sequentially.

The jigsaw method consists of two main stages (DeZure, 2010). In the first stage, students are assigned groups in which they address and study one dimension of a problem. Here, each group focuses on a different aspect of the same problem, and thus becomes an "expert" in that area. In the second stage, students are placed into secondary groups, where each new group consists of one member from each of the earlier formed groups. Each "expert" is then responsible for teaching the rest of the team (Wood & Dixon, 2011). In this stage, the students share their insights gained from the first stage and collaborate on integrating them into a holistic overview of the situation to which they can propose a solution. Within interdisciplinary problem solving, each student is assigned to primary groups for different disciplinary perspectives on a complex problem. In stage two, the students bring the different disciplinary perspectives together and integrate them into an interdisciplinary solution (DeZure, 2010).

Research on Jigsaw and Interdisciplinarity

The jigsaw method is a beneficial method for interdisciplinarity, as it facilitates higher-order critical thinking skills, and student-centered learning in groups (DeZure, 2010). Further, the jigsaw method has been found to lead to higher achievements among students, as students' gathering information in an autonomous and self-adjusted way which they then explained to others contributed to the information being meaningful (Karacop, 2017). Thus, although it is a time-consuming model, it is suitable for interdisciplinary learning as it demonstrates the relationship between discipline-based learning and integration into interdisciplinary solutions.

In a study by Wood and Dixon (2011), the jigsaw method is used on business students to create awareness of different perspectives that influence business and give insight into difficult considerations made by businesses and stakeholders. The case study follows business students enrolled in seven universities in Australia, as they discuss an ethical green dilemma. The students conducted an analysis of the stakeholders in the chosen project, with the overarching question of whether a project should be carried out or stopped. The students then proceeded to play the part of one of the stakeholders, thus playing out a discussion between the different views of the stakeholders involved. An example of such a dilemma was whether a proposed wood pulp factory in the north of Tasmania in Australia should be built. What sustainability issues does the project raise? Should Tasmania's natural resources be exploited? The stakeholders included were the authorities, workers, the local community, nature conservation, and the relevant company. A group of five people was then made. Each person was distributed a stakeholder and then a brief description of their identity. They were then to gather in expert groups, i.e., groups with the same stakeholders, where they got to know their identity better. Later, the students went back to their original groups. Discussions began as to whether the project should continue and on what terms, where each student played the role of the stakeholder they were assigned. They were asked questions that required an assessment of the project's sustainability. This case illustrates how a jigsaw method can be executed. The researchers concluded that the method was successful, as students were very satisfied with the workshop and reported that it made an impression on them.

Criticisms against the Jigsaw Method

The Jigsaw method, while widely recognized for its collaborative approach, is not without criticism. A paper researching the effect of the jigsaw method on student performance in 2015 provides valuable insights on this matter (Azmin, 2015). Insights from students' viewpoints on the method shed light on potential difficulties associated with the method. As one student expressed, "Sometimes, when one member is not helpful and not doing their reading or writing notes, it really disrupts the whole group."(Azmin, 2015, p.102). This underscores the significance of each member's active participation and preparation. Another student highlighted a challenge faced when using the method, saying, "The barrier I face in this jigsaw method was when one of our group members did not do his work, so we had to ask for help from the other groups.". (Azmin, 2015, p.102). This illustrates the method's dependence on collaborative efforts and the potential disruption when one group member falls short. Such experiences highlight the importance of addressing these challenges when presenting and describing the Jigsaw method to optimize the benefits of enhancing student performance.

World Café

What is World Café?

World café is a method for discussion and exploring solutions with others. The method involves small group discussions and conversations, with focus on establishing a relaxed atmosphere aimed at uncovering group wisdom (Chang & Chen, 2015). Participants are divided into small groups that rotate between different tables or "café" stations. This approach has been put forward as fostering collective intelligence, allowing creativity and stimulating the emergence of novel ideas (Jori et al., 2020). Further, adaptations can be made to the method to make it suitable for a range of purposes. An example is the “research world café” used within academic settings to allow researchers to conduct relevant and timely research (Schiele et al., 2022).

As the aim of a World Café is to facilitate a structured but informal discussion, a café setting is created through offering drinks, food, and playing music to enable a relaxing atmosphere (Recchia et al., 2022). The workshop has an experienced key host who introduces the purpose of the workshop, and who assigns participants to groups. There are several tables in the room, with a total of four to six participants seated at each table. Each round of discussions lasts about 15-20 minutes, and a World Café normally consists of a minimum of three consecutive rounds of dialogue. At each table, there is a secondary ‘host’, who is, for

instance, a researcher in the field of discussion or in other ways competent to lead the conversation. The secondary hosts stay at their table for each round of the workshop. The remaining participant transfer to a new table each round, based on random seat charts, where they can continue the conversation with a new group of participants. The changing of groups ensures the inclusion of the views of a wide range of people. The secondary host presents the previous groups' discussions to the new participants for each new round, and the new group can continue from here, hopefully adding new ideas and insights. One can either have the groups discuss the same questions for several or all rounds of the workshop, or the key host can choose to ask new questions for each round. Alternatively, they can choose to propose several questions for a round, to help extend the exploration and discussion within the groups. The discussions are aided through the use of creative materials, such as eg. paper and colored markers, whiteboard and pens, post-its, paints etc. At the completion of the rounds of discussion, a plenary discussion is held, where each group share their results, findings, and insights. In this large discussion, all ideas can be gathered, misunderstandings clarified, and novel learning opportunities can emerge. The data gathered from these discussions is key concepts, outlined ideas, drawings, models etc. created and noted during the discussions. These typically constitute the basis of a thematic analysis done after the workshop.

There are several variations of the World Café method. Some found that the discussions were better if the groups were consistent throughout the rounds of discussion and the participants did not move, as to allow participants to evolve together as a group (Jori et al., 2020).

Research on World Café and Interdisciplinarity

A paper discussing the efficiency of African swine fever control strategies in European wild boar used World Café method as a tool for increasing the level of participation in multi-stakeholder group discussions (Jori et al., 2020). The authors of the study arranged an interactive workshop that brought together experts from diverse fields including wildlife management, wild boar ecology, sociology, epidemiology, and animal disease management to discuss the advantages and disadvantages of various control approaches. As this type of problem is complex, good methods are essential for effective multi-disciplinary discussions. The method was perceived as an efficient tool for quickly grasping comprehensive perspectives from the professionals involved in managing ASF and wild boar populations. Utilizing the World Café method created a comprehensive understanding of the problem, and

the process also produced valuable suggestions for controlling African swine fever (ASF) in European wild boar populations.

Criticisms against World Café

World Café method, while regarded for its effectiveness in fostering meaningful conversations, may present limitations when applied to specific challenges. As articulated by Carson (2011), these limitations become more apparent when the method's potential to instigate substantial societal change surpasses its capacity to deliver on such promises. The method remains valuable in its ability to facilitate large-scale discussions. Carson's perspective underscores that the World Café method is most effective in domains such as research methodologies, problem-solving scenarios, and strategic planning.

Gallery Walk

What is Gallery Walk?

A gallery walk is a discussion technique that gets learners out of their seats and invites them to become active participants in the learning process (Stewart and Beaudry, 2017). The gallery can consist of posters in different sizes featuring images, graphics, and text (Stewart and Beaudry, 2017). All posters relate to the same theme, but each station might approach the theme differently or cover various subcategories of the theme. Participants navigate through the “gallery”, which usually is a classroom, engaging with content, contemplating ideas, and exchanging thoughts with peers. After going through all the stations, participants should have engaged with the theme in diverse ways.

There are different ways of conducting the Gallery walk method. There are however some crucial steps to make sure that the method facilitates collaboration, critical thinking, independent learning, and strong learning outcomes.

Step 1: Make posters or make your students make posters about a topic. Make also a list of questions the student needs to answer.

Step 2: Hang the poster around the room to make the poster connect.

Step 3: Make groups out of the students (not more than the number of posters).

Step 4: Engage the students to go around and gather information.

Step 5: Hand them the list of questions they now can answer. You can either give them the sheet of questions before (so they can go around with the sheet) or after the experiment.

Research on Gallery Walk and Interdisciplinarity

Stewart and Beaudry (2017) discuss how the Gallery Walk method has been used in various professional development settings to effectively engage participants with complex concepts and models. Participants' feedback showed that they understood concepts better and really liked the learning experience (Stewart and Beaudry, 2017). The text illustrates how the Gallery Walk method helps with useful learning for professionals and teamwork.

Another paper researched the effectiveness of the Gallery Walk technique for improving English as a foreign language (Namaziandost et. Al, 2018). The study revealed that the application of this technique resulted in enhanced speaking performance among students. The study supports the importance of teaching speaking skills and highlights the role of educators in creating motivating and supportive classrooms. Implementing a Gallery walk can facilitate the exchange of ideas, knowledge, and perspectives among individuals from diverse fields. In this way, it can foster interdisciplinary learning, motivating participants to engage, exchange perspectives and collaboratively tackle complex issues.

Conclusion

This research paper has delved into the realm of interdisciplinary education, uncovering numerous workshop methods to enhance interdisciplinary learning. The paper focuses on mapping and describing these methods, centering around the existing literature documented on each method.

In today's changing academic landscape, the importance of interdisciplinary education is clear. The boundaries between academic disciplines are no longer rigid, and the skill of combining different knowledge is crucial. The methods discussed in this paper offer a practical approach to teaching students this important skill set.

In examining each workshop method, the paper not only discusses the strengths of the method, but also the criticisms that surround its usage. This exploration provides a guide for educators, embracing workshops as a way to enhance students' interdisciplinary education. By commenting both on the strengths and limitations of these methods, educators are

equipped with a deeper understanding of the given methods, which enables them to make informed decisions in adapting and implementing them to their specific contexts.

In essence, this research paper underscores how workshop methods can contribute to shaping the landscape of interdisciplinary education. However, it should be emphasized the importance of further investigation on both the methods described in this paper and new methods linked to interdisciplinary education. This ongoing exploration is essential to strengthening interdisciplinary education and drive advancements.

Bibliography:

Allabarton, R. (2022). *How To Run a Design Thinking Workshop [2022 Guide]*. https://www.workshopper.com/post/how-to-run-a-design-thinking-workshop

Azmin, N. H. (2015). Effect of the Jigsaw-Based Cooperative Learning Method on Student Performance in the General Certificate of Education Advanced-Level Psychology: An Exploratory Brunei Case Study. *International Education Studies*, 9(1), 91. https://doi.org/10.5539/ies.v9n1p91

Bereiter, C., & Scardamalia, M. (2003). Learning to work creatively with knowledge. In De Corte, E., Verschaffel, L., Entwistle, N., & Van Merrienboer, J. (2003). *Powerful learning environments: Unravelling Basic Components and Dimensions*. Pergamon Press.

Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating Project-Based Learning: Sustaining the Doing, Supporting the Learning. *Educational Psychologist*, 26(3–4), 369–398. https://doi.org/10.1080/00461520.1991.9653139

Brozo, W. G., Fisher, D., Frey, N., & Ivey, G. (2007). *50 Content area strategies for adolescent literacy.* Merrill/Prentice Hall

Brundiers, K., & Wiek, A. (2013). Do we teach what we preach? An International Comparison of Problem- and Project-Based Learning Courses in Sustainability. *Sustainability*, *5*(4), 1725–1746. https://doi.org/10.3390/su5041725

Carson, L. (2011). Designing a public conversation using the World Cafe method. *Social Alternatives*, 30(1), 10–14.

Chang, W.-L., & Chen, S.-T. (2015). The impact of World Café on entrepreneurial strategic planning capability. *Journal of Business Research*, 68(6), 1283–1290.

DeZure, D. (2010). Interdisciplinary pedagogies in higher education. The Oxford Handbook

of Interdisciplinarity. In The Oxford handbook of interdisciplinarity. (2011). *Choice Reviews Online*, *48*(05), 48–2406. https://doi.org/10.5860/choice.48-2406

DiCamillo, L., & Bailey, N. M. (2016). Two Teacher Educators Go to the Source: Teaching an Interdisciplinary Class in an Urban Charter High School. *The Social Studies*, 107(6), 218–226. https://doi.org/10.1080/00377996.2016.1214904

Donnelly, R. Fitzmaurice, M. (2005) Collaborative Project-based Learning and Problem-based Learning in Higher Education: a Consideration of Tutor and Student Role in Learner-Focused Strategies. In G. O'Neill, S. Moore & B. McMullin (eds) Emerging Issues in the Practice of University Learning and Teaching (pp.87-98). Dublin, AISHE/HEA.

Dolmans, D. H., De Grave, W., Wolfhagen, I. H., & Van Der Vleuten, C. P. (2005). Problem-based learning: Future challenges for educational practice and research. *Medical Education*, 39(7), 732–741.

English, M. C., & Kitsantas, A. (2013). Supporting student self-regulated learning in problem-and project-based learning. *Interdisciplinary Journal of Problem-Based Learning*, 7(2), 6.

Han, E. (2022, January 18). *What is design thinking & why is it important? | HBS Online*. Business Insights Blog. https://online.hbs.edu/blog/post/what-is-design-thinking

Helle, L., Tynjälä, P., & Olkinuora, E. (2006). Project-based learning in post-secondary education–theory, practice and rubber sling shots. *Higher Education*, 51, 287–314.

Hofrenning, S., Hargraves, R., Chen, T., Filippas, A., Fitzgerald, R., Hearn, J., Kayes, L., Kunz, J., & Segal, R. (2020). Fishbowl Discussions: Promoting Collaboration between Mathematics and Partner Disciplines. *Journal of Mathematics and Science: Collaborative Explorations*. Vol. 16, Number 1 (2020). https://doi.org/10.25891/1Z36-KS38

Lee, H.-J., & Lim, C. (2012). Peer Evaluation in Blended Team Project-Based Learning:

What Do Students Find Important? *Educational Technology & Society*, 15 (4), 214–224.

Iskander, N. (2018, September 26). *Design thinking is fundamentally conservative and preserves the status quo*. Harvard Business Review. https://hbr.org/2018/09/design-thinking-is-fundamentally-conservative-and-preserves-the-status-quo

Jonassen, D. H., & Hung, W. (2012). Problem-Based learning. In *Springer eBooks* (pp. 2687–2690). https://doi.org/10.1007/978-1-4419-1428-6_210

Jori, F., Chenais, E., Boinas, F., Busauskas, P., Dholllander, S., Fleischmann, L., Olsevskis, E., Rijks, J., Schulz, K., & Thulke, H. (2020). Application of the World Café method to discuss the efficiency of African swine fever control strategies in European wild boar (Sus scrofa) populations. *Preventive Veterinary Medicine*, 185, 105178.

Karacop, A. (2017). The Effects of Using Jigsaw Method Based on Cooperative Learning Model in the Undergraduate Science Laboratory Practices. *Universal Journal of Educational Research*, 5(3), 420–434.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41(2), 75–86.

Kolmos, A. (2008). Problem-Based and Project-Based learning. In *Springer eBooks* (pp. 261–280). https://doi.org/10.1007/978-0-387-09829-6_13

Krajcik, J. S., & Blumenfeld, P. C. (2005). Project-Based Learning. In R. K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences*. Cambridge University Press; Cambridge Core. https://doi.org/10.1017/CBO9780511816833.020

Namaziandost, E. (2018). *The effect of gallery walk technique on pre-intermediate EFL learners' speaking skill*. https://ssrn.com/abstract=3469849

Pham, T. (2018). Project-Based Learning From Theory to EFL Classroom Practice. *The 6th International OpenTESOL Conference*.

https://www.academia.edu/38231987/Project_Based_Learning_From_Theory_to_EFL_Classroom_Practice

Priles, M. A. (1993). The fishbowl discussion: A strategy for large honors classes. *English Journal*, 82(6), 49.

Recchia, V., Dodaro, A., De Marco, E., & Zizza, A. (2022). A critical look to community wisdom: Applying the World Café method to health promotion and prevention. *The International Journal of Health Planning and Management*, 37, 220–242.

Schiele, H., Krummaker, S., Hoffmann, P., & Kowalski, R. (2022). The "research world café" as method of scientific enquiry: Combining rigor with relevance and speed. *Journal of Business Research*, 140, 280–296.

Schmidt, H. G., Rotgans, J. I., & Yew, E. H. (2011). The process of problem-based learning: What works and why. *Medical Education*, 45(8), 792–806.

Shreeve, A., and Batchelor, R. (2012) Designing relations in the studio: Ambiguity and uncertainty in one to one exchanges, in Israsena, P., Tangsantikul, J. and Durling, D. (eds.), *Research: Uncertainty Contradiction Value - DRS International Conference 2012*, 1-4 July, Bangkok, Thailand. https://dl.designresearchsociety.org/drs-conference-papers/drs2012/researchpapers/126

Solis, J. (2023, August 9). How to use Project-Based Learning approach to build learning environments. *Teachfloor Blog*. https://www.teachfloor.com/blog/how-to-use-project-based-learning-approach-to-build-learning-environments

Stentoft, D. (2017). From saying to doing interdisciplinary learning: Is problem-based learning the answer? *Active Learning in Higher Education*, 18(1), 51–61.

Stewart, M. A. & Beaudry, J. (2017). The gallery walk: Educators step up to build assessment literacy. *Journal of Learning Professional*, 38(6), 48-53.

Stoller, F. (2002). Project work: A means to promote language and content. *Methodology in*

Language Teaching: An Anthology of Current Practice, 10, 107–119.

Vandenhouten, C., Groessl, J., & Levintova, E. (2017). How do you use Problem-Based learning to improve interdisciplinary thinking? *New Directions for Teaching and Learning*, *2017*(151), 117–133. https://doi.org/10.1002/tl.20252

Vinsel, L. (2018, May 21). Design thinking is a boondoggle. *The Chronicle of Higher Education*. https://www.chronicle.com/article/design-thinking-is-a-boondoggle/

Wolniak, R. (2017). The Design Thinking method and its stages. *Systemy Wspomagania w Inżynierii Produkcji*, 6(6), 247–255.

Wood, L. N., & Dixon, P. (2011). Stakeholder analysis: Using the jigsaw method for ethical dilemmas in business. *Asian Social Science*, 7(4), 77.

Young, J. (2007). Small Group Scored Discussion: Beyond the Fishbowl, or, Everybody Reads, Everybody Talks, Everybody Learns. *The History Teacher*, *40*(2), 177–181.