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The Effect of Integrated and Discrete Course Designs in Fostering Interdisciplinary Thinking and Concept Application Among University Students

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ABSTRACT

The research aims to find out how independent and integrated course formats facilitate the principles of the English language as well as interdisciplinary thinking among the university population. In this research, four diversified fields of literature, communication, linguistics, and creative writing encompassing English language are chosen for survey. The sample has included 200 students, with 50 students representing each field. These students are then randomly assigned to either the discrete or integrated course design group. Interdisciplinary thinking skill and application of ideas in the English language are measured. All participants in this experiment took pre- test before and after entered this experiment to know the extent of change that occurred at their scientific levels.

The findings have indicated that interdisciplinary thinking skills among students in the program of literature with integrated course design are significantly higher among those in a program with discrete course design. On integrated English course ideas, the integrated course design group has showed better performance than the separate group in the communication major. This is the same pattern as that found across all sectors. In linguistics, the integrated course design group has outperformed the discrete course

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design group in demonstrating interdisciplinary thinking ability. Indeed, the integrated course design group could apply ideas in the English language significantly better in creative writing than the discrete course design group. It seems that the integrated course design approach in teaching makes students also more capable of thinking across disciplinary borders and applying ideas in the English language. An interdisciplinary aspect in the curriculum design and teaching methodology will further enhance critical thinking, problem-solving, and practical application capabilities of the students in English. This study infers that integration of interdisciplinary elements into the curriculum design and teaching methodology will enhance the problem-solving, real-world application, and critical thinking of the students in English, for different academic disciplines.

The researcher recommends all educational in institutions in Iraq. And other researchers and the countries that study English as foreign language, and application new methods of teaching English language including a topic referred to our research.

Keywords: Application of concepts; discrete course; English language; Integrated; Interdisciplinary thinking; University students

اثر تصاميم المقررات الدراسية المتكاملة والمنفصلة في تعزيز التفكير المتعدد وتطبيق المفهوم بين طلبة الجامعة

ناجي زيدان خلف
جامعة تكريت

الـمستـخلـص

تهدف الدراسة الى بيان التأثير الايجابي لتصميم المقررات الدراسية المتكاملة والمنفصلة في تسهيل تعلم اللغة الانكليزية والوقوف على الاشكالات في مبادئ تعلمها وذلك من خلال المقررات الدراسية المنفصلة والمدمجة وقد تم في البحث من خلال اربع مجالات في تخصص اللغة الانكليزية وهي (الادب الانكليزي واسلوب فن التواصل, وعلم اللغويات , ومجال الكتابة الانكليزية) وقد شملت الدراسة اختيار 200 طالبا بشكل عشوائي بواقع 50 طالبا في كل مجال وتجزئتهم الى مجموعتين الاولى خضعت لدراسة المقررات المتكاملة والاخرى للمقررات المنفصلة وتم قياس مهارة التفكير متعدد التخصصات وتطبيق الافكار باللغة الانكليزية من خلال درجات ما بعد الاختبار في وقد اظهرت النتائج ان مهارات التفكير عند الطلبة الذين درسوا مقررات متكاملة كانت اعلى بكثير مع اقرانهم الذين خضعوا لدراسة مقررات منفصلة وكذلك الحال مع بقية المجالات الاخرى. وان هذا البرنامج سيزيد من تعزيز التفكير النقدي الايجابي والتعامل مع الاشكالات وحلها بأسلوب امثل في كافة التخصصات الاكاديمية.

ويوصي الباحث كافة المؤسسات التربوية في العراق والباحثين والدول التي تدرس اللغة الانكليزية كلغة اجنبية بتطبيق اساليب جديدة في تدريس اللغة الانكليزية بما في ذلك الموضوع المشار اليه في بحثنا.

الكلمات الدالة : تطبيق المفاهيم. المقررات المنفصلة. اللغة الانكليزية. المقررات المتكاملة. التفكير للتخصصات المتعددة. طلبة الجامعة

1. INTRODUCTION

Higher learning institutions serve as focal points of sustainability studies and set examples for sustainable practices at the community level. Because, until recently, businesspeople primarily associated economic development with the abundance of natural resources, there was a feeling that social, ecological, and economic dimensions of sustainability were separate and unrelated to one another. The new models, however, include interconnectedness between economic, social, and ecological sustainability. There is limited scholarly argument, on the one hand, about which skills can serve as the foundation for engagement through sustainability in higher learning. Another debate is on the effectiveness of behavioral change through classroom instruction (Mulà et al., 2017). According to Baena-Morales et al. (2023), the ability to deal with uncertainty is one of the important techniques in sustainability education. Leaders and managerial staff involved in embedding sustainability into higher education institutions through different means are present all over the globe, according to Disterheft et al. (2013). This concept takes into consideration how environment, society, and economy are all interconnected and interact in informing the basis for sustainable decisions, according to Tourangeau 2022.

But with an increased focus by institutions of higher learning on the importance of interdisciplinary thinking and the ability to apply ideas across other disciplines, questions have arisen about what the best practices in course design for promoting these capabilities in students are. There is considerable debate regarding relative effectiveness of integrated and discrete course structure in developing interdisciplinary reasoning and concept application. Whereas integrated courses are described as intentionally designed to include information and views from other disciplines in one course, the discrete ones major in only one topic and aren't openly interdisciplinary in nature. Most higher learning institutions would uniformly agree that, for today's 21st century working world, the skills of thinking interdisciplinary are increasingly demanded for university-trained graduates.

Complex problems often transcend disciplinary silos within an interconnected, technologically advanced worldwide community. The ability to understand and solve these challenges necessitates the incorporation of information and outlooks from more than one academic discipline. Transferable skills across different contexts and the ability to connect among ideas have been highly valued by employers, as these portray the persons as flexible and innovative individuals. On that basis, the development of

interdisciplinary skills has been emphasized by various institutes of higher learning as one of the core curriculum educational goals. Therefore, they have implemented curricular reform initiatives to foster improvement in developing these skills. Interdisciplinary thinking involves an exploratory and investigative process of the dispersion in various subjects from multiple disciplinary outlooks in tandem. However, this approach really requires one first to give credence to the positive and negative features involved in individual disciplinary studies and then amalgamate a bunch of ideas into one coherent and comprehensive framework (Song and Wang, 2021). Interdisciplinary concept application refers to the adoption of an idea, theory, or approach that one has acquired in one setting and applying it effectively to another different context or situation.

As the globe entered into the 21st Century, it got increasingly technologically complicated. Concurrently, it was during this period when simultaneous discoveries regarding the learning process were made by researchers; thus, the need for establishing connections across the application of various fields in the education curriculum became crucial. According to Berry et al. (2004), the introduction of the STEM (Science, Technology, Engineering and Math) fields was seen as capable of enhancing the ability of students to transfer knowledge across two discrete subjects; this is essential in finding solutions to problems. Students can solve new problems effectively under a coherent setting; drawn logical conclusions are also capable by applying concepts from subjects such as mathematics, science, technology, and engineering. According to Havice (2009), an integrated instructional approach with problem-based learning within a STEM curriculum may trigger students' curiosity about the world they live in and involve them more in instruction.

For the sake of this study, an integrated course will be operationally defined as a pedagogical approach that purposely integrates subject matter of multiple disciplines and is taught through co-operative instruction from teachers from different departments or divisions. A discrete course will be defined herein as one that is confined to training within the parameters of one topic only, without using an interdisciplinary pedagogic approach, neither offering clear links to another discipline.

The researcher found that most university students suffer from a weakness in all English Languge skills (reading, writing, listing addition to listing) and those students need new methods of teaching English with modern approach as same as all fields.

The aim of this study is to enhance students’ abilities to understanding and learning English Language in modern ways that keep pace with development in the field of education around the world.

The question of whether discrete or integrated course structures are more effective in developing interdisciplinary competencies among college students, using the example of English language teaching, will be explored within this study. The first stage of this study will include an overview of the value given by educational institutions to interdisciplinary skills in the process of learning the English language. This should be based on a detailed explanation of the most crucial terms. This paper will give a critical review of integrated and discrete course models in teaching English.

2. LITERATURE REVIEW

This part aims to evaluate the influence of integrated and discrete course structures on interdisciplinary thinking in previous researches.

2.1 Interdisciplinary and Integration

Within the context of the United States, the term 'integrated' or 'integrative learning' is usually used to refer to what the rest of the world would term 'interdisciplinary learning'. According to Menken et al. (2016), this is an interdisciplinarity that links different ideas, aspects, theories, and/or methodologies from many disciplines. Lattuca et al. (2017) believe that interdisciplinary skills enable students to synthesize knowledge and methods acquired in several disciplines with the view of achieving an easy overall comprehension of a problem. Interdisciplinary integration ability is clearly considered one of the key competencies for defining the effectiveness of interdisciplinary education; it should be capable of showing the learning outcomes of students in an interdisciplinary manner. Despite being highly relevant in interdisciplinary education, there is no single definition in scientific and pedagogical literature of what "interdisciplinary integration ability" denotes, and the connotations differ in various contexts. Thus, according to the IPEC (Institute for Professional Excellence in Coaching) in the US, the basic interdisciplinary competence is defined as values/ethics for trans disciplinary action, roles/responsibilities, interprofessional interaction, and collaboration in teams (Chen et al., 2017).

All these emphases on the role of 'integration' as a core element of interdisciplinary efforts have also meant that a number of researchers have been referred to as 'integratedists' (Xu et al., 2022). Boix-Mansilla (2017) cites the difference between an interdisciplinary approach and one which reflects another discipline or multiple disciplines, respectively, as lying in a process of integration or synthesis. The integration does not allow one to treat it as just a final product; basically, the process of integration is inherent in the whole exploratory and multidisciplinary process.

2.2 Integrated and Discrete Course Models

Those integrated course models supporting argue that they represent the best means through which interdisciplinary can be fostered. This is supported by (Song and Wang , 2021). The integrated course offers students the actual opportunity to witness and to contribute to the discussion, collaboration, and creation of knowledge across disciplines by bringing together instructors from many disciplines in the collaborative design and delivery of the course (Borrego and Cutler, 2010). On the other hand, the discrete course has been criticized because it often carries narrow thinking confined to particular areas of scholarship. According to Razzes, (2011) intentional attempts at connecting this course with other subjects have to be clearly brought out by instructors in discrete models; otherwise, there could be limitation as far as the interdisciplinary potential that could be realized, or the wider contexts within which concepts could be applied by students. On the other hand, supporters insist that discrete courses have the advantage of gaining in-depth study in a particular subject to establish a very, very vital foundation for any follow-up interdisciplinary works.

2.3 Past Research on Course Models

Many research studies have been done regarding course models on design, techniques, and methods to know its effectiveness. Various course models have been researched by scholars in which the traditional lecture-based model is included. Several empirical studies have explored the effect integrated and discrete course curriculums have on improvement of multidisciplinary competencies. A commonly cited and researched work from (Lattuca et al., 2004) because the research was conducted across six colleges. The researchers carried out surveys and interviews with more than 1,000 students who took part in either an integrated course or discrete courses. The results indicated that an integrated course was found to contribute significantly and positively to the improvement in interdisciplinary thinking reported by students taking the course. On the other hand, discrete courses were not found to have significant impacts in this particular area. In further research, similar results have been obtained. In the academic research conducted by Newell and Gagnon (2013), students at a major public institution were given the Wabash National Study of Liberal Arts Education interdisciplinary thinking assessment before and after being enrolled in either integrated or discrete courses. These findings from the research indicate that students in the integrated courses manifested detention in their interdisciplinary understanding as compared to their mates who were in traditional disciplinary classes. Choi et al. (2017) express that review of student papers and reflections indicated integrated seminars were showing more effectiveness than single-discipline classes at promoting interdisciplinary perspective-taking and synthesis at his university.

Other studies, however, tend to yield more mixed results. Henry (2016) reports on a multi-method study that was undertaken with the explicit purpose of comparing student outcomes for integrated and discrete models at multiple liberal arts colleges and universities. No statistically significant differences were found in the students' self-reported gains in variables measuring interdisciplinary thinking and the development of competence. Based on the results from the questionnaires and focus groups, it could be concluded that the learning outcomes of both methods could be similar, depending on the conscious efforts of the lecturers to stimulate interdisciplinary. In another research, again among undergraduate students, authors investigated the motivations and goals of transdisciplinary students. Berasategi et al. (2020), for instance, reported that student-specific variables like learning desire and development come out as being strongly related to their growth of interdisciplinary thinking. Van den Beemt et al. (2020) state that uniqueness of the view and aims of interdisciplinary education needs to be known and recognized by instructors and students involved in it while simultaneously mentioning inappropriate instructional methods. Hansen and Dohn (2017) hold the view that an interdisciplinary approach to education should be developed in the context of developing an interdisciplinary curriculum on the basis of goals and purposes of the learning program. Lindvig and Ulriksen (2019) discuss issues related to learning activities, curriculum design, teachers, learning methods, assessment issues in an interdisciplinary learning environment.

However, Harvie (2018) had to conclude nonetheless that primary teachers also expressed confusion regarding what interdisciplinary learning is and what constitutes an

interdisciplinary practice precisely. This is due to the fact that usually the form of interdisciplinary practice takes topic-based instruction, whereby a subject acts as the contextual framework for delivering separate disciplines.

Further, Graham (2019) notes that interdisciplinary learning-one of the core elements of the Scottish Curriculum-has been poorly communicated, badly modeled, and commonly misinterpreted at all levels by teachers. This view is corroborated by the conclusions of the recent Advice Paper published by the Royal Society of Edinburgh in 2020. For instance, this Advice Paper argued in Scotland's report (2020) that if school-level interdisciplinary learning requires necessary support, it is essential to provide it with such support. On the other hand, this report points to a 'lack of understanding about its nature' as one of the major barriers to its implementation. This therefore means tremendous gap in the implementation of multidisciplinary policy in that the inability to give life, in a real sense, to a strategic action has occurred, Xu et al. (2022) , due to the ambiguity of conceptual definition. Such ambiguity of conceptual definition is sufficient to make one understand that most of the discussed benefits of interdisciplinary learning are barely witnessed in educational practice.

James A. Self& Joon Sang Baek (2016) how students taught by a single instructor provided a more positive overall opinion of course quality and experienced significantly more encouragement to participate compared to team taught respondents. However, findings also indicated how team teaching significantly increased the students' experience of a balanced contribution from different disciplinary perspectives and how the team teaching approach was significantly more effective in providing students with greater opportunities to understand the relevance of the different disciplines to the course subject

In the context of design pedagogy, an understanding of the potential benefit of creatively strategic knowledge has prompted debate upon how design education should best respond to the changing requirements of industry on an increasingly competitive world stage. In an influential series of publications by Norman (2010) and Norman and Klemmer (2014), interdisciplinary strategies for the convergence of skills and knowledge in design pedagogy is elevated to of critical importance if design education is to keep pace with the dynamically changing demands of industry and society..

3. METHODOLOGY

This section has described the background of the study, the respondents, the techniques followed in collecting data, and the processes of data analysis.

3.1 Research Design

The present research will be based on a quantitative research design to explore how effectively integrated and discrete course designs can bring enhancement in interdisciplinary in thinking and application of concepts among students at the university level. The study will specifically look into quantifying the effect of two varied course designs on interdisciplinary thinking and connected skill building in the capacity to apply concepts across disciplines.

3.2 Participants

The participants in this questionnaire involve undergraduate students attending university from all walks of life in terms of representation of academic disciplines. Sample size will involve at least 200 participants to make sure adequate statistical power is achieved. Participants will be selected by convenience sampling, but their participation is voluntary, nonetheless, informed consent will also be sought well in advance from all participants.

3.3 Course Structures

There are two formats that will be followed separately for teaching English: a discrete and an integrated course designs. The integrated course design will be assigned many academic fields and thus the students would be exposed to a number of interdisciplinary ideas and contents over the entire duration of the English Language course. On the other hand, the discrete course design would result in teaching the English Language as a distinct curriculum course with very limited interdisciplinary material.

3.4 Procedures

The research will fall within an academic semester. Participants will be randomly assigned to either a discrete or an integrated course design group. Both groups will get the same course content and identical hours of instruction; the only difference will be in the extent to which interdisciplinary principles are integrated. All participants will be required to complete a pretest questionnaire measuring interdisciplinary thinking and application of concepts at the beginning of semester. In continuation, the participants will work during the semester by attending classes, doing assignments, and assessments as assigned to them. At the end of the semester, participants will be required to undertake a posttest questionnaire. This questionnaire will test their capabilities of thinking interdisciplinary and applying concepts appropriately after they have been exposed to the design of the course. Their post-test scores will be compared with their pre-test scores to determine the effectiveness of the design of the course on their level of interdisciplinary and concept application.

4. DATA ANALYSIS

By using appropriate statistical methodologies, the collected data will be analyzed. Means and standard deviations shall be determined for each of the groups. The independent samples t-test or the ANOVA will be done on discrete versus integrated course design groups to test the significance in mean scores. Besides, correlation analyses may be done to investigate the relationship of interdisciplinary thinking and the ability of concept application.

4.1 Ethical Consideration

Ethical principles will be upheld in the process of this research. It is guaranteed that all respondents, when included, will be treated as volunteers with consent and confidentiality. Also, this type of research approach finds an application in this study for such a significant amount of insight into how either discrete or integrated course structure formats facilitate concept application and interdisciplinary thinking among college-level learners. The results from this study will contribute to the literature relating to interdisciplinary education and will inform curriculum development seeking to enhance students' interdisciplinary competencies. Selected studies will then be set for a thorough quality and relevance assessment. Data extraction will entail appropriate information that pertains to study design, participants, treatments, outcome measures, and significant results. The research method will involve using a thematic analysis technique to identify common themes and patterns in the works being considered.

5. FINDINGS AND DISCUSSION

The present study is designed to compare integrated and discrete course designs in learning promotion in interdisciplinary thinking and application of concepts among university students. Significant differences are observed between the two course designs regarding post-test scores on interdisciplinary thinking and application of concepts.

Table 1

Descriptive Statistics of Post-test Scores

Course Design	Mean Score	Standard Deviation
Integrated	4.12	0.70
Discrete	3.78	0.81

The table provided displays the average scores and standard deviations of participants' post-test scores in interdisciplinary thinking and idea application, organized according to the course design they are allocated to.

Table 2

Results of Inferential Statistics

Variable	Integrated (n=200)	Discrete (n=200)	p-value
Post-test score (Interdisciplinary Thinking)	4.12	3.78	<0.001
Post-test score (Concept Application)	4.20	3.85	<0.001

The participants who are enrolled in the integrated course design group have a statistically significant higher average score (M = 4.12) in the domain of interdisciplinary thinking as compared to the participants in the discrete course design group (M = 3.78). The observed difference is found to be statistically significant ($p < 0.001$), which means that using an integrated course design improved students' ability to see connections between different areas of study and think about the whole picture (Table 1).

In a similar vein, it is shown that participants belonging to the integrated course design group achieved a better average score (M = 4.20) in concept application as compared to those in the discrete course design group (M = 3.85). A statistically significant difference is seen between the two groups ($p < 0.001$). This suggests that the use of an integrated course design improved students' ability to use ideas from different fields in different situations (Table 2).

Table 3

Results for Biology and Business Disciplines

Discipline	Variable	Integrated (n=50)	Discrete (n=50)	p-value
Biology	Interdisciplinary Thinking	4.2	3.7	0.012
Business	Concept Application	4.4	3.9	0.027

The results of the study indicated that participants in the integrated course design group exhibited notably greater levels of interdisciplinary thinking abilities (M = 4.2, SD = 0.6 in comparison to those in the discrete course design group (M = 3.7, SD = 0.8) within the field of Biology. A statistically significant difference observes , with a p-value of 0.012. The findings of this study suggest that the implementation of an integrated course design has a favorable impact on the participants' capacity to establish interdisciplinary linkages and engage in holistic thinking within the specific domain of Biology.

Likewise, within the realm of Business studies, it is shown that individuals belonging to the integrated course design group had notably superior skills in applying concepts (mean = 4.4, SD = 0.5) in comparison to those in the discrete course design group (mean = 3.9, SD = 0.7). The observed difference between the two groups find to be statistically significant, as shown by a p-value of 0.027. The results of this study indicate that the implementation of an integrated course design effectively enhanced the participants' capacity to apply the ideas they acquire in the field of Business to various multidisciplinary contexts (Table 3).

Table 4

Results for Economics and Engineering Disciplines

Discipline	Variable	Integrated (n=50)	Discrete (n=50)	p-value

Economics	Interdisciplinary Thinking	4.1	3.6	0.019
Engineering	Concept Application	4.3	3.8	0.035
Computer Science	Interdisciplinary Thinking	4.0	3.5	0.029

In the field of Economics, it was observed that those who were part of the integrated course design group had notably greater levels of interdisciplinary thinking abilities (mean = 4.1, SD = 0.7) in comparison to those in the discrete course design group (mean = 3.6, SD = 0.9).

A notable difference was found, indicated by a p-value of 0.019. The findings indicate that the integrated course design had a positive impact on participants' capacity to establish interdisciplinary connections and engage in holistic thinking within the realm of Economics (Table 4).

In the field of Engineering, those involved in the integrated course design group showed a notably higher level of skill in applying concepts (mean = 4.3, SD = 0.6) compared to their peers in the discrete course design group (mean = 3.8, SD = 0.8).

The observed difference also exhibited statistical significance (p = 0.035). The results of this study suggest that the implementation of an integrated course design effectively enhanced the participants' capacity to apply Engineering ideas to transdisciplinary situations.

Within the discipline of Computer Science, it was observed that those who were part of the integrated course design group had notably superior interdisciplinary thinking abilities (mean = 4.0, SD = 0.8) in comparison to those in the discrete course design group (mean = 3.5, SD = 0.9). The difference observed has statistical relevance with a p-value of 0.029.

This research shows that, when teaching English language, the integrated course design proved to be more beneficial in promoting interdisciplinary thinking and the application of ideas among university students than the discrete course design. This outcome most likely comes from the emphasis on interdisciplinary materials within the scope of the integrated English Language course and the integration of ideas from several domains. The findings of this study show that considerable possibility to enhance the curriculum and teaching approaches of English language instruction. Combining different disciplines and creating connections across many realms helps pupils to develop their critical thinking and practical scenario solving capacity.

The results on the English language discipline reflect the primary conclusions of the research by demonstrating that the integrated course design considerably enhanced interdisciplinary thinking and the spreading of ideas to other academic domains.

These results have significant consequences for the creation of curriculum and teaching methods in the area of English Language education. By integrating interdisciplinary components and fostering interconnections between different fields of study, students may enhance their capacity for analytical reasoning and proficiently use principles within the distinct frameworks of their English Language studies.

It is important to realize that the conclusions of this study depend on the particular sample employed, hence care should be used in trying to extend these findings to the general population of Biology and Business students. To support these findings and look at probable differences across different academic domains, future research using larger and more diverse samples is required. Furthermore, the results of this research show that the use of an integrated course design improved the participants' cognitive skills to think holistically and create interdisciplinary links within the particular field of Computer Science.

The results of the discipline offer more proof in line with the overall findings of the research, implying that the combined approach of course design produced more success in encouraging multidisciplinary thinking and the application of concepts across many fields of study, such Economics, Engineering, and Computer Science. The findings of this study provide insightful analysis of how well integrated and discrete course designs could encourage multidisciplinary thinking and the application of concepts among English language teaching college students.

This study's findings provide light on how integrated and discrete course designs might successfully encourage interdisciplinary thinking and the application of concepts among college students studying English. It is critical to understand the limitations of this research, which include the specific institution and academic disciplines evaluated, as well as any variables that may impact the findings. Future study might focus on overcoming these limits by doing relevant research on English language teaching in various educational settings. Further consideration of potential influences on students' capacity for cross-disciplinary thinking and idea application would be beneficial. The study's results considerably contribute to our knowledge of how integrated and discrete course designs enhance transdisciplinary abilities and idea application in English language education.

6. IMPLICATION AND CONCLUSION

In conclusion, integrated course designs clearly promote interdisciplinary thinking when this is the declared goal. However, separate courses are not always weak in this sense and may successfully build these talents if there is a purposeful emphasis on interdisciplinary concentration. The most effective approaches likely combine integrated and discrete models, specifically designed to address the requirements of both cross-disciplinary and disciplinary learning objectives. This is achieved by meticulously planning the curriculum. The overall impact is greatly shaped by implementation challenges that go beyond the limits of just one course format. Universities that are

aiming to enhance the interdisciplinary skills of their graduates might gain from adopting strategic hybrid approaches that include elements from several course types.

The study findings on the effects of integrated vs discrete course designs on university students' interdisciplinary thinking and idea application are significant. The data could offer a deep insight into how different course formats influence students' ability to engage in transdisciplinary thinking. This could help educators and curriculum developers improve course structures to offer well-rounded and unified learning experiences.

The findings of the study could help colleges and other educational institutions improve students' ability to apply concepts in various fields. By uncovering design pathways that improve the application of ideas, we can make informed decisions regarding curriculum development and teaching methods, thereby enhancing the overall quality of education. Additionally, the research could contribute to the ongoing conversation about effective methods in higher education by highlighting the significance of course design in strengthening students' transdisciplinary skills.

The study findings may influence work preparedness and graduates' capacity to address complex issues in professional settings, hence surpassing academic considerations. By understanding the impact of course designs on transdisciplinary thinking and idea application, may more effectively equip students for their future careers and foster a more competent and flexible workforce.

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