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The Efficiency of the Worksheet and Practical Applications in the Context of the School Trip

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ABSTRACT. This study highlights the effects of using a worksheet for the analysis of practical applications carried out with students. As part of an interdisciplinary thematic field trip, a tourist route through a historic urban center was followed, and a natural history museum was visited. These activities were preceded by documentation and the creation of a magazine, aimed at identifying and correcting potential gaps, validating prior knowledge to which new information, concepts, or procedures will be related, as well as gathering, selecting, and structuring information for future use. The study involved 43 students aged 16-18, of both genders, from nine classes (10th-12th grades) at "Al. Papiu Ilarian" National College in Târgu-Mureș. To achieve the research objectives, the students participated in a project-based learning activity. They went through several stages, with the current study detailing the practical applications and the completion of the worksheet. The necessity of involving students in practical experiences is emphasized for the development of critical thinking and scientific skills.

Keywords: worksheet, field trip, interdisciplinarity, practical applications, visit, museum

ZUSAMMENFASSUNG. Diese Studie hebt die Auswirkungen der Verwendung eines Arbeitsblattes zur Analyse praktischer Anwendungen hervor, die mit Schülern durchgeführt wurden. Im Rahmen einer interdisziplinären thematischen Exkursion wurde eine Touristenroute durch ein historisches Stadtzentrum

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verfolgt und ein naturhistorisches Museum besucht. Diesen Aktivitäten ging eine Phase der Dokumentation und die Erstellung eines Magazins voraus, mit dem Ziel, mögliche Lücken zu identifizieren und zu beheben, vorhandenes Vorwissen zu überprüfen, an das neue Informationen, Konzepte oder Verfahren angeknüpft werden können, sowie Informationen für die zukünftige Nutzung zu sammeln, auszuwählen und zu strukturieren. An der Studie nahmen 43 Schülerinnen und Schüler im Alter von 16-18 Jahren aus neun Klassen (10. bis 12. Jahrgangsstufe) des "Al. Papiu-Ilarian" Nationalkollegs in Târgu-Mureș teil. Um die Forschungsziele zu erreichen, nahmen die Schüler an einer projektbasierten Lernaktivität teil. Sie durchliefen mehrere Phasen, wobei die aktuelle Studie die praktischen Anwendungen und die Bearbeitung des Arbeitsblatts detailliert beschreibt. Die Notwendigkeit, Schüler in praktische Erfahrungen einzubinden, wird betont, um kritisches Denken und wissenschaftliche Fähigkeiten zu fördern.

Stichwörter: Arbeitsblatt, Exkursion, Interdisziplinarität, praktische Anwendungen, Besuch, Museum

INTRODUCTION

Practical applications represent an effective teaching method through which students learn theoretical concepts and apply them in real-world contexts (Dulamă, 2008a, 2008b; Ilovan, 2007, 2020). Practical applications in urban and museum settings allow students to observe urban infrastructure (Maroşi et al., 2019), museum exhibits, and other significant elements (Conţiu & Conţiu, 2024), while also developing essential skills in analysis, synthesis, and teamwork (Dulamă et al., 2012, 2013). For students and teachers, practical applications pose a challenge to think geographically and are the focus of research at both high school and university levels (Ilovan, 2019; Ilovan et al., 2016, 2018; Conţiu & Conţiu, 2024a).

Through the design, organization, and coordination of practical applications by the teacher, essential conditions are ensured for understanding and deepening geographical knowledge (Mândruț, 2013), for ensuring learning progress (Black et al., 2011), and for students to perceive the complexity of interdisciplinary relationships (Conţiu & Conţiu, 2009). These activities also help in acquiring technical and cognitive skills, along with transversal competences (Dulamă, 2010a, 2010b). During practical applications, students can develop competences in exploring, presenting, and representing urban spaces (Ursu et al., 2019).

The use of the most effective interactive teaching strategies in organizing a learning situation, where the student solves a task (Bocoș et al., 2021), creates favorable conditions for a better understanding of geographical space (Paraschiv,

2007), for establishing the connection between theory and practice, and for thorough learning (Dulamă et al., 2020). Practical experiences help students develop critical thinking and combine theoretical learning with direct field observations (Conţiu & Conţiu, 2023, 2024a). Practical applications provide an authentic learning context and, by supporting environmental knowledge, leads to self-awareness, a key goal in the development of human personality (Conţiu & Conţiu, 2013b). The development of students' personalities occurs through action, confrontation, communication (Albulescu & Albulescu, 1999), active learning, and cooperation (Pop-Păcurar, 2007; Dumulescu et al., 2021).

Regarding students' education and learning content, the importance of active and cooperative learning should be highlighted (Pop-Păcurar et al., 2023), the trend of interdisciplinary organization (Cucoș, 2009), and the need to reconsider the educational role of museums (Conţiu & Conţiu, 2013a). The concept of interdisciplinarity, which emerged as a necessity to overcome the boundaries between different fields and foster integrated education, represents a way of curricular organization focused on methods and attitudes, through a specific interdisciplinary approach that transcends the content area (Ardelean & Mândruț, 2012). The interdisciplinary approach offers several advantages: grounding learning in reality and promoting a global vision, facilitating contextualization, decompartmentalization, and reducing the temptation of integralism in the formation of concepts and representations (Bradu, 2013). However, with excessive use, it poses the risk of gaps, superficiality, and lack of rigor in the cognitive process (Conţiu & Conţiu, 2014a, 2014b).

This research started from the observation that students retain information more easily and learn thoroughly when they engage in non-formal educational activities where they apply and contextualize the knowledge acquired in the classroom (Conţiu, 2009; Conţiu & Conţiu, 2016). The practical applications carried out on a tourist route through a historic urban center, the visit to a natural science museum, and participation in a symphonic concert, as part of a thematic interdisciplinary trip, preceded by research and the creation of a magazine, and followed by the completion of a worksheet, offer the opportunity to establish a connection between theory and practice, as well as to contextualize learning, acquire new knowledge, skills, or abilities, and complement the collection of valuable experiences for personal and professional development.

In the context of this educational approach, practical activities are defined as a set of applied, interactive, and exploratory tasks carried out outside the traditional classroom setting, involving the direct participation of students in observing, analyzing, collecting, and processing real-world information. The worksheet is a key tool designed to stimulate reflection and active learning, helping to organize and apply knowledge through practical activities. School

field trips provide an interdisciplinary framework that facilitates integrated, and applied learning. They have a significant positive impact on the development of students' skills, such as critical thinking, autonomy, collaboration, and problem-solving abilities.

The aim of this study is to investigate the effects of teacher-guided practical applications, direct individual observations, and the completion of a worksheet on students' knowledge and competencies. This includes identifying and correcting potential gaps, validating prior knowledge to which new information, concepts, or procedures will be related, as well as gathering, selecting, and structuring information for future use.

To achieve the aim of the study, two research questions were established:

Q1. What is the effectiveness of the worksheet and practical applications on students' knowledge about urban and museum spaces, in the direct analysis of a historic urban center and a natural history museum?

Q2. What are the effects of direct observation on the elements identified by students in urban and museum spaces?

METHODOLOGY

Participants. This research involved 43 students from 9 classes (10th-12th grades) at "Al. Papiu Ilarian" National College in Târgu-Mureș, aged 16-18, of both genders. Six classes had a scientific profile (specializations: "nature sciences bilingual English", "nature sciences intensive English", "nature sciences", and "mathematics-informatics intensive informatics"), and three had a humanities profile (specializations: "social sciences intensive English" and "social sciences intensive German"). The criteria for selecting the students were: belonging to one of the classes taught by the two authors of the study; membership in the *GeoArt* Club, founded and coordinated by the two authors; and participation in the thematic interdisciplinary trip. The students participating in the project were divided into eight heterogeneous groups in terms of gender, geographic competence level, and class, but homogeneous in age (16-18 years). Based on the participants' free choice, five groups of five students and three groups of six students were formed. These student groups were also involved in the study concerning the preparation for the trip (Conțiu & Conțiu, 2024b).

Procedure. The activities were organized and carried out in November 2024, through a thematic interdisciplinary trip (Vienna, November 7-10), as part of an international educational project, occasioned by the Târgu Mureș State Philharmonic concert at the Wiener Musikverein ("Golden Hall", Vienna) and the partnership agreement with the Iunona Community Development

Association, the event organizer. The project aims to raise students' awareness of European cultural and spiritual values and to involve them as active citizens of the community.

To achieve the research objectives, students participated in a project-based learning activity. The students went through several stages: (1) the documentation and magazine creation stage; (2) the practical applications stage (walking the tourist route through the historic center and visiting the natural history museum); (3) participation in the symphonic concert; (4) the worksheet completion stage. Between October and November 2024, the students completed the documentation and magazine creation stage (*Geographia*, no. 2/2024, Vol. XXII), which then served as a useful guide for the participants (cf. Conţiu & Conţiu, 2024b).

Teaching Activities. This study details the use of the worksheet for analyzing the practical applications carried out with the students in November 2024. This stage consists of three sub-stages.

Sub-stage 1. *Discussing the task, objectives, and requirements with the students*. The students were assigned the task of completing a worksheet based on the practical applications carried out in Vienna (walking the tourist route through the historic center and visiting the natural history museum). Following the practical applications, the students achieved several objectives: identifying gaps and raising awareness of their prior knowledge about the capital of Austria, the Natural History Museum in Vienna (Naturhistorisches Museum Wien), and urban, museum, and cultural spaces in general; observing specific historical, religious, and cultural elements, as well as the museum exhibits, and having each team complete a worksheet related to the research theme; analyzing how these elements are integrated into the urban context and the local community, and developing the ability to correlate field observations with theoretical knowledge.

The task was formulated as follows: Form teams of five or six students. When you walk the tourist route through the historic center and visit the natural history museum, each of you will take notes in a notebook, recording the explanations provided by the teacher and your own impressions. These will be discussed with the other team members at the end of each day's activities and completed. On the bus, on the way back, a representative from each team will present the key elements they remembered and/or noticed. Each team will complete the worksheet (Annex 1) upon returning home. The worksheet will be evaluated by the teachers and by another team chosen by them. Two weeks will be allocated for completing the worksheet. Starting from the second half of November 2024, during geography lessons and a round table (at the first of the weekly GeoArt Club meetings after returning from the trip), each group will

discuss the worksheet with the teacher and other groups, and will explain why they believe students should be involved in such projects and participate in thematic interdisciplinary trips. You will organize a photo exhibition in the Antechamber of the College's Festive Hall, publish articles in the local press, and create a new edition of the *Geographia* magazine (no. 1/2025).

Sub-stage 2. *Forming the groups, conducting practical applications, and group completion of the worksheets*. The students formed five groups of five students and three groups of six students. Each group organized its activity outside of class hours, distributed tasks independently, conducted research, and completed the worksheet after carrying out the practical applications guided by the teachers and returning home.

Sub-stage 3. *Completion, presentation, and evaluation of the worksheets took place* in the first week after returning home (November 11-15, 2024). At the end of the project, each team completes the worksheet according to the instructions provided by the teachers and the field guidance, and discusses it with the other groups as well as with the teacher. Each group evaluates the worksheet of another group (as chosen by the teachers) and engages in discussions with students from the other group.

Instruments. The research data were collected through the worksheet and an evaluation grid for it.

The worksheet (Annex 1) consists of two sections, preceded by identification elements for the groups, the members of the groups, the classes to which the participants belong, and the date. The first section includes five tasks related to *the historic center of Vienna*. The first four structured questions require the completion of short answers related to the names of buildings/ monuments and the year (or century) of construction, architectural details and styles, and the atmosphere of the historic center (sounds, colors, activities). The fifth task asks for a sketch of the route taken through the historic center of Vienna, coordinated by the teachers, and the notation of the main tourist attractions observed, along with the attachment of representative photographs. The second section is related to *the Natural History Museum* (*Naturhistorisches Museum Wien*). It includes three structured questions: the first two are about two exhibits in the museum that caught their attention (name, a brief description, and notable aspects), and one of the sections visited (name, interesting aspects, and the connection to what was learned in class, in biology and geography lessons); the third task involves observing and describing species of animals and fossils.

The evaluation grid for the worksheet (Table 1) includes the completion by the eight teams of the tasks specified in the two sections of the worksheet,

preceded by the general data. The responses of the teams were centralized, along with the examples provided, their number, and their weight.

RESULTS AND DISCUSSIONS

1. Analysis of the completion of tasks in Section A of the worksheet: The Historic Center of Vienna

All students mentioned the group number, the names and surnames of each member, the class or classes they belong to, and the date of completion of the worksheet. Regarding *the Historic Center of Vienna*, the analysis of the answers (Table 1) reflects the following. All teams named *a representative building*: St. Stephen's Cathedral (3 teams; 37.5%), Hofburg Palace (3 teams; 37.5%), and the Vienna City Hall (2 teams; 25%). They also specified the year or century of construction (1137 for St. Stephen's Cathedral; 13th century for Hofburg Palace; 1883 for Vienna City Hall). The students identified architectural styles: Gothic (6 teams; 75%), Baroque (3 teams; 37.5%), Renaissance and Neoclassical (2 teams each; 25%), and Rococo (1 team; 12.5%). Architectural details were identified by 7 teams (87.5%): the monumental façade of the Heldenplatz Gate (Hofburg), the stained-glass roof of St. Stephen's Cathedral, and the clock tower of the City Hall (2 teams each; 25%); the Renaissance façade of the Neue Burg wing, with imposing statues and decorated balconies (1 team; 12.5%). The results show that the students have well-developed observation skills, have made interdisciplinary connections between tourism geography and visual education, and linked what they learned in plastic arts lessons about architectural styles, recognizing the importance of visual-aesthetic education values.

All teams specified a *representative religious building*. Since the requirement did not specify that the representative religious building should not be the same as the representative building mentioned in the previous point, St. Stephen's Cathedral (Dom) was mentioned by the majority of teams (6 teams; 75%), who specified the year construction began (1137), as well as moments from its later evolution (for example, GD completed the information by mentioning its transformation into the Gothic style in the 13th-15th centuries and the completion of the southern tower in 1433). St. Peter's Church (1701-1733) with its fresco-decorated dome, and Karlskirche (18th century) with its elegant and monumental architecture, featuring impressive domes, were specified by one team each (12.5%). The Gothic style (6 teams; 75%) and Baroque style (2 teams; 25%) were mentioned.

Regarding *the monument or statue observed*, the *Plague Column* (*Pestsäule*) was mentioned by 5 teams (62.5%), *the Maria Theresa Monument* by 2 teams (25%), and *the Equestrian Statue of Joseph II* by one team (12.5%).

Elaborate responses to the question "*How would you describe the atmosphere in the historic center of Vienna from the perspective of the sounds you heard*?" were provided by 2 teams (25%): 'It is vibrant and full of life. The predominant sounds are a mix of urban noise and historical harmonies; classical music, coming from in front of cafes or street musicians, complements the elegant and refined atmosphere of the city; the sound of the bells from St. Stephen's Cathedral rings periodically, offering a sacred and ancient air; the atmosphere is one of harmony between tradition and urban dynamism' (GD); 'It is dominated by the sounds of conversations in various languages, blending with the echo of horse hooves on the cobblestone pavement; Christmas carols in multiple languages, played through the audio systems of stores and terraces, add a warm and festive feeling, turning the space into a sonic painting full of charm and tradition' (GF). "Melodious and artistic", and "cheerful, pleasant, and calm" were described by 2 teams each (25%; GE and GA, respectively GG and GH). The atmosphere in the historic center of Vienna was described as "chaotic" in the large boulevards, and "with a variety of sounds that sometimes blend inharmoniously", by one team each (12.5%; GC and GB). The students' responses indicate a good perception of the sounds and noise, and in their presentations, they demonstrate oral communication competence when using literary language.

To the question "*How would you describe the atmosphere in the historic center of Vienna from the perspective of the predominant colors?*", the elaborate responses were provided by the same two teams (25%): "A palette of elegant and sophisticated colors, shades of cream, beige, and white, reflecting a classic and aristocratic air, evoking the imperial splendor of the city; the baroque and gothic facades are often decorated with details of gold and silver, adding a subtle, refined contrast; the roofs are covered with colorful tiles, such as green and yellow, which add a touch of life and energy, while the gardens and parks offer shades of green, providing a pleasant contrast" (GD); "It is subtle and elegant, dominated by warm and white tones emanating from the lighting of the historic buildings; the imposing facades shine in a calm light, creating a sense of intimacy and refinement; a combination of tradition and innovation gives the place a unique charm" (GF). The colors white, green, and red, as well as golden accents, were noted by 2 teams (25%; GE, GG), while the color uniformity, visual harmony "pleasing to the eye", and the "old aura, but not outdated", were remarked by 4 teams (50%; GA, GB, GC, GH). Notably, the use of literary language shows that the students demonstrated high-level linguistic skills and well-developed observation abilities, with good-quality memory and representations, fine perceptions of colors and their effects, attention focused on details, noticing harmonies and contrasts, with the urban landscape having a strong impact on them.

Table 1. *Evaluation Grid for the Worksheet*

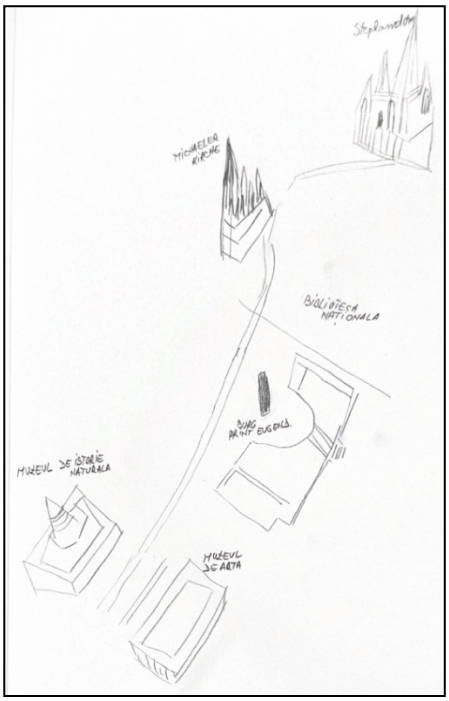
Tasks/ Answers \ *Group*			G^A	G^B	G^C	G^D	G^E	G^F	G^G	G^H	Total	
											Nr.	%
General data	Group number		x	x	x	x	x	x	x	x	**8**	**100**
	Student's first name/last name		x	x	x	x	x	x	x	x	**8**	**100**
	Class/Classes		x	x	x	x	x	x	x	x	**8**	**100**
	Date		x	x	x	x	x	x	x	x	**8**	**100**
Section A. The Historic Center of Vienna	*1. A representative historical building*											
	a. The name of the building	St. Stephen's Cathedral	x	-	-	x	-	-	x	-	**3**	**37.5**
		Hofburg Palace	-	-	-	-	x	x	-	x	**3**	**37.5**
		Vienna City Hall (Rathaus)	-	x	x	-	-	-	-	-	**2**	**25**
	b. The year of construction/ century	1883 (Vienna City Hall/ Rathaus)	-	x	x	-	-	-	-	-	**2**	**25**
		1137 (St. Stephen's Cathedral)	x	-	-	x	-	-	x	-	**3**	**37.5**
		The 13th century (Hofburg Palace)	-	-	-	-	x	x	-	x	**3**	**37.5**
	c. Architectural style	Gothic	x	x	-	x	x	-	x	x	**6**	**75**
		Renaissance	-	-	-	-	x	x	-	-	**2**	**25**
		Baroque	-	-	-	-	x	x	-	x	**3**	**37.5**
		Rococo	-	-	-	-	-	x	-	-	**1**	**12.5**
		Neoclassical	-	-	-	-	x	x	-	-	**2**	**25**
	d. An architectural detail	The monumental façade of Heldenplatz Gate (Hofburg)	-	-	-	-	-	x	-	x	**2**	**25**
		The Renaissance façade of the Neue Burg wing, with imposing statues and ornate balconies	-	-	-	-	x	-	-	-	**1**	**12.5**
		The colored glass roof of St. Stephen's Cathedral	x	-	-	x	-	-	-	-	**2**	**25**
		The clock tower of the City Hall	-	x	x	-	-	-	-	-	**2**	**25**
	2. A representative religious edifice											
	a. The name of the edifice	St. Stephen's Cathedral	-	x	x	x	x	x	-	x	**6**	**75**
		St. Peter's Church	x	-	-	-	-	-	-	-	**1**	**12.5**
		Karlskirke	-	-	-	-	-	-	x	-	**1**	**12.5**
	b. The year of construction/ century	1137 (St. Stephen's Cathedral)	-	x	x	x	x	x	-	x	**6**	**37.5**
		1701-1733 (St. Peter's Church)	x	-	-	-	-	-	-	-	**1**	**12.5**
		Sec. XVIII (Karskirke)	-	-	-	-	-	-	x	-	**1**	**12.5**
	c. Architectural style	Gothic	--	x	x	x	x	x	-	x	**6**	**75**
		Baroque	x	-	-	-	-	-	x	-	**2**	**25**
	d. An impressive detail	The interior columns and distinctive Gothic arches	-	x	-	-	-	-	-	-	**1**	**12.5**
		The South Tower (Südturm; 136 meters tall) and the roof adorned with colorful ceramic tiles	-	-	x	x	x	x	-	x	**5**	**62.5**
		The interior dome decorated with frescoes	x	-	-	-	-	-	-	-	**1**	**12.5**
		Elegant and monumental architecture with impressive domes	-	-	-	-	-	-	x	-	**1**	**12.5**
	3. A notable monument or statue											
	a. Name	I. The Plague Column (Pestsäule)	x	x	-	x	-	x	-	x	**5**	**62.5**
		II. The Maria Theresa Monument	-	-	x	-	x	-	-	-	**2**	**25**
		III. The equestrian statue of Joseph II	-	-	-	-	-	-	x	-	**1**	**12.5**
	b. What does it represent (historically, artistically)	I. A baroque column erected in 1693 as a symbol of gratitude for the end of the plague epidemic of 1679	x	x	-	x	-	x	-	x	**5**	**62.5**
		II. A tribute to Empress Maria Theresa, the monument depicts the empress on a throne, surrounded by advisors and generals	-	-	x	-	x	-	-	-	**2**	**25**
		III. The Habsburg emperor, known for his reforms and promotion of administrative modernization	-	-	-	-	-	-	x	-	**1**	**12.5**
	c. An	I. A statue of the Holy Trinity	x	x	-	x	-	x	-	x	**5**	**62.5**

Tasks/ Answers		*Group*	G^A	G^B	G^C	G^D	G^E	G^F	G^G	G^H	**Total**	
											Nr.	**%**
	interesting detail	(symbolizing divine protection), surrounded by angels and saints										
		II. The bas-reliefs on the pedestal include historical scenes illustrating the reforms and achievements of the era	-	x	-	x	-	-	-	-	**2**	**25**
		III. Joseph II is depicted without a crown, emphasizing his focus on reforms rather than traditional power	-	-	-	-	-	-	x	-	**1**	**12.5**
	4. The atmosphere in the historic center											
	a. Sounds heard	A vibrant, lively, calm, warm, and festive atmosphere; a soundscape full of charm and tradition	-	-	-	x	-	x	-	-	**2**	**25**
		A melodic and artistic atmosphere	x	-	-	-	x	-	-	-	**2**	**25**
		A cheerful, pleasant, and peaceful atmosphere	-	-	-	-	-	-	x	x	**2**	**25**
		A chaotic atmosphere within the wide boulevards	-	-	x	-	-	-	-	-	**1**	**12,5**
		A variety of sounds blending together, sometimes disharmoniously	-	x	-	-	-	-	-	-	**1**	**12,5**
	b. The predominant colors	A palette of elegant and sophisticated colors, with shades of cream, beige, and white, reflecting a classic and aristocratic air, evoking imperial splendor; warm and white tones emitted by the lighting of the historic buildings	-	-	-	x	-	x	-	-	**2**	**25**
		Colors: white, green, and red, along with golden accents	-	-	-	-	x	-	x	-	**2**	**25**
		The chromatic uniformity, the visual harmony "pleasing to the eye," the "old aura, yet not outdated"	x	x	x	-	-	-	-	x	**4**	**37,5**
	5. Sketch of the route through the historic center		x	x	x	x	x	x	x	x	**8**	**100**
Section B. The Natural History Museum (Naturhistorisches Museum Wien)	*1. Two exhibits that caught your attention*											
	a. Name	Ia. The Venus of Willendorf. Ib. The giant rose quartz crystal from the mineral collection	-	-	-	-	x	X	-	x	**3**	**37.5**
		IIa. The Muonionalusta Meteorite. IIb. Tyrannosaurus Rex	x	-	-	X	-	-	-	-	**2**	**25**
		IIIa. The skeleton of an Allosaurus; IIIb. The skeleton of a Diplodocus dinosaur	-	x	x	-	-	-	x	-	**3**	**37.5**
	b. A short description	Ia. A small Paleolithic figurine (around 28,000 - 25,000 BC): a female figure carved from limestone, decorated with red ochre pigments. Ib. unusual dimensions, delicate color, and an almost perfect shape due to geological processes over millions of years	-	-	-	-	x	X	-	x	**3**	**37.5**
		IIa. Discovered in Sweden, it is one of the oldest known objects on Earth, with an estimated age of 4.5 billion years. IIb. It comes from a species of Tyrannosaurus Rex, one of the largest and most feared carnivorous dinosaurs that lived during the Cretaceous period	x	-	-	x	-	-	-	-	**2**	**25**
		IIIa. A land predator with sharp teeth and strong claws. IIIb. A large herbivorous dinosaur (around 150 million years ago), fully reconstructed.	-	x	x	-	-	-	x	-	**3**	**37.5**
	c. What have	Ia. A symbol of fertility, abundance,	-	-	-	-	x	x	-	x	**3**	**37.5**

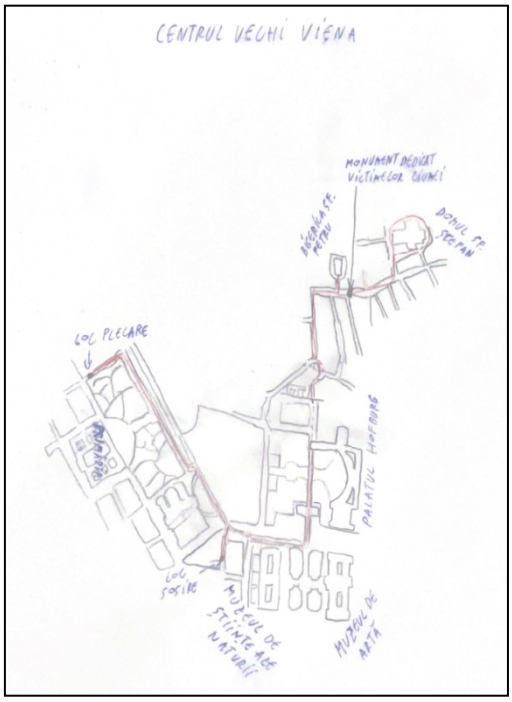
Tasks/ Answers		*Group*	G[A]	G[B]	G[C]	G[D]	G[E]	G[F]	G[G]	G[H]	Total	
											Nr.	%
	you learned from the associated explanations?	used in religious rituals or as a talisman for reproductive success. Ib. Rose quartz forms under specific pressure and temperature conditions in the depths of the Earth's crust										
		IIa. It comes from the solidified core of a celestial body destroyed in the early Solar System, providing valuable information about events that influenced the evolution of Earth (linked to lessons in geology and astronomy). IIb. Hunting behavior, anatomy adapted for speed and strength, and the discovery of its skeletons, which are essential for understanding the evolution of dinosaurs and prehistoric ecosystems	x	-	-	x	-	-	-	-	**2**	**25**
		IIIa. Allosaurus was an agile predator with binocular vision and perfect adaptations to dominate various ecosystems. IIIb. A long and flexible tail used for defense, it fed on rich vegetation, being an example of adaptation to the terrestrial environment during the Jurassic period	-	x	x	-	-	-	x	-	**3**	**37.5**
	2. Choose a visited section and complete it											
	a. The name of the section	I. The Paleontology section	x	-	x	x	-	x	-	x	**5**	**62.5**
		II. The Mineralogy section	-	x	-	-	x	--	x	-	**3**	**37.5**
	b. An interesting element discovered here	I. The complete skeleton of a Diplodocus, a large herbivorous dinosaur from the Jurassic period, and the fossil of a woolly mammoth from the Pleistocene	x	-	x	x	-	x	-	x	**5**	**62.5**
		II. An impressive collection of quartz crystals in various shapes and colors, including dark purple amethyst	-	x	-	-	x	--	x	-	**3**	**37.5**
	c. How do the information discovered/received relate to what you have learned in school?	I. The information about dinosaurs and their evolution is related to the lessons about the evolution of life on Earth and the geological periods studied in school. The interactive exhibition provided a practical perspective on the theoretical concepts learned	x	-	x	x	-	x	-	x	**5**	**62.5**
		II. The information about the formation and structure of minerals is connected to the geography and chemistry lessons studied in school, where students learned about rocks, minerals, and their properties	-	x	-	-	x	--	x	-	**3**	**37.5**
	3. Observe and describe species of animals and fossils											
	a. An interesting animal or a notable fossil	The woolly mammoth (*Mammuthus primigenius*)	-	-	x	x	x	-	x	x	**5**	**62.5**
		A pair of human-like monkeys (Hominidae)	-	x	-	-	-	-	--	-	**1**	**12.5**
		Quetzalcoatlus, a huge pterosaur	x	-	-	-	-	-	-	-	**1**	**12.5**
		Megalodonul, the biggest shark	-	-	-	-	-	x	-	-	**1**	**12.5**
	c. What surprised you about these exhibits?	Details of fossils and models.	x	x	x	x	x	x	x	x	**8**	**100**
		Collection of minerals and rocks	-	x	-	-	-	-	-	-	**1**	**12.5**
		Volcano simulator	-	x	-	-	-	-	-	-	**1**	**12.5**
		The Tissint meteorite	-	-	-	-	-	-	x	-	**1**	**12.5**

x = exist; - missing

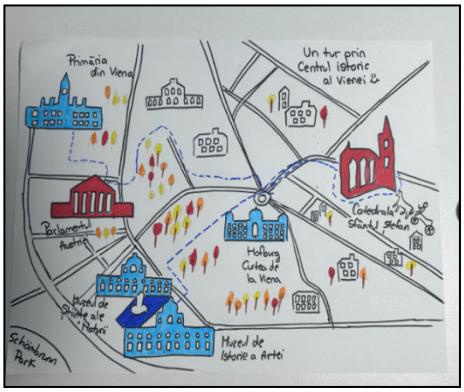
All eight teams created sketches of the route through the historic center of Vienna in the form of mental maps (Fig. 1) and attached their own photographs. Mental maps are cognitive representations that differ from maps created by cartographers in that they do not involve mathematical calculations, are more schematic, and are acquired through a slower, incomplete, and often confusing encoding process (Miclea, 1999). The term "cognitive map" also appears in the literature, essentially defined as a network of representations that encode both places and the sequential relationships between them (Moore & Golledge, 1976, apud Johns & Blake, 2001). Depending on experience and knowledge, some parts of the territory represented in the mental maps created by the students contain more details, while others are depicted more briefly and confusingly (Bagoly-Simó et al., 2016; Dulamă, 2006).



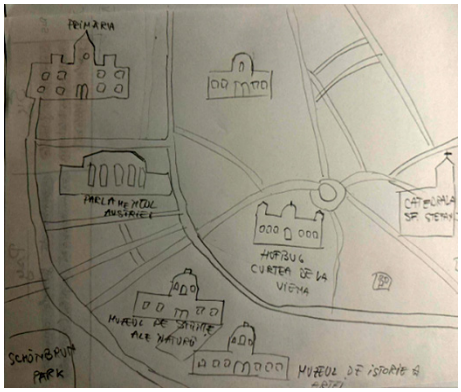
G^A



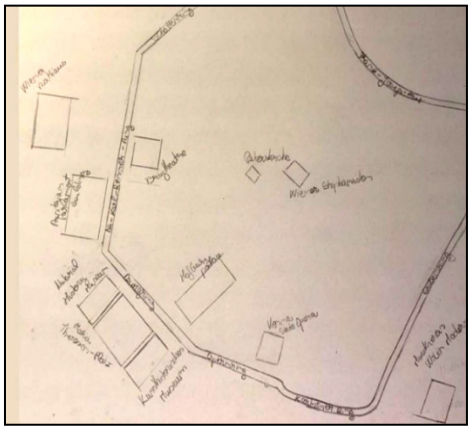
G^B



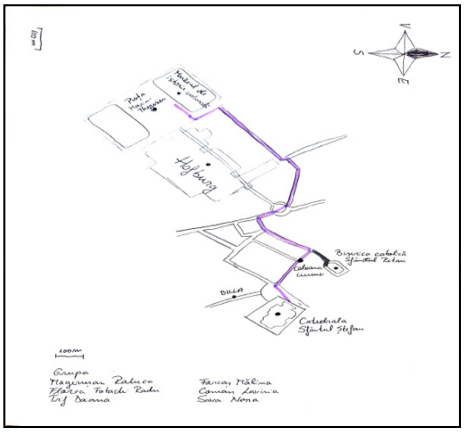
G^C



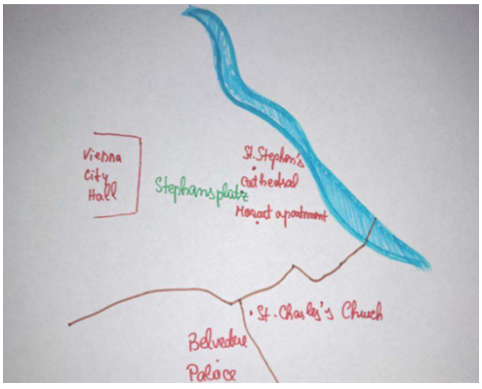
G^D



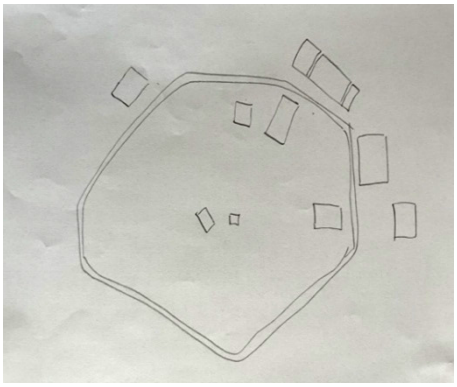
G^E



G^F



G^G



G^H

Figure 1. *The sketches of the tourist route through the historic center of Vienna (mental maps) made by the students*

Since the worksheet was completed by each team upon returning home, the students had the opportunity to use tourist maps and digital maps (Google Maps) to compare them with their own mental maps. This aspect is less noticeable in the case of three teams (37.5%; GA, GG, and GH). The title was mentioned by two teams (GB and GC), and orientation toward the north and scale were noted by one team (GF). Three teams (GA, GC, and GD, 37.5%) created three-dimensional representations. The route was marked and shown on the map in a specific color by three other teams (37.5%; red by GB, blue by GC, and purple by GF), while the other representations were in black and white (except for team GG, which represented the observed reality very briefly and without explicitly showing the route). One team (12.5%; GG) represented the route and buildings very briefly, inaccurately, and superficially, without specifying any names or other cartographic elements. The street network of the historic center, delimited by the traveled route, was partially perceived and represented by half of the teams. Street names are missing, except for one team (GE, but incompletely). The existence of a watercourse (the Danube, even though it was not included in the route) and vegetation elements were captured by one team each (12.5%; GG and GC, respectively). Apart from mentioning some buildings (7 teams; 87.5%) and streets (one team; 12.5%), no team created a legend, and the scale and orientation were mentioned by only one team (12.5%, with the scale being inaccurately represented), which indicates a certain superficiality and gaps in cartographic knowledge and skills (Table 2). The diversity of the mental maps is noteworthy, as is the way buildings (3D, 2D) and the street network are represented, with some places being more accurately depicted than others.

The evaluation grid for the sketches of the tourist route through the historic center of Vienna (mental maps) made by the students (Table 2) includes elements for dating and identification (students' names, class/classes, team number, date of creation), general elements of a map (title, legend, scale, orientation toward North), and other elements: color representation, depicting the route with a line, locating buildings and monuments observed along the route or outside of it, specifying street names, depicting the street network of the historic center, and elements of vegetation. The results show that the students predominantly represented the street network of the historic center and buildings and monuments located along the route. Half of the sketches are in color, and 37.5% include three-dimensional representations. The students paid little attention to the title, legend, and orientation toward North.

Table 2. *The evaluation grid for the sketches of the tourist route through the historic center of Vienna (mental maps) created by the students*

Tasks/Answers \ Group		G^A	G^B	G^C	G^D	G^E	G^F	G^G	G^H	Total	
										Nr.	%
Students' First Name/Last Name		-	-	-	-	-	x	-	-	**1**	**12.5**
Class/Classes and Group Number		-	-	-	-	-	-	-	-	**-**	**-**
Date		-	-	-	-	-	-	-	-	**-**	**-**
Title		-	x	x	-	-	-	-	-	**2**	**25**
Legend		-	-	-	-	-	-	-	-	**-**	**-**
Scale		-	-	-	-	-	x	-	-	**1**	**12.5**
North Orientation (Compass Rose)		-	-	-	-	-	x	-	-	**1**	**12.5**
Three-dimensional representation		x	-	x	x	-	-	-	-	**3**	**37.5**
Color representation		-	x	x	-	-	x	x	-	**4**	**50**
Depiction of the route with a line		-	x	x	-	-	x	-	-	**3**	**37.5**
Edifices and monuments located and observed along the route	St. Stephen's Cathedral	x	x	x	x	x	x	x	-	**7**	**87.5**
	St. Peter's Church	-	x	-	-	-	x	-	-	**2**	**25**
	Natural History Museum	x	x	x	x	x	x	-	-	**6**	**75**
	Museum of Art History	x	x	x	x	x	-	-	-	**5**	**62.5**
	Burgtheatre	-	-	-	-	x	-	-	-	**1**	**12.5**
	Hofburg Palace	-	x	x	x	x	x	-	-	**5**	**62.5**
	Vienna City Hall	-	x	x	x	x	-	x	-	**5**	**62.5**
	Austrian Parliament	-	-	x	x	x	-	-	-	**3**	**37.5**
	Plague Column	-	x	-	-	-	x	-	-	**2**	**25**
Other edifices and monuments located (outside the route)	Schönbrunn Park	-	-	x	x	-	-	-	-	**2**	**25**
	Michaelerkirke	x	-	-	-	-	-	-	-	**1**	**12.5**
	National Library	x	-	-	-	-	-	-	-	**1**	**12.5**
	Vienna State Opera	-	-	-	-	x	-	-	-	**1**	**12.5**
	Muzikverein	-	-	-	-	x	-	-	-	**1**	**12.5**
Street network of the historic center		-	x	x	x	-	x	-	-	**4**	**50**
Street names		-	-	-	-	x	-	-	-	**1**	**12.5**
Vegetation elements		-	-	x	-	-	-	-	-	**1**	**12.5**

x = exist; - missing

2. Analysis of the tasks completed in section B of the worksheet: Natural History Museum (Naturhistorisches Museum Wien)

Regarding *the Natural History Museum (Naturhistorisches Museum Wien)*, the analysis of the responses (Table 1) reflects the following. All teams named two exhibits, which they described according to the explanations provided by the teachers and the information gathered from the museum, making connections with the information learned in geography and biology lessons. Two exhibits stood out: *the Venus of Willendorf* and *a giant rose quartz crystal* from the mineral collection (3 teams; 37.5%). The students wrote that from the associated explanations, they learned that the statuette is a symbol of fertility and abundance, used in religious rituals (or as a talisman for reproductive success), and that rose quartz forms under specific pressure and temperature conditions deep within the Earth's crust ("We made the connection with the geography lessons, where we studied the formation of minerals and rocks, and we better understood the importance of minerals in various fields, from jewelry to industry; this crystal strengthened our appreciation for the beauty and complexity of nature" GF).

The Muonionalusta Meteorite, along with *Tyrannosaurus Rex*, was mentioned by two other teams (25%). The students learned that this meteorite comes from the solidified core of a celestial body destroyed in the early Solar System, providing valuable information about the formation of the Solar System and the events that influenced the Earth's evolution, connecting with the geography lessons (grades IX and XI), where they acquired certain knowledge in geology and astronomy. They also learned about the hunting behavior of *Tyrannosaurus Rex*, its anatomy adapted for speed and strength, and the discovery of its skeletons, which are essential for understanding the evolution of dinosaurs and prehistoric ecosystems. For the skeleton of an *Allosaurus* and a *Diplodocus* dinosaur, 3 teams opted (37.5%). The students made the connection with biology lessons.

Regarding the following requirement ("*Choose a section visited and complete it*"), 5 teams (62.5%) chose the Paleontology section, while 3 teams (37.5%) opted for the Mineralogy section. As interesting elements discovered, on the one hand, the complete skeleton of a *Diplodocus*, a large herbivorous dinosaur from the Jurassic period, was mentioned, as well as the fossil of a woolly mammoth from the Pleistocene, and on the other hand, the impressive collection of quartz crystals in various shapes and colors, including dark violet amethyst, was noted again. The students wrote that the information about dinosaurs and their evolution is linked to lessons about the evolution of life on Earth and geological periods studied in biology and geography classes. They

learned about major changes in Earth's history, such as the extinction of dinosaurs at the end of the Cretaceous period, and how these changes influenced the development of other life forms. The visit to the museum provided them with a more detailed perspective on these topics, concretized through fossil exhibits and 3D reconstructions. They also mentioned that the interactive exhibition provided a practical perspective on the theoretical concepts learned, and the information about the formation and structure of minerals is related to geography and chemistry lessons studied at school, where they learned about rocks, minerals, and their properties.

Regarding the last requirement ("*Describe animal species and fossils observed*"), the Woolly Mammoth (*Mammuthus primigenius*) was noted by 5 teams (62.5%). Its description highlights its adaptations to the cold climate of the Ice Age: dense fur, huge tusks (which could reach up to 5 meters in length), a thick layer of fat, and small ears to reduce heat loss. The exhibition also includes information about its habitat, way of life, and its relationship with prehistoric humans, who hunted it for food and materials. This presentation offers a fascinating perspective on the extinct megafauna and its interaction with the environment. Other animal species or fossils, including a pair of monkeys with human-like traits (*Hominidae*; standing upright), Quetzalcoatlus, and Megalodon, were observed and described by one team each (12.5%).

All the teams were impressed by the details of the fossils and models, such as the *Allosaurus* skeleton, the *Archaeopteryx* fossil, the woolly mammoth, and the *Megalodon* jaw model. The mineral and rock collection, as well as the volcano simulator, along with the *Tissint* meteorite, were noted by one team each (12.5%; GB and GG, respectively).

By participating in the project and completing the practical applications, the students enriched their knowledge qualitatively and quantitatively regarding urban and museum spaces in general, and specifically the historic center of Vienna and the Natural History Museum. At the same time, they made connections between what they learned at school in geography, biology, chemistry, and art education lessons, and the new knowledge they gained. The students became more sensitive to European cultural and spiritual values, becoming more open to ideas of sustainability, tolerance, civilized behavior, and the role of active citizens (Conțiu & Conțiu, 2024b). They recognized the importance of learning through cooperation and the supportive role of group activities in strengthening friendships and enhancing intercultural relations. They were encouraged to speak and understand two internationally spoken languages (English and German).

CONCLUSIONS

The results of the study show that the implementation of practical applications (tourist route, museum visit) as part of a thematic excursion with an interdisciplinary character in an international educational project, along with the use of a worksheet, proved to be an effective tool in identifying gaps in students' knowledge about the historic center of Vienna and the Natural History Museum, urban and museum spaces, as well as in reinforcing this knowledge in long-term memory.

The practical applications represented an innovative way to acquire new information, develop new skills, and enhance other competencies, establish the connection between theory and practice, as well as contextualize learning. The students' discussions in groups and with their teachers contributed to clarifying concepts, completing knowledge, and correcting misconceptions related to significant urban and museum elements and how they integrate into the urban context and the local community, which were identified through the completion of the worksheet.

The analysis of how students completed the worksheets and the materials they attached (sketches) reveals that this process was effective in developing students' skills in field orientation, research, and connecting theory with practice. As a result of the field applications carried out, guided by teachers, and through the careful and responsible completion of the worksheet, along with the inherent documentation of this research stage, students became aware of the importance of field observation for gathering information and the role of the worksheet in organizing data and knowledge based on specific criteria and tasks.

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ANNEX 1. WORKSHEET

Group number, students' first and last names: ……

Class/classes: ……

Date: ……

A. The historic center of Vienna

1. Mention a representative historical building observed and complete:
    a. Name of the building: ……
    b. Year of construction (or century): ……
    c. Architectural style (baroque, gothic, etc.) ……
    d. An architectural detail that impressed you: ……
2. Mention a representative religious edifice observed and complete:
    a. Name of the building: ……
    b. Year of construction (or century, if not mentioned): ……
    c. Architectural style (baroque, gothic, etc.) ……
    d. A detail that impressed you: ……
3. Note a monument or statue observed:
    a. Name of the monument: ……
    b. What it represents (historical, artistic) ……
    c. An interesting detail about the monument: ……
4. How would you describe the atmosphere in the historic center?
    a. Sounds heard: ……
    b. Predominant colors: ……
5. Create a sketch of the route through the historic center of Vienna and note the main tourist attractions observed (on an A4 sheet, with a pencil/colored pencils)……

B. Natural History Museum (Naturhistorisches Museum Wien)

1. Note two exhibits that caught your attention:

Name: ……

A short description: ……

What did you learn from the associated explanations? ……

2. Choose a section you visited and complete it:

a. The name of the section: ……

b. An interesting element discovered here: ……

c. How do the information discovered/received relate to what you have learned in school? ……

3. Observe and describe species of animals and fossils:

a. An interesting animal or a notable fossil: ……

b. What surprised you about these exhibits? ……