THE TRANSVERSIBILITY OF THE EFFECT OF MATHEMATICS-RELATED PHYSICAL EDUCATION CLASSES ON STUDENT ATTITUDES.

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Abstract: The general purpose of this research is to examine the effects of courses prepared with an interdisciplinary approach on students' perceptions of different courses. In this context, we aim to examine the effects of students' attitudes towards physical education and mathematics lessons. In this study, the experimental method "pretest posttest with an experimental control group" was used. The study sample was formed with 34 sixth-grade students studying at the Public School: Prudencia Daza Educational Institution of the city of Valledupar, in the 2023 academic year, the lessons were taught with prepared activities from the current curriculum, in addition to the results of the sixth-grade mathematics course, for 12 weeks, while in the control group they continued according to the current curriculum. Therefore, students' attitudes towards mathematics, and students' attitudes towards physical education Attitudes Scale developed by Vanol-Sünbül (2016).

Key words: Transversal approach, Mathematics, Physical Education, Attitudes.

INTRODUCTION

Disciplinary teaching is expressed as teaching based on a particular subject. In this approach, lessons are taught separately and there is no activity or study related to the transfer of knowledge and skills to the outside life. In the disciplinary approach, although the student actively participates in the lesson, the teacher is more active than the student. Therefore, the disciplinary approach leaves the learner in the background and reduces motivation. Therefore, the interdisciplinary (or transversal) approach, which adopts the disciplinary approach but emphasizes the importance of partnering with other disciplines, has gained importance (Yıldırım, 1996).

According to Jacobs (1989), the interdisciplinary approach is defined as the understanding of the program that employs the methodology of different disciplines for the study of a concept, topic, or experience. According to Apostel (1970), it is expressed as the relationship between two or more disciplines. According to Yıldırım (1996), it is the presentation of traditional thematic areas by meaningfully uniting them around certain concepts. On the other hand, with this approach, it is essential that lessons are delivered in an integrated way (Karacaoglu, 2011). An interdisciplinary approach is beneficial in terms of bridging discipline-based education and providing problem-solving skills. It allows the individual to know themselves, be aware of what is happening around them, and bring about change. In this method, a relationship is established between different disciplines through the exchange of information in a transversal way.

Yıldırım (1996) emphasizes that students' present and future skills and needs should be taken into account in instructional designs developed using an interdisciplinary approach. Because they form the basis of the interdisciplinary approach as well as other approaches. With these issues in mind, in order to design effective teaching, the practical aspect of teaching must be more than the theoretical part. Such a design, in which activities and experiences predominate, can allow students to actively participate in the subject.

The use of interdisciplinary approach to learning experience designs in teaching and learning processes is becoming more widespread. Interdisciplinary programs are opened in universities, interdisciplinary teaching programs are developed, and interdisciplinary learning experiences are designed. While some schools devote a special place to interdisciplinary learning activities, they are observed to recommend prepared learning experiences with an interdisciplinary approach in their curricula (MEB (2018).

As is known, the main goal of physical education is to help each student achieve the highest level of movement ability by providing education through physical activities, i.e., movements (Tamer & Pulur, 2001). The math course, on the other hand, is abstract in nature and teaching math as an abstract science that requires complex operations and is difficult to understand distracts students from math. However, teaching abstract concepts by concretizing them can reduce the difficulty of learning mathematics, so mathematics can be more concrete and understandable by establishing relationships between concepts and daily life (Baykul, 2014).

In recent years, there has also been an increase in descriptive and experimental research on learning experiences developed with an interdisciplinary approach and learning activities designed with an interdisciplinary approach. In the research conducted by Ozcelik (2015), the effect of teaching activities based on the interdisciplinary teaching approach on students' academic performance on the volumes of geometric objects was examined. According to the findings obtained in the research carried out at the secondary level, it was revealed that the interdisciplinary approach had a positive impact on the success of the students in the volumes of geometric objects, according to the teaching required by the program. On the other hand, Yarımca (2011) conducted a study on the application of themes designed according to the principles of the interdisciplinary approach at the secondary level in art education. The results of the research revealed that the interdisciplinary approach has a positive effect on art education compared to the traditional method. It has been noted that interdisciplinary studies have been conducted that relate several courses to each other. However, no studies have been found in which mathematics and physical education classes are associated with interdisciplinary activities.

The aim of this research is to acquire the achievements of the physical education lesson and the mathematics lesson through common learning experiences, and thus, by associating the achievements of the two lessons with each other, reveal how students' attitudes towards physical education and mathematics lessons are affected.

Status of the problem

It is very difficult for the human mind to make sense of and answer the questions and problems that exist as a whole in real life by looking at them from a single point. While course designs developed with a disciplinary approach, which has been going on for years, leave the task of combining subjects and activities in different courses to students, interdisciplinary course design makes it easier for the student to establish a relationship with real life by bringing topics together around themes.

Disciplinary teaching is expressed as teaching around a certain subject area. In this approach, lessons are taught separately and there is no activity or study related to the transfer of knowledge and skills to the outside life. In the disciplinary approach, although the student actively participates in the lesson, the subject and the teacher are more active than the student. Therefore, the interdisciplinary approach, which adopts the disciplinary approach, but emphasizes the importance of associating with other disciplines, has gained importance (Yıldırım, 1996, pp. 89-93).

Although the interdisciplinary approach has been interpreted differently by many, there are also similarities. According to Jacobs (1989), the interdisciplinary approach is defined as the understanding of the program that employs the methodology of different disciplines for the examination of a concept, topic, or experience. According to Apostel (1970), it is expressed as the relationship between two or more disciplines. According to Yıldırım (1996); It is the presentation of traditional subject areas by meaningfully uniting them around certain concepts. On the other hand, with this approach, it is essential that lessons are delivered in an integrated way (Karacaoglu, 2011, p. 164). The interdisciplinary approach is complementary, more useful, and alternative to discipline-

based education in terms of integration skills, and problem-solving. Allowing the individual to know themselves, be aware of what is happening around them and generate changes.

The interdisciplinary approach helps to reveal the characteristics of the individual that they do not possess by their nature. That is, the expression 'interdisciplinary', the historian who studies the past of existing things, the scientist who tries to discover how it works, and the artist who produces new things, is the combination of mental functions (Hope, 1991 cited in Demir, 2009, p. 12), explained multidimensional thinking, investigative character, problem-solving skills, Creative thinking, questioning, research skills, and the different aspects that an individual can gain as a result of these, which are hidden in the focus. In addition, it provides the individual with the right to generate self-criticism or feedback. Therefore, it will provide an opportunity for people who can freely express their thoughts to participate in original developments (Hepkon, 2006).

When preparing the course design according to the principles of interdisciplinary teaching, it is necessary to know the interdisciplinary structure and how to establish the interdisciplinary relationship. In this approach, when preparing a course design, it is necessary to associate the topic or concept with more than one discipline rather than being overwhelmed by a single discipline. The topics chosen should allow for engagement with multiple disciplines. (Source). At this point, when choosing a very specific subject, for example, teaching strokes in butterfly swimming, it can be difficult to relate it to other disciplines. Or, when choosing a very broad topic/concept, it can be difficult to establish a healthy relationship between disciplines such as: sports.

Yıldırım (1996) emphasizes that students' present and future skills and needs should be taken into account in instructional designs developed using an interdisciplinary approach. Because they form the basis of the interdisciplinary approach as well as other approaches. With these issues in mind, in order to design effective teaching, the practical aspect of teaching must be more than the theoretical part. Such a design, in which activities and experiences predominate, can allow students to actively participate in the subject.

While learning experiences elaborated with an interdisciplinary approach are generally thematic or problematic and involve teamwork, the preparation process, determined designs, and stages differ, therefore, how, definitions and discussions, which are seen in learning experiences prepared with the interdisciplinary approach that have some advantages compared to the disciplinary approach. Here are some quotes:

- It allows students to actively participate in their learning life.
- It allows students to interconnect what they have learned with real life.
- It gives students a holistic approach to what they learn.
- It is possible to help reveal the characteristics that the student has and cannot see.
- It helps the student to think multidimensionally.
- It directs the student to research.
- Develops the student's problem-solving skills.
- Encourage students to think creatively.
- It leads students to questioning and critical perspective.
- It gives students the ability to express themselves freely.

The use of interdisciplinary approach to learning experience designs in learning and teaching processes is becoming more widespread. Interdisciplinary programs are opened in universities, interdisciplinary teaching programs are developed, and interdisciplinary learning experiences are designed. While some schools dedicate a special place to interdisciplinary learning activities. However, it is evident that the curricula also recommend learning experiences developed with an interdisciplinary approach.

In recent years, there has also been an increase in descriptive and experimental research on learning experiences developed with an interdisciplinary approach and learning activities designed with an interdisciplinary approach. In the research conducted by Ozcelik (2015), the effect of teaching activities based on the interdisciplinary teaching approach on students' academic performance on the volumes of geometric objects was examined.

According to the findings obtained in the research carried out at the secondary level of El Prudencia Daza, it was revealed that the interdisciplinary approach had a positive impact on the success of students in the volumes of geometric objects, according to the teaching required by the program. It can also be stated that the subjects designed according to the principles of the interdisciplinary approach at the secondary level are art, yielding as results the research that the interdisciplinary approach has a positive effect on art education compared to the traditional method. It has been noted that interdisciplinary studies have been conducted that relate several courses to each other. However, no studies have been found in which mathematics and physical education classes are associated with interdisciplinary activities. Consequently, the aim of this research is to acquire the achievements of the physical education lesson and the mathematics lesson through common learning experiences, and thus, by associating the achievements of the two lessons are affected.

MATERIALS AND METHODS

The study sample was formed with 34 sixth-grade students who study at the Public School: Prudencia Daza Educational Institution in the city of Valledupar, in the 2023 academic year. Care was taken to ensure that the sixth-grade branches of the school included in the study were as similar as possible to the previous year's interest in math and physical education lessons, their grades, and student numbers. 17 of the students were randomly selected as an experimental group and the other 17 as a control group. Before starting the investigation, permission was obtained from the Directorate of the Municipal Secretary of Education and the administration of the educational institution. In addition, a parental consent form was obtained from all students who participated in the study.

In the experimental group of the study, lessons were delivered with prepared activities in addition to the current curriculum for 12 weeks, while the control group continued with the current curriculum. The research pattern of the study is shown in Table 1:

Groups	Pre-test	Experimental Application	Final examination			
	Education Lesson	Activities that relate 6th	IEPD School Physical			
Exporimontal	Attitude Scale	grade math and physical	Education Lesson			
experimental	IEPD School Physics	education lessons to an	Attitude Scale			
group –	Math Lesson Attitude	interdisciplinary approach	Math Lesson Attitude			
	Scale	applied teaching method	Scale			
Control Group –	Education Lesson	A teaching method in which	Education Lesson			
	Attitude Scale	activities related to the	Attitude Scale			
	IEPD School Physics	6th grade math and physical	IEPD School Physics.			
	Math Lesson Attitude	education with an	Math Lesson Attitude			
	Scale	interdisciplinary approach.	Scale			
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Table 1. Research Pattern

Elementary School Physical Education Lesson Attitude Scale: The Elementary School Physical Education Lesson Attitude Scale developed by Phillips and Silverman (2012) and adapted by the scale is a 5-point Likert scale consisting of two sub-factors, cognitive and affective, and 15 items, of which 8 are positive and 7 negative. Cronbach's alpha value for the global scale was 0.83, the reliability coefficient for the first "cognitive" sub-dimension was 0.96, and the second sub-dimension was 0.95 for "affective".

Mathematics Attitude Scale: The Mathematics Attitudes Scale developed by Önal (2013) is a 5-point Likert scale. The Cronbach's alpha coefficient calculated to determine the internal consistency of the scale was 0.90. According to the factor analysis, the 1st factor was gathered under the heading: Interest, the 2nd factor: Anxiety, the 3rd factor: work, and the 4th factor under the heading: Need. The scale consists of 22 Attitude Indicators, 11 of which are positive and 11 negative. All the data

were taken together by the physical education teacher (Researcher) and the Mathematics teacher who made the application. The pre-test was taken about 15 minutes before the first study, in the gymnasium, using the forms prepared by number of students. The final test, on the other hand, was collected by the researcher and the course teacher through forms prepared in the last 20 minutes of the lesson on the same day the 12-week experimental study was completed.

Experimental study

Before starting the research, the researcher designed 12 different interdisciplinary activities in which physical education and mathematics lessons were taught together. After the researcher prepared the activities, an experienced math teacher assessed them in terms of their suitability for the school's math course content and deemed them appropriate. It was then examined by an academic working in the field of educational sciences and the activities were finalized according to the suggestions. The achievements associated with the physical education lesson and the mathematics lesson in the activities are shown in Table 2.

Act.	Achievements - PE lesson	Mathematics Course Result		
1	Apply scrolling motions showing awareness of space and effort.	It determines the ratio of two multiplicities of units that are the same or different from each other.		
2	Apply scrolling motions showing awareness of space and effort.	Solves problems that require four operations with decimal expressions.		
3	Individual solutions to problems encountered in games and sports preparation activities.	Know the concepts related to mathematics.		
4	Understand the importance of cooperation in games and activities.	Create the desired steps from the given number and the shape patterns.		
5	Understand the importance of cooperation in games and activities.	Add and subtract decimal numbers.		
6	Apply scrolling motions showing awareness of space and effort.	Divide decimal representations with given numbers.		
7	It explains changes in fitness level over time as a result of participation in physical activities. Calculate the number of calories used in daily life.	Integers add, subtract, multiply, and divide.		
8	He realizes the importance of using time effectively in games and activities.	Explain the meaning of simple algebraic expressions.		
9	Evaluates the performance of himself and his friends in games and activities. Understand the importance of cooperation in games and activities.	Draw the orthogonal coordinate system based on examples from everyday life.		
10	Explain movement concepts used in games and activities that prepare for sports. Demonstrates movement skills in games and activities that prepare you for team sports.	It is determined by measuring that the ratio of the length of a circle to its diameter is a constant value.		
11	Apply scrolling motions showing awareness of space and effort. Explain movement concepts used in games and activities that prepare for sports.	Understand the basics of sets.		
12	Individual solutions to problems encountered in games and sports preparation activities. Apply the strategies and tactics developed in games and sports preparation activities.	Solves problems that require four operations with decimal expressions Perform basic math with whole numbers.		

Table 2. Associated achievements of the physical education lesson and the mathematics lesson in activities prepared with an interdisciplinary approach.

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The study was limited to two hours of class per week for 12 weeks. The activities were carried out by the physical education teacher of the experimental and control groups. Each week, one of the

interdisciplinary activities developed by the researcher and completed with the opinions of the experts was applied to the experimental class. The execution time of the activities varied between 20 and 30 minutes. In the first part of the 60-minute lessons, after the routine warm-up exercises, the lessons were taught according to the annual plan. Once the main phase of the course was completed, the interdisciplinary activities developed for the experimental study were applied in the remaining 30 minutes of the course.

Validity Reliability

The construct and content validity, the factor analyses, the internal consistency of the scales used in the research were performed during the development and adaptation stages, and the internal consistency of the scales was determined. To ensure the validity and reliability of the analysis of the data collected in the research setting, the scales that were not filled out in their entirety were not included in the analysis process.

Data analysis

In the analysis of the data obtained in the research, the statistical program SPSS 16 was used. The independent sample t-test was applied to the data belonging to the pre- and post-tests applied to the experimental and control groups. In addition, the sample-dependent t-test was used to determine if there was a significant difference between the groups' pre- and post-test data. Data were assessed with a significance level of 0.05.

Results

Group	N	x	SD	Mexico City	t	Р
Pre-test	17	57.23	4,75	17	1.5	150
Final examination	17	53.41	8.50	0	0	150

scores:

Considering the attitudes of students who teach mathematics-related physical education classes with an interdisciplinary approach towards physical education classes in the pre-test (57.23 points) and post-test (53.41 points), the difference between them is not statistically significant (P>0.05).

Table 4. Comparison of the Experimental Group's Attitude Toward Pre- and Post-Test Scores of
the Math Lesson

Group	N	x	SD	Mexico City	t	Р
Pre-test	17	81.94	20.24	16	0.137	0.892
Final examination	17	81.47	17.50	0	0	0

Considering the attitudes towards mathematics of students who teach physical education classes associated with mathematics with an interdisciplinary approach, the difference between them is not statistically significant (p>0.05).

Group	N	x	SD	Mexico City	t	Р
Pre-test	17	52.88	8.85	16	-329	0.746
Final examination	17	53.70	8.71	0	0	0

Table 5. Comparison of Control Group Attitude Towards Pre- and Post-PE Lesson Test Scores

The difference between the pretest (52.88 points) and post-test (53.70 points) averages of the attitudes towards physical education of students who do not teach physical education classes

associated with mathematics with an interdisciplinary approach is not statistically significant (p>0.05).

Group	N	x	SD	Mexico City	t	Р
Pre-test	17	71.58	14.64	16	-1.415	0.176
Final examination	17	75.74	18.49	0	0	0

Table 6. Results of the sample t-test dependent on pre- and post-test scores of the control group's attitude toward the math lesson

An interdisciplinary approach determines the attitudes of students who teach physical education lessons towards the mathematics lesson without applying the activities related to the physical education lesson and the mathematics lesson. The difference between the pretest (71.58 points) and posttest (75.74 points) means was not statistically significant (p>0.05).

In the field of research, no significant difference was observed in the attitudes of the students of the experimental group, to whom physical education lessons associated with mathematics were applied, and the students of the control group, to whom the traditional approach was applied, towards mathematics. and physical education. In other words, it has been concluded that the attitudes of students who study with an interdisciplinary approach towards mathematics and physical education do not differ significantly from those who take classes with traditional education. Interdisciplinary approaches in education are an accepted teaching approach based on the assumption that the disciplinary approach is not enough. The most important detail in the interdisciplinary approach is to combine all the fields that have an impact on the realization of a learning outcome and to give the student the opportunity to see the big picture and have a holistic learning experience (Drake & Burns, 2004).

This approach ensures the student's active participation, enhances their understanding of the need to learn information, and supports long-term learning. In this approach, the student's motivation to learn increases. Students have the opportunity to relate the topics to real life, which makes the learning experience and learning environment more engaging. It develops a culture of lifelong learning (Guercio, 2003 and Sullivan, 2000). Different research results have emphasized that learning experiences developed with an interdisciplinary approach lead to beneficial outcomes in the development of multidimensional thinking skills, acquisition of high-level skills, and increased decision-making and problem-solving skills, and verbal, mathematical, and intellectual skills. expression skills (Coşkun, 2009).

The literature mostly concludes that the interdisciplinary approach yields more positive results in students' attitudes towards the course, in the development of high-level competencies and in the establishment of relationships between courses and life. Despite that, the fact that there is no significant difference in students' attitudes towards the physical education lesson and the math lesson as a result of this research brings with it the idea that many factors are effective in the interdisciplinary approach. According to Yıldırım (1996), in order for the interdisciplinary approach to be successfully applied in the teaching process, it is necessary to know exactly the interdisciplinary approach and its principles. Also, one should not be under the influence of a single discipline, interrelated disciplines should be used as much as possible, themes and themes should be comprehensive and harmonious, and they should be linked. The existing and future skills and needs of the students should be taken into account, the practical aspect of teaching should be emphasized, and it should be suitable for teamwork. Lake (1994), on the other hand, drew attention to the importance of establishing relationships between concepts.

In the research carried out by UNESCO (1986), emphasis was placed on the analysis of the needs of the individual, the teaching strategy and method, the suitability of the materials, and the duration and time of application. It has been claimed that the success of the interdisciplinary approach is effective in the success of the application, such as the competence of the teacher, the fact that the

student has some basic knowledge and skills, and the ability to question, think multidimensionally and establish relationships. (Coşkun and Altun, 2012; Gunsel, 2004).

When we try to understand the reasons why the results of this research may have caused different results from the literature, it is possible to make the following assessments: The study continued for 12 weeks without interruption and the implementation of an interdisciplinary activity each week may have been short in terms of the duration of the research. While the physical education lesson is one of the most beloved subjects by students, the attitude towards the math lesson is relatively low. It can be said that associating these two courses creates difficulties in terms of students' perception of the course.

Looking at similar studies, it can be stated that numerical courses such as mathematics and science are associated, or interdisciplinary relationships are established between verbal courses such as history, music and English. The fact that the course design is different from the ordinary physical education course and especially the attempt to establish a relationship with the mathematics course and the students' strong prejudices towards mathematics may have affected the results of the research. In addition, the concrete and skill-oriented structure of the physical education lesson made it possible to rationalize the mathematics lesson in the student's mind and rationally make sense of it, but it can be evidenced, in similar studies, the interdisciplinary relationship with which it was attempted to be established in a more conceptual framework (Coşkun, & Altun, 2012; Ozcelik, 2015). Also, because our results came out this way, the interdisciplinary activities we designed may not have been suitable for the students' interests and needs.

When constructing interdisciplinary studies, it is recommended to practice in more than one field at the same time, with the collaboration of teachers (Gur, 2003; Yarımca, 2011). In this study, the interdisciplinary study was conducted solely by the physical education teacher. The fact that teachers of mathematics and different branches did not make their course designs on an interdisciplinary basis may have affected the results of the study.

BIBLIOGRAPHIC REFERENCES

- [1] Apostle, L. (1970). interdisciplinary; Problems of teaching and research in universities. Paris: Organisation for Economic Co-operation and Development.
- [2] Baykul, Y. (2014). Teaching Mathematics in Primary Education. 1-5. For Classes. Ankara: Pegem A. Publications
- [3] Coskun, S. B., & Altun, S. (2012). The effect of teaching the eighth grade math lesson according to the principles of the interdisciplinary approach on students' math performance. Kalem Journal of Education and Human Sciences, 2.
- [4] Coskun, S.B. (2009). Investigation of the effect of teaching the eighth grade math lesson with an interdisciplinary focus on students' mathematical performance and critical thinking dispositions. Unpublished Master's Thesis. Yıldız Technical University.
- [5] Drake, S., & Burns, R. (2004). Meet standards through integrated curriculum. Alexandria, Va.: Association for Curriculum Supervision and Development.
- [6] Guercio, C. J. (2003). An interdisciplinary curriculum and its positive effect on student motivation in the classroom. Unpublished master's thesis, Caldwell College.
- [7] Gunsel, A.M. (2004). Physical education and its applications in primary education. Ankara: Memoirs.
- [8] Gur, T. (2003). The future of education, the changing paradigm of universities and education. Interdisciplinarity in Research and Education. Istanbul: University Press.
- [9] Jacobs, H. H. (1989). Interdisciplinary Curriculum: Design and Implementation. Alexandria: Association for Supervision and Curriculum Development.
- [10] Karacaoglu, O. C. (2011). Curriculum development in online education. Ankara: Need for publication.
- [11] Lago, K. (1994). Integrated Curriculum. Portland: Northwest Regional Education Lab.
- [12] MEB (2018). Mathematics Curriculum (Elementary and Secondary Grades 1, 2, 3, 4, 5, 6, 7 and 8). Ankara: Ministry of National Education.
- [13] Onal, N. (2013) Scale Development Study for High School Students' Attitudes Toward Mathematics. Elementary - Online, 12(4).
- [14] Ozcelik, C. (2015). The effect of teaching activities based on the interdisciplinary teaching approach on students' academic performance and problem-solving skills on volumes of geometric objects. Unpublished Master's Thesis, Bartin University, Institute of Education Sciences, Bartin.

- [15] Phillips, S. R., & Silverman, S. (2012). Development and validation of scores of an instrument to measure the attitude of fourth and fifth grade students towards physical education. Measure of Physical Education and Exercise Science.
- [16] Sullivan, J. M. (2000). A Study of the Effect of an Interdisciplinary Study Enhancement Program on Academic Achievement and Classroom Behavior Among Tenth-Grade Students. Unpublished doctoral thesis, University of Massachusetts Lowell.
- [17] Tamer, K., & Pulur, A. (2001). Teaching methods in physical education and sport. Ankara: Island
- [18] UNESCO (1986). Interdisciplinarity in General Education. Division of Educational Sciences (1-5 July 1985). UNESCO Headquarters.
- [19] Varol Y.K., Ünlü H., Erbaş M K., Sünbül A. M. (2016) Adaptation of the attitude scale of primary school physical education lesson to Turkish, Journal of Sport Sciences. 27.
- [20] Yarimca, O. (2011). A case study based on an interdisciplinary approach. Journal of Academic Perspective, (25).
- [21] Yildirim, A. (1996). The Concept of Interdisciplinary Teaching and its Implications for Programmes. Journal of the Faculty of Education of Hacettepe University.