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Developing Interdisciplinary Learning Experiences of English Learners at University Level Based on the Interdisciplinary Concept Model

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Abstract: *Embedding interdisciplinarity into a higher educational curriculum allows students to develop competence in synthesizing and applying knowledge and skills from across multiple disciplines to address problems and find solutions that would not be possible if only a single disciplinary lens is used. The overall purpose of this study is to develop interdisciplinary learning experiences of English learners based on the Interdisciplinary Concept Model in EFL classroom. In this regard, this paper mainly focusses on analyzing the instructional design for Audio-visual course at university level according to Jacobs and Borland (1986)'s model. It provides a platform for instructional and curriculum designers for integration of interdisciplinary approaches into a curriculum design.*

Keywords: *Interdisciplinarity; English learners; Instructional Design*

1. Introduction

According to Haynes (2017), interdisciplinarity is frequently seen as a means of fostering creativity[7], innovation, and synergy via application, cooperation, collaboration, and the blurring of disciplinary boundaries. Although it is frequently seen as a desirable component of higher education [5], it can be challenging to apply in academic settings due to the dearth of pedagogical resources [10]. Multidisciplinary classrooms can give students the skills they need to solve unstructured challenges. The integration of information from several disciplines to address issues that cannot be resolved by a single disciplinary approach is known as interdisciplinary education. As a result, interdisciplinarity offers a framework for equipping students to draw links between seemingly disparate or isolated information in academic and professional curriculum, and to apply that knowledge to real situation [8]. The goal of this paper is to explore the practice of interdisciplinary in higher education, especially focus on instructional design for audio-visual course, to developing interdisciplinary learning experiences of English Learners based on the Interdisciplinary Concept Model, and the significance of these advantages for curriculum and instructional designers implementing interdisciplinary learning experiences in higher education settings.

2. Research in the field

2.1. Interdisciplinarity in Higher Education

According to a review of recent literature, interdisciplinarity and sustainability are closely associated, and this relationship can be investigated at different educational levels. In light of interdisciplinary education for sustainable development, where students should be encouraged to combine knowledge of different disciplines in order to advance in understanding and sustainable development issues, Annan et al. (2017) propose that "interdisciplinarity should be applied to MBA students from graduate courses of different backgrounds".[1] "Traditional unidirectional educational processes are of very limited use for the education of sustainable development". The authors also support the idea that "mutual learning based on real-world cases requires an interdisciplinary point of view," which highlights the significance of the systemic view in this situation. Other qualities, like creative capacity, social skills, and specialized communication skills to adorn dynamic transition, are necessary for solving the complicated sustainable development conundrum, and these teachings should be learned in the classroom. According to Ferrer-Balas et al. (2008)[6], universities play a significant role in this process and increasing interdisciplinarity

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becomes a strategic goal at practically all levels of education. "Educators do not yet have rigorous research on learning barriers, outcomes, and concrete interventions to support this interdisciplinary development," state Paretti (2009). Klassen (2018) states that certain factors[11], such "the choice of the problem, the level of interaction between different disciplines, and the constructive alignment," are required to develop an interdisciplinary education.

Educators must understand the theoretical goals that support the necessity of interdisciplinary action because universities are still primarily expository environments. It is not enough to have teachers opposite each other in the classroom to foster comprehension and sophisticated thinking. While acknowledging the realities of the present, it is imperative to preserve the significance of the "other" in the process of creating knowledge. In order to develop an adequate and thorough curriculum, there should also be redundancy in the sense of encouraging interpersonal interaction among teachers in order to share information (Kern et al., 2011). "In the United States, funding agencies fund interdisciplinary research and universities promote the expansion of interdisciplinary research," claim Rhoten (2007)[17]. Yarime et al. (2012) state that interdisciplinarity and sustainable issues are closely related, saying that interdisciplinarity has become a fundamental concept for understanding the science of sustainability because sustainability issues cut across many academic disciplines, from the natural sciences to the social and human sciences. According to Zverev (1975), interdisciplinarity should be applied to educational subjects, showing their subordination to the framework for studying education in schools that was established through a review of scientific knowledge.

2.2. Pedagogical Considerations

Pedagogical assistance is necessary when teaching through an interdisciplinary lens [2]. However, interdisciplinary teaching and learning cannot be facilitated by a single approach[10]. Interdisciplinary learning is centered on synthesis and meaning making. Constructivist in nature, interdisciplinarity emphasizes the application of knowledge as well as the development of higher order critical thinking and reflexivity skills. Under this paradigm, students are required to ask insightful questions about a complex problem, sort through and combine various sources of data and viewpoints, identify points of intersection, and create a comprehensive framework to address those questions. Every one of these processes has its own set of difficulties, though.

One common example is the framing of issue definition as a disciplinary procedure, which can lead to difficulties in locating pertinent bodies of information that are not part of the discipline being taught. The interdisciplinary learning of students is shaped and affected by their background in education and work, as well as their level of readiness. As a result, when it comes to creating lesson plans and addressing epistemological differences, students could encounter the same difficulties as their teachers[4].

2.3. The Interdisciplinary Concept Model

Instructors and designers can brainstorm and assess subjects and disciplines that might be included in an interdisciplinary course or program using the Interdisciplinary Concept Model [9], which provides a framework for course development with interdisciplinarity at its center. The concept comprises multiple elements to assist in creating an interdisciplinary curriculum that permits students to intentionally investigate other fields while maintaining awareness of their own disciplines: 1). Choose a central subject or organizing principle that provides the framework for the multidisciplinary experience. For students to be able to investigate and grasp topics, an organizing theme needs to have a manageable breadth. 2). Make a list of all the disciplines that address the chosen topic or theme, along with any subtopics that fall under each field. These linkages ought to include a broad spectrum of concepts, which can then be narrowed down. 3). Choose guiding questions to specify the parameters and lay out the order of the topics. This measure guarantees that the class can cover the suggested diversity of topics and any discussions that may arise from them, while also promoting a balance in the representation of disciplines. 4). Determine and list the activities that will enable a thorough examination of the subject or theme.

This concept is exemplified by Ullrich et al.'s (2014) description of Georgetown University's Interdisciplinary Program in Neuroscience (IPN)[14]. The goal of this curriculum is to produce well-rounded neuroscientists with an emphasis on professional identity development. Seven professional skill domains that are essential for working in an interdisciplinary discipline like neuroscience make up the program's core. These areas include teamwork, ethics, teaching, public outreach, leadership, written and oral communication, and mentoring. Students actively participate in the practical application of co-constructed knowledge, which includes assuming leadership roles and composing grant proposals, in

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addition to theoretical discussions and the synthesis of disciplines. Students are also actively involved in co-designing the program.

2.4. Interdisciplinary competence evaluation

Interdisciplinary thinking is a sophisticated cognitive ability with several subskills. Four cognitive processes were listed by Mansilla (2010) as potentially contributing to better results with interdisciplinary integration when they are activated, for instance, maintaining a critical perspective, constructing leveraged integrations, assessing disciplinary insights and developing purpose. Students' work should incorporate both academic and transdisciplinary perspectives in order to elicit these processes. It might take a long time for students to reach a sufficient level of complexity in this process, and certain creations might be more representational of interdisciplinary cognitive processes than others. Additionally, it is challenging to transition from the simple application of one field to another, which is the hallmark of cross- or multidisciplinary methods, to the integration of disciplines that make up transdisciplinarity (Spelt et al. 2009). Because of this, it's critical to make sure that the intricacy of the cognitive and metacognitive effort that goes into creating a truly transdisciplinary course or program is taken into consideration when assessing interdisciplinary ability.

However, rather than concentrating on the caliber of work and efficacy of interdisciplinary integration, instructors and evaluators frequently turn to considerations about the degree or intensity of interdisciplinarity inclusion, as Boix Mansilla (2010) observed in the evaluation of student work[3]. In order to surmount this obstacle, they developed an assessment framework with the goal of fostering an interdisciplinary evaluation culture. Three crucial criteria are included in this framework to measure interdisciplinarity: 1) A solid grounding or foundation in a discipline to guarantee the discipline's fundamental insights and limitations prior to attempting to merge diverse disciplines. 2) Progress via the integration of several disciplinary lenses, allowing students to express their understanding and invoke epistemic frameworks of synthesized knowledge from various disciplines. 3) A critical understanding of the synthesis of disciplinary knowledge. By now, students have developed a metadisciplinary awareness of their own work and are in line with the multidisciplinary framing of the problem at hand as well as defined objectives. This necessitates a deep commitment to their profession and discernment regarding the rationale behind particular decisions.

A set of standards for assessing engineering students' multidisciplinary ability was created by Lattuca et al. (2013)[12]. It outlines eight important factors that, in part, concur with the suggestions: 1) Knowledge of discipline. Understanding of other disciplines is supported by a cognitive apparatus that possesses a particular level of disciplinary expertise. Furthermore, realizing how socially constructed disciplines are could inspire students to investigate alternative fields of study. 2) Understanding the disciplinary viewpoint. This describes a progression from broad comprehension to more specialized knowledge. To truly appreciate a discipline, one must be able to recognize its benefits as well as its shortcomings. 3) Understanding of non-disciplinary viewpoints. Here, students can show that they can appreciate information outside of their own field of study in order to solve challenging issues. In order to adopt a non-disciplinary approach, Lattuca et al. (2013) also stress the significance of collaborating with stakeholders to comprehend a problem or issue from their point of view. 4) Understanding the boundaries of discipline. Here, overcoming bias toward a particular subject or discipline and adopting a critical mindset toward and knowledge of the limitations of various disciplines are the main points of emphasis. 5) Evaluation from an interdisciplinary lens. The benefits, weaknesses, and constraints of each discipline should be critically assessed by students as they contribute to an interdisciplinary body of knowledge. 6) Seeking points of agreement. Students must dynamically adjust and revise their perspectives in light of the data they gather from many fields and other people's points of view. 7) Reflexivity. Comprehending the interrelationships across many disciplines is crucial for their amalgamation and amalgamation, acknowledging one's personal partialities, and arriving at a more intricate or comprehensive perspective of issues. 8) Complementary abilities. In order to come up with a potential solution, one must be able to effectively integrate and synthesize disciplines by taking ideas from related fields. If such solutions were only considered from one discipline's perspective, they would be less comprehensive[13].

3. Methodology

This study involves three main topics in English audio-visual course at university level and analyzes the instructional design according to the Interdisciplinary Concept Model. This course conducted theme-based approach and interdisciplinary was applied in instructional design, students’ performance was

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observed and discussed. From the university English teaching and learning practice, English as a subject is also a tool, integrating the knowledge of different subjects into English listening and speaking practice is the best embodiment of interdisciplinary practice. The topics used in this study are shown in Table 1.

Table 1: Topics selected for English Audio-visual Course in this study

Topics	Activities(sub-topic)	Key words	Discipline
Five things you really need to know about AI	Be an AI Device Designer	AI/Device/Designer	Engineering/ computer science
SWOT Analysis	Case study(A brand of milk tea)	SWOT/brand	Business/marketing
The benefits of E-Commerce	Sell your stuff online(cross-border E-commerce)	e-commerce/ live streaming sales/live commerce/marketing	International business/mass media

4. Design Process Considerations and Students' Performance

4.1. Design process considerations

The English audio-visual course conducted several topics to develop students' English language competency, especially in listening and speaking skills. In this regard, the researcher set different theme to develop students' interdisciplinary awareness and competence. Based on Jacobs and Borland (1986), a clearly defined scope is essential for an organizing theme in order to support students' learning and help them become experts in the field. As a result, the course's topics were chosen based on popular culture or current events that the students are already familiar with, and they have access to enough internet resources to get both a theoretical comprehension of new subjects and practical skills. Some relevant examples in this study are demonstrated as follow:

The selected topic or theme should include a wide range of ideas, refers to different subtopics. Brainstorm can be conducted with disciplines. This manifested in the instructional design of the topics in this course. For example, the topic, "Be an AI Device Designer" was designed to let students have a general understanding of AI. In this regard, three subtopics were considered and discussed by students, "AI", "device" and "designer". In this regard, students had to learn basic knowledge of engineering or computer science. It needs to be understood instead of particular profound.

In the case "The benefit of E-Commerce", students were required to have a general understanding about E-commerce before they conduct the activity. Besides, they were required to find products, and marketed a cross-border E-commerce with gained knowledge, promoted the products via live streaming in the end. In this course, knowledge of international business and mass media was combined, as well as knowledge of English language. Students had to acquaint themselves with knowledge of different fields though consulting relevant information. The brainstorming process helps them organize content from different disciplines, and this process embodies the cultivation of interdisciplinary consciousness.

Based on another principle of the Interdisciplinary Concept Model, the development of interdisciplinary learning experiences in course level is influenced by guiding questions to some extent. Determine guiding questions to establish the parameters and frame the order of topics. This measure guarantees that the class can cover the suggested diversity of topics and any discussions that may arise from them, while also promoting a balance in the representation of disciplines.

Besides, the variety of elements that make up interdisciplinary competence necessitates a range of evaluation techniques that capture higher order cognitive functions like integration of disciplines, problem solving, and critical thinking. A few strategies are portfolios and reflections that encourage students to synthesize their knowledge across multiple subjects; self and peer assessment [15]; and experiential or service-learning opportunities that would allow students to bring together knowledge across different fields [16]. Assessment of artifacts from collaborative project/problem-based learning in an interdisciplinary environment is also important because it allows students to demonstrate their competence of higher-order skills.

4.2. Students' performance

According to Klassen (2018), collaboration is essential to enhancing both scientific practice and

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multidisciplinary research. An interdisciplinary teaching approach necessitates the blending of content and pedagogy into an understanding of how specific topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction, to allow students to engage in such a critical review of disciplines. In this study, all topics teaching and practicing in the course design were conducted in groups, which was in accordance with the principle of interdisciplinary teaching approach.

In this study, well-crafted learning experiences that support the successful and efficient integration of disciplines and assist students in creating their own comprehensive frameworks to explain phenomena are necessary to guarantee that students adopt an interdisciplinary perspective. Yang (2009) advises beginning the process of creating an interdisciplinary experience by asking two fundamental questions: Why is interdisciplinary experience important for this course or program? And what results are possible for students who enroll in these kinds of multidisciplinary courses? In order to provide students with a better understanding of different disciplines, teachers in this research created all of the topics based on current trends, such as live streaming， artificial intelligence and brand marketing, etc[18]. By viewing a course via an outcome-based lens, teacher can guarantee student motivation and engagement by concentrating on what the students can learn, why it might be significant to them.

4.3. Interdisciplinary measurement

Students ‘performance in this study is consistent with Mansilla (2010)’s claim. To trigger transdisciplinary processes, students' work should combine transdisciplinary and academic viewpoints. Students may need some time to get to a point where this process becomes sufficiently complicated, and some of their inventions may better depict multidisciplinary cognitive processes than others. Furthermore, it might be difficult to go from cross- or multidisciplinary approaches' trademark of simply applying one area to another to transdisciplinarity's integration of disciplines.

In this study, different topics allowed students to experience disciplinary in English course. They were required to articulate their understanding and invoke epistemic frameworks of synthesis knowledge from diverse disciplines by advancing via the integration of multiple disciplinary lenses. However, a strong foundation or footing in a discipline to ensure the discipline's basic understandings and constraints before attempting to combine different disciplines. In this study, despite possessing a strong foundation in English and the ability to articulate themselves effectively, students' discourse may exhibit a limited perspective and lack depth due to their insufficient knowledge in artificial intelligence or business. A critical comprehension of the discipline knowledge synthesis. By now, students are aligned with the interdisciplinary framing of the topic at hand and have established objectives. They have also formed a meta disciplinary knowledge of their own work. This calls for a strong sense of dedication to their work and discernment when it comes to the reasoning behind specific choices.

5. Conclusion

Higher-order metacognitive abilities, such as critical thinking and the capacity to see issues from a variety of disciplinary perspectives, are developed by immersing students in interdisciplinary experiences. It also helps students synthesize disciplinary knowledge to come up with creative solutions. However, creating and implementing an interdisciplinary curriculum can be difficult for teachers, curriculum designers, and students in equal measure. These difficulties could result from divergent epistemological stances, the limitations of the current system of higher education, or a deficiency of educational frameworks that facilitate the adoption of interdisciplinary approaches.

The techniques and models covered in this paper may provide some light on how cooperation between co-teachers, possibly with the aid of instructional designers, can facilitate the development of learning experiences that get beyond the obstacles posed by disciplinary language and epistemologies.

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