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Artículo

Are urban green spaces used as didactical resources in Spanish Primary Education?

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Are urban green spaces used as didactical resources in Spanish Primary Education?

Abstract

Urban green spaces (UGS) are patches of nature that, when located in the vicinity of schools, can be used to encourage active learning. But when educators plan on using these spaces in their daily routine, they have to face numerous difficulties. This paper analyses the uses of UGS by primary education teachers and the influence that the distance between UGS and schools in Zamora, a small city located in NW Spain, has in their usage. Quantitative data were collected by means of a paper-based questionnaire administered to 119 students of the Primary Education Teaching Degree after their professional practice period in primary schools. In the questionnaire, composed of 20 closed-ended questions, students were asked about several aspects of their tutors' daily use of UGS. Results show low usage of UGS by primary teachers, even though schools have very high accessibility to these spaces. Teachers largely use UGS to reinforce natural and social sciences lessons, developing activities associated with plants and nature. But there are barriers that hinder the educational use of these spaces such as curricular planning and teacher training. Nevertheless, results show that when teachers visit UGS, they use these spaces as teaching laboratories where they apply active teaching methodologies, such as inquiry-based methods.

education; science education; green areas; primary education.

¿Se utilizan los espacios verdes urbanos como recurso didáctico en la Educación Primaria en España?

Resumen

Los espacios verdes urbanos (EVU) son espacios de naturaleza que, cuando están situados cerca de las escuelas, pueden ser utilizados para fomentar la enseñanza activa. Pero cuando los educadores planean utilizar estos espacios en su rutina diaria, deben hacer frente a numerosas dificultades. Este artículo analiza el uso de los EVU por parte de los profesores de Educación Primaria y la influencia de la distancia entre las escuelas y los EVU en Zamora, una pequeña ciudad del NW de España. Los datos cuantitativos fueron recogidos a través de un cuestionario en papel que fue administrado a 119 estudiantes del grado en Maestro en Educación Primaria tras finalizar su periodo de prácticas profesionales en colegios de Educación Primaria. En el cuestionario, compuesto por veinte preguntas cerradas, se preguntó a los estudiantes sobre algunas cuestiones relacionadas con el uso diario que hacían sus tutores de los EVU. Los resultados muestran una baja utilización por parte de los maestros, incluso en escuelas con una elevada accesibilidad a estos espacios. Los profesores usan en su mayoría los EVU para reforzar las lecciones de ciencias sociales y ciencias naturales, desarrollando actividades vinculadas con las plantas y la naturaleza. Pero hay una serie de barreras que dificultan el uso educativo de esos espacios, como la planificación del currículo y la formación del profesorado. Sin embargo, los resultados muestran que cuando los maestros visitan los EVU, usan estos espacios como laboratorios educativos donde aplican metodologías de enseñanza activas, como los métodos basados en la indagación guiada.

Palabras clave: espacios verdes urbanos, educación ambiental, educación científica, áreas verdes, educación primaria.

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Introduction

Urban green spaces (UGS) stand out as highly valuable areas in cities because they can be used as learning laboratories for educators to promote interdisciplinarity, the study of nature, the city and its dwellers (Derr, 2018). Dadvand *et al.* (2015) have demonstrated the beneficial impact of greenspace exposure on cognitive development in primary education students. Therefore, in a continent like Europe, where almost 75% of its population lives in cities (EUROSTAT, 2016), UGS can boost the link between school and nature by providing natural laboratories where educators can design engaging lessons. However, when teachers plan outdoor learning they have to confront many difficulties. According to Rickinson *et al.* (2004) these difficulties are: a) fears concerning students' health; b) insufficient teachers expertise in teaching outdoors; c) curricular obligations; d) lack of time and support; and e) school organization problems. Researches have recently demonstrated that a major obstacle for outdoor learning is the existence of a standardized curriculum that promotes traditional lessons in classrooms (Wee *et al.*, 2016; Wilks, 2010). Particularly, in the case of UGS as educational spaces, their distance from schools could be a cross-cutting issue because of its direct impact on some of these difficulties (i.e. lack of time and school organization problems). In fact, a recent study has revealed a positive correlation between the distance from school to UGS and the frequency of visits to these spaces (Wolsink, 2016), showing that schools with nearby parks engage in more fieldwork than others. However, research on the influence of the distance from school in the use of UGS as a teaching resource in primary schools and their potential role in primary education is very scarce.

In order to know more about the reasons that explain the use of UGS in primary education, and to fill the research gap found in the literature, this paper analyses the educational use and location of UGS in Zamora, a small compact city located in north-western Spain, close to the Portuguese border. The city of Zamora provides an ideal case study to investigate the use of UGS by primary education teachers because despite of the fact that the urban tissue is very compact, it has well-tended green spaces and 7.9 % of the city surface is devoted to green areas.

This study focuses on the use that primary school teachers make of these spaces in their daily work routine and also on the influence of the distance between UGS and schools. Specifically, the three purposes of this research are: 1) to analyse if schoolteachers use UGS in their daily activity; 2) to identify how they use this educational resource; and 3) to analyse the importance of proximity and other factors to explain their use.

What are UGS?

UGS are accessible green spaces such as public city parks and gardens, most of them built and maintained by local governments, and mainly characterized by the presence of vegetation within an artificial urban ecosystem. This is similar to the definition proposed in the European Commission's Mapping Guide for a European Urban Atlas, where green urban areas are described as "public green areas for predominantly recreational use such as gardens, zoos, parks, castle parks and cemeteries" (European Commission, 2011, p. 21).

Over the last centuries, parks and gardens have proliferated in cities as an attempt by local governments to improve citizens lives. Nowadays, in most European countries, the existence of these spaces is regulated by urban development and environmental laws, since urban green spaces can fulfil a broad variety of functions in cities. Some authors have classified these functions into five major groups: ecological, economic, social, urban planning and multidimensional, included there different roles, such as landscape-related or educational functions (Levent *et al.,* 2004). In our society, people value the presence of these spaces inside the city as something positive, because they provide the opportunity of being in touch with nature (Emelianoff, 2007; Madureira *et al.,* 2011) and because living close to urban green spaces usually creates feelings of well-being (Chiesura, 2004; Kyttä *et al.,* 2011; Tzoulas *et al.,* 2007).

Some investigations have revealed that motivation to visit parks and interact with nature is driven more by nature orientation than on the availability and ease of access to green spaces (Lin *et al.,* 2014). But other studies conducted in some European countries had highlighted the importance of distance and accessibility to green spaces to take advantage of some of their functions (Grunewald *et al.,* 2017; Salomon Cavin, 2017; Van Herzele & Wiedemann, 2003). Studies specifically developed in Spanish and Portuguese cities, including the city of Zamora and cities close to it, have shown that people who live close to parks and gardens are those who most often visit these spaces (Gómez-Gonçalves, 2013; Gómez-Gonçalves *et al.,* 2014; Santana *et al.,* 2007). Based on this assumption, the Local 21 Agenda plan uses the distance between UGS and people's homes as one of the main criteria to analyse local sustainability (European Commission, 2000).

UGS for education

UGS can fulfil an educational function by providing citizens with the chance to observe the growth of plants and animals according to biological laws in an artificial urban ecosystem. Over the last years, empirical research has been carried out in order to know more about the contribution of green urban areas to environmental education purposes. UGS are pieces of nature that, when located close to schools, can be used to encourage active learnings about the environment and about sustainability (Bentsen *et al.,* 2013). In addition, the use of these spaces can increase children's concentration capacity and foster discipline in their daily work (Taylor *et al.,* 2001).

Hence, educators could use UGS as a complement to classroom instruction to enhance the way they teach natural and social sciences in primary education. For this purpose, they could use a teaching resource such as field trips or fieldwork, which are curriculum-related activities that involve going outside the classroom to learn through first-hand experience (Boyle *et al*., 2007; Lonergan & Andresen, 1988). Some researchers have demonstrated the key role of educational school trips as strategies to improve the acquisition of scientific knowledge (see review in DeWitt & Storksdieck, 2008). Fieldwork reinforces environmental knowledge, helping students to assimilate new concepts through the preparation for the trip and the information obtained from it (Fernández Manzanal *et al.,* 1999), which can contribute to a behaviour change towards the preservation of the environment. Thus, when educators design field experiences focused on environmental topics, the results obtained show an improvement in students' attitudes toward the environment (Barnett *et al.,* 2011). To make the fieldwork more effective, Remmen and Froyland (2014) provided some recommendations: a) design a field trip within walking distance of the school; b) include inquiry-based learning activities; c) take advantage of the field trip to carry out multidisciplinary activities; and d) follow up during fieldwork.

Nowadays, the vast majority of the education community accepts that pedagogical practices using inquiry-based methods are more effective than traditional ones, since these methods contribute to increase not only young people's interest in science, but also the teachers motivation as well. Children are naturally attracted to science, but the traditional way of teaching has a negative impact on the development of the necessary skills to learn the subject. However, the real picture in Spanish classrooms seems to be similar to that described in the Rocard Report (2007) a decade ago: science lessons are directed by teachers, with textbooks playing a key role (Vílchez & Escobar, 2014; Vílchez *et al.,* 2019). According to these studies, educators prefer traditional lectures to accomplish their school curricula, instead of planning and conducting field trips to natural spaces where ideas of sustainability and related concepts could be reinforced. In fact, in the Spanish context, textbook prevalence in science courses has gained popularity during the twentieth century to the detriment of experiential natural resources and the environment (Corrochano *et al.,* 2019).

UGS could provide a context in which inquiry-based learning is easy to develop because they can be used as natural laboratories. Parks and gardens could promote outdoor learning, improving school performance, development skills and cognitive abilities (Taylor *et al.,* 1998; Wells, 2000). Educators can use such spaces to teach natural or social sciences lessons, capitalising on the possibility of carrying out exploration work on site while encouraging knowledge generation during the educational process itself; thus, green curricula could enhance the multifunctional approach (Ioja *et al.,* 2014). Derr (2018) emphasises the educational potential of green areas to work on the history, ecology and culture of a city, and Lackstrom and Stroup (2009) pointed out the opportunity that some of them offer to teach geography in its natural and cultural aspects.

Teaching in natural spaces allows children to feel that they are part of a whole and has been confirmed to have a positive impact on interpersonal relations among students (Almers *et al.,* 2018). Blair (2009) has demonstrated that other green spaces, such as school gardens, can promote academic instruction and improve students' results and behaviour. Moreover, Malberg Dyg and Wistoft (2018) concluded that these spaces also improve students' wellbeing, as learning in natural environment creates feelings of happiness and freedom

in them. The advantages of using UGS to teach environmental education are (Pereira *et al.,* 2006): a) their proximity to schools; b) the possibility to repeat the visit; c) the possibility to perceive seasonal changes; d) the direct contact with nature; e) the possibility of analysing relationships between citizens and nature; and f) the opportunity to develop affective feelings. This last idea was analysed in depth by Boyle *et al.* (2007), who conclude that, in general, fieldwork triggers affective responses that can encourage deep learning.

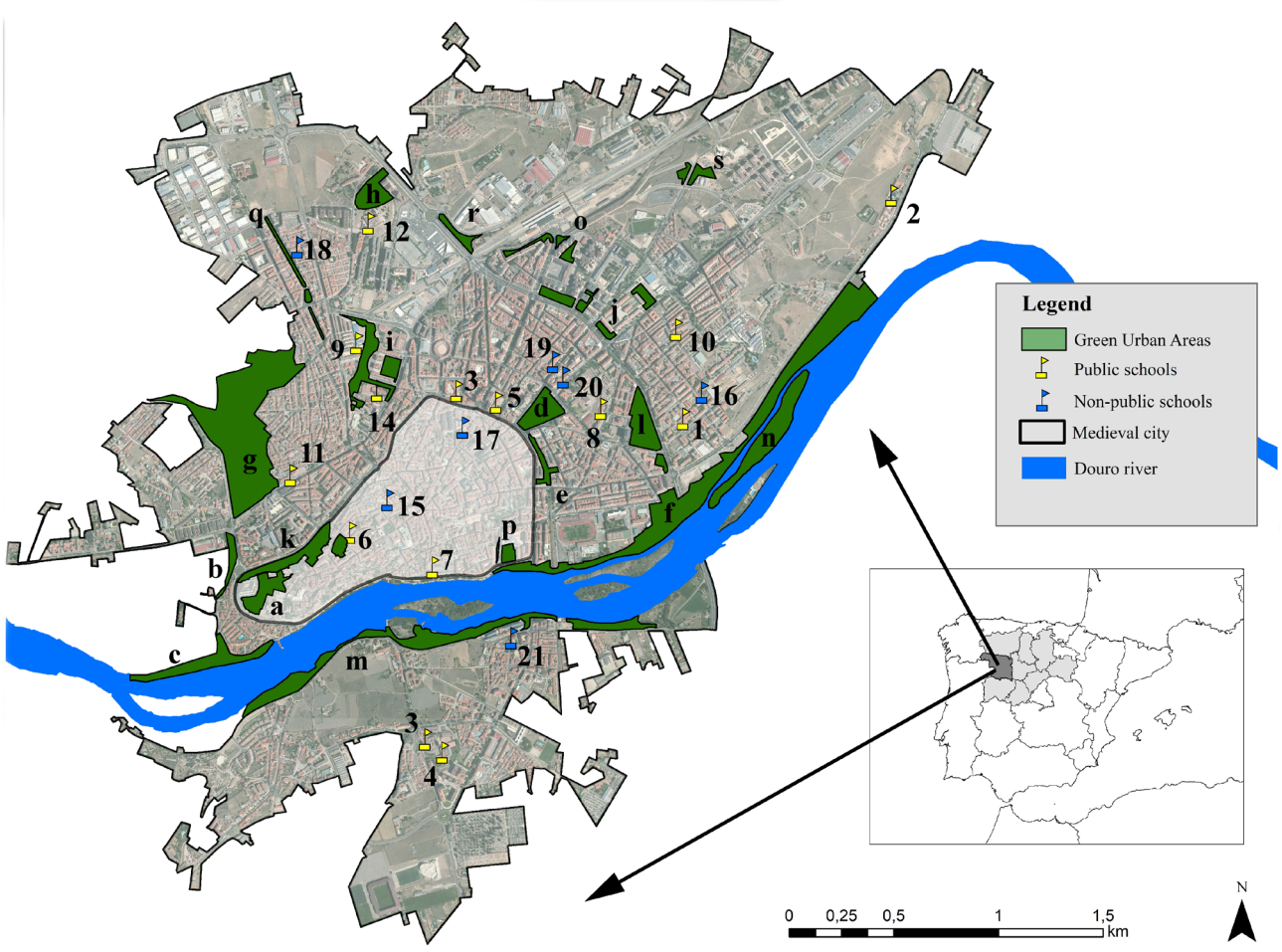
This paper tries to contribute to better understand the use of UGS in real teaching situations. It will also try to elucidate how they are used and if there are any barriers that hinder their use in primary education classrooms, as the reviewed literature seems to show.

Methods

This research tries to analyse the use of UGS in primary education schools in Zamora, a small city located in northwestern Spain. The research methods involved two quantitative components. Firstly, we used a paper-based questionnaire to understand the use of UGS in real educational contexts, and secondly, we used Geographical Information Systems (GIS) to characterize access to UGS from schools in distance terms.

Zamora is located in the northwest of Spain. With a population of 61,406 citizens (Instituto Nacional de Estadística, 2020), it is the capital city of one of the nine provinces that make up the region of Castile and Leon. In terms of urban planning, Zamora has the typical layout of Spanish medieval Christian cities: a very compact city center clearly limited by a wall. This part is currently the city's commercial, administrative, touristic and functional centre. Zamora is a relatively small city, with a maximum distance N-S and E-W of 5 km, so a person can cross it through it in less than two hours walk. In addition, the city center is, for the most part, pedestrianized, which, together with a dense public transport network, allows public and safe mobility for most of the population. As a result, Zamora appears as a city of 956 hectares that is characterized by a very compact urban tissue and with a small number of open spaces (Figure 1).

Figure 1.
Urban green spaces and primary schools in Zamora.



Source: own elaboration.
Note: schools are numbered 1 through 21 and parks are numbered "a" through "s" (see Appendix 1 and 2).

The use of UGS in primary education

We have used a new methodological technique employed in the Spanish context during the last years. It is based on the data collection about teaching activities and methodologies used by teachers in their daily activities through the filter of the pre-service teachers during their internships in primary schools. They were in the early stages of their Primary Education Teaching Degree in a medium-size public university, and during their internships in primary schools, an important part of their tasks was the observation and analysis of the activities and the methods used by teachers in order to try to learn from them. This methodological resource, in which students participate as observers and report their perceptions about a specific research problem, has been successfully employed before by several authors in the Spanish educational context (Cañal *et al.*, 2013; Doménech *et al.*, 2016; Vílchez & Escobar, 2014; Vílchez *et al.,* 2019). Data collection was carried out by means of a paper questionnaire completed by students after their teaching internships in primary schools. In the questionnaire, university students were asked about several aspects of the mentors' daily use of UGS.

Non-probabilistic and convenience sampling was employed, consisting of students enrolled in the same course (MacMillan & Schumacher, 2001). Data collection was carried out during four successive academic years from a sample including 119 anonymous voluntary university students: 33 students in 2016, 26 in 2017, 32 in 2018 and 28 in 2019. The differences in the years between students are directly related to the number of students who conducted their professional practices in each of them. The sample consisted of 81 women (68.1%) and 38 men (31.9%), with an average age of 22.2 years old (SD 2.3). They had just finished their professional practices (three-month duration) at 21 primary schools of the city of Zamora: 14 were public schools (66.6%) and 7 were non-public (33.3%). All schools have playgrounds for games and sports, and half of them (52.3%) have outdoor green areas (see Appendix 1). At the end of the first semester of the third university year, students have a practical university course that consists of professional practices in a real context. During this period, they carry out work at a primary school where they have daily contact with primary students and teachers. Their practices are always supervised by schoolteachers (mentors) who teach and design the lessons according to their regular practice. Of the total number of mentors who indirectly participated in the present study, 63.9% came from public schools, whereas 36.1% were from non-public schools. 72.2% of the mentors were women and 27.7% men.

The used questionnaire, adopted from Vílchez and Escobar (2014) and Vílchez *et al.*, (2019), was composed of 20 *ad hoc* questions, the vast majority of them oriented to the description of the teaching practice of the mentor about the UGS and their methodological usage. Thus, the survey provides second-hand, but valuable information, about the real use of UGS as pedagogical resources in primary schools and about the methods followed by the teachers to work in such spaces in their daily routine. In order to facilitate its implementation and to try to ensure that the instrument reflects only objective data (meaning that the answers do not depend too much on the personal interpretation of the student) it was decided to ask closed-ended questions in which students should only indicate whether they had observed during their internships what was being said. Only one question, regarding the activities carried out during the visit, was open-ended. The questionnaire

included questions related to five main aspects to be studied about the use of UGS in primary education (its use or not, which parks were most visited, the reasons why they were or were not visited, what type of subjects were worked and what activities and methodology were followed). Categories of reasons to visit UGS (e.g., distance from school, size, safety, maintenance, equipment, vegetation, regular users, others) were obtained from Gómez-Gonçalves *et al.* (2014, 2018). It should be noticed that students were also asked if they know if mentors have visited UGS at another time during the course.

Students responded to the questionnaire in a half hour session that took place immediately after their teaching internships in primary schools. Before the students answered the questionnaire, the questions and the doubts that arose regarding its interpretation were resolved. Frequency and percentage statistics were used to represent most information variables. The analysis of the qualitative data about the activities carried out in UGS was done by grouping the most similar responses among them.

How is proximity between schools and UGS measured in Zamora city?

GIS were used to characterize access to UGS from schools in distance terms. The identification of Zamora's UGS was carried out according to the definition used by Gómez-Gonçalves *et al.* (2018) in their research developed in the city of Zamora. They selected every single green space that covered over 0.6ha, excluding those which cannot be freely used by people for leisure or social purposes, such as roundabouts, private gardens or farmlands.

Thus, we identified 19 UGS in Zamora, most of them located outside the medieval city and beyond the area corresponding to the city spread that took place during the first half of the twentieth century, since the latter did not develop according to a prior urban planning design. The main characteristics of the parks are listed in Appendix 2, where it can be observed that most of them have benches and playgrounds, while picnic areas are unusual. It should be noticed that the largest parks are Valorio forest (id. g in Figure 1) to the west of the city limits, and the green areas located on both sides of the Douro river (id. f and m in Figure 1). Considering that the city had a surface area of 956ha in 2019, UGS would account for 7.9% (75.3ha) of Zamora's surface, and, consequently, the per capita UGS index is 12.2m^2 for each citizen. According to Fuller and Gaston (2009), this figure is higher than in other Spanish and Italian cities (3-4m²/inhabitant), but smaller than in northern European cities.

In addition, every single primary school, either public (yellow colour in Figure 1) or non-public (blue colour Figure 1) was located to know whether schools are close to UGS. For this purpose, we used the list of schools in the city of Zamora according to the last census provided by the local educational authorities ("Mapa de centros", s.f.). The distribution of primary schools is more regular than that of parks and gardens, also including schools located on the city's borders. To calculate whether primary schools have access to UGS or not, we have created a category called "access to UGS" following the method used by the European Environment Agency to find out citizen's access to UGS from their home. This method focuses on the relationship between the

spatial distribution of population and green areas, and accessibility is defined according to a distance of 300 m or a 10-minute walk between UGS and people's homes (Poelman, 2016). Thus, in order to analyse whether children and educators have access to UGS, meaning if they can easily reach green areas from their school, we have employed a distance of 300 m between UGS and schools, either public or non-public. Consequently, we have drawn a 300 m buffer from each UGS with a GIS software in order to compare the location of the schools with that distance.

Results

Use of UGS for teachers in their daily activity

Results reported herein show a low level of UGS usage by primary teachers in Zamora. During their professional practices in primary schools, only 20% of the survey's respondents visited UGS in Zamora with primary students and their mentors (Table 1). 79.1% of these teachers were women, and 20.8% were men. 62.5% of the teachers worked in public schools, whereas 37.5% worked in non-public schools. Additionally, 40.6% of the survey respondents said that teachers had visited UGS with their primary students during the same academic year but in a different period from university students' placement.

Distance from school was reported as the main reason to use UGS by the teachers who used them to deliver instruction (66.7% answers in Figure 2, Table 1). Vegetation (52.4%) appears second in importance as the main element that teachers use to work on contents with children, as will be discussed later, followed by park size (42.9%). It is also important to underline that security and maintenance are also aspects that schoolteachers take into account when planning visits to UGS with their students (28.6% and 21.4%). Respondents also mentioned other reasons such as daily users, architecture, history or the presence of animals.

The average duration reported for visits to UGS is between 30 and 60 minutes (38.9%), followed by between one and two hours (33.3%). Thus, visits are short, and activities are carried out in one or even two-hour lessons, but rarely longer (Table 1).

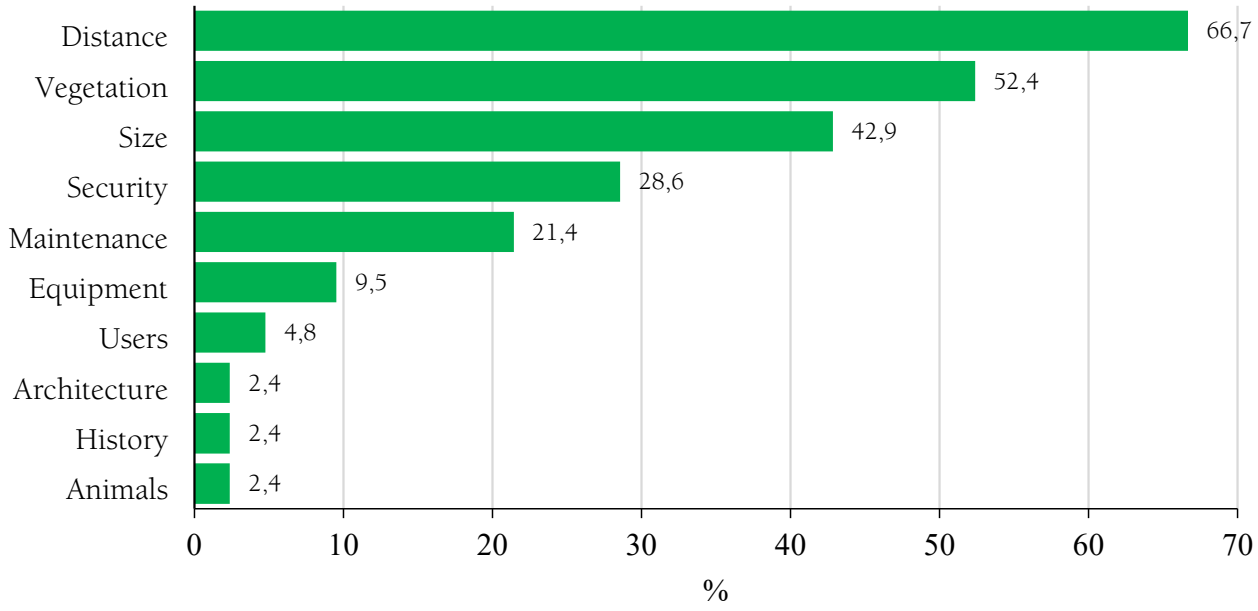
When we asked about what parks the teachers visited most often (Table 1), Valorio forest (34% of the visits) was the most visited park, followed by green spaces located on the right side of the Douro river (15.1%) and by Leon Felipe park (15.1%). On the other hand, small parks located to the north of the medieval city did not receive school visits, except for one that is close to the city's northern limit.

Table 1.
Main results obtained in the present study related to the use of UGS in Primary Education.

Do the teachers use the parks in their daily teaching activities?	**%**
Yes	20
No	80
What are the average duration of the visits to UGS?	
30-60 minutes	38.9
1-2 hours	33.3
Others	27.8
What are the most visited UGS in Zamora related to Primary Education activities?	
Valorio Forest	34
Douro river UGS	15.1
León Felipe	15.1
What are the subjects and courses related to visits to UGS?	
Natural Sciences	80.6
Social Sciences	61.1
Physical Education	19.4
Mathematics	13.9
Spanish Language	11.1
What are the main reasons for visiting UGS?	
Distance between UGS and schools	66.7
High biodiversity of vegetation	52.4
Size of the park	42.9
Security and safety	28.6
Well maintenance	21.4
Elevated equipment	9.5
Type of users	4.8

Presence of animals	2.4
History	2.4
Architecture	2.4
What kind of activities teachers propose to their students when visiting UGS?	
Observation of natural phenomena or processes	54.8
Plant identification, collection and manipulation (herbariums)	45.2
Playing games (mostly traditional games)	29.0
Others (e.g., fieldwork, teaching outdoors, nature walkings, bike rides, outdoor snack, etc.)	12.9
Team-building activities (collaborative work)	9.7
Road-safety education	9.7
Recycling activities	6.5
Other sensitive activities	3.2
What kind of methodologies teachers use during their visits to UGS?	
Teacher gives examples about contents (method A)	20.6
Students work on contents previously studied indoors (method B)	52.9
Teacher proposes inquiry research (method C)	23.5
Students propose research (method D)	2.9
Observation of curious phenomena or experiences (method E)	20.6
Other (method F)	11.8
What are the main reasons for not visiting UGS?	
Extensive curricula programming	70.8
Sparse teacher's education on outdoors teaching	52.2
Park maintenance	36.3
Safety (fears concerning students' health)	30.1
Reduced park equipment	17.7
Park vegetation (low biodiversity)	15.9
Distance of UGS from schools	9.7
Park size	1.8
Others	0.9

Figure 2.
Main reasons to visit UGS.



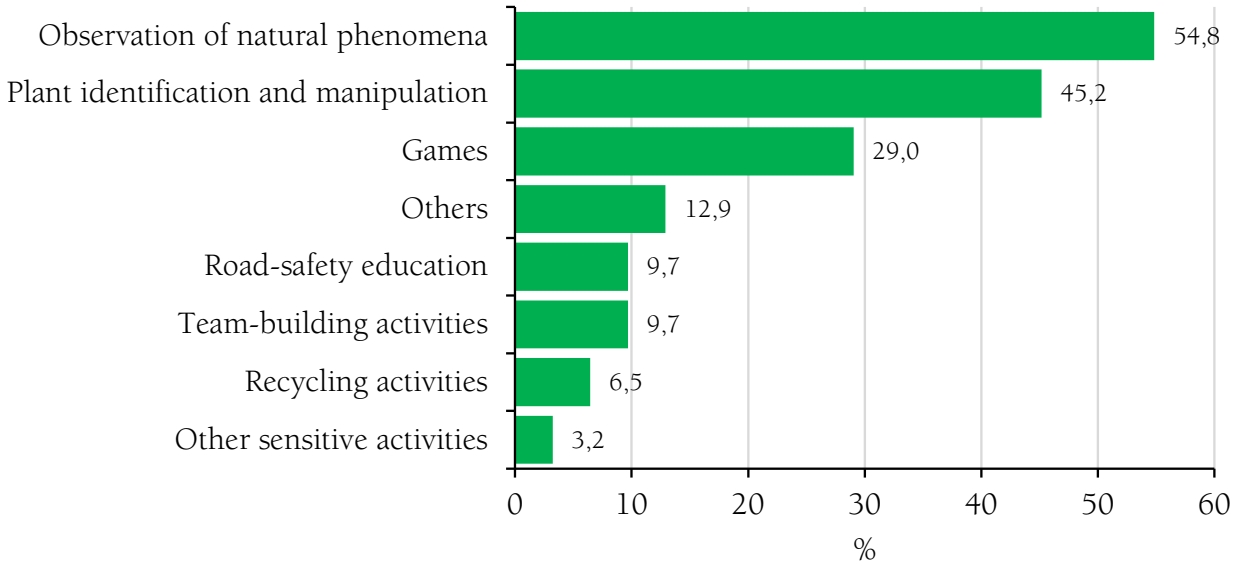
Source: own elaboration.

How do teachers use UGS

After identifying what are the main reasons to visit UGS, arises the question: what do teachers usually do when they go there with their students? According to the survey respondents (Table 1), work on contents associated with Natural Sciences appears in the first place (80.6 % of the visits), followed by Social Sciences (61.1 %). Likewise, Physical Education (19.4 %), Mathematics (13.9 %) and Spanish Language (11.1 %) also play a remarkable role in visits to UGS, alongside the less mentioned subjects of Arts and Foreign Language.

Only 31 survey respondents mentioned the kind of activities that teachers proposed for their students in their visits to UGS in Zamora, the most common being observation of natural phenomena (54.8% in Figure 3), followed by plant identification and manipulation (45.2%). The combination of these two activities during field trips shows that visits to UGS include activities where children work with nature, thus explaining why vegetation appears as one of the most important reasons for visiting green areas. Other activities developed in parks are related to games (29%), revealing parks as pleasant environments for children, and to cross-curricular contents such as road-safety education (9.7%), team-building activities (9.7%) or recycling activities (6.4%).

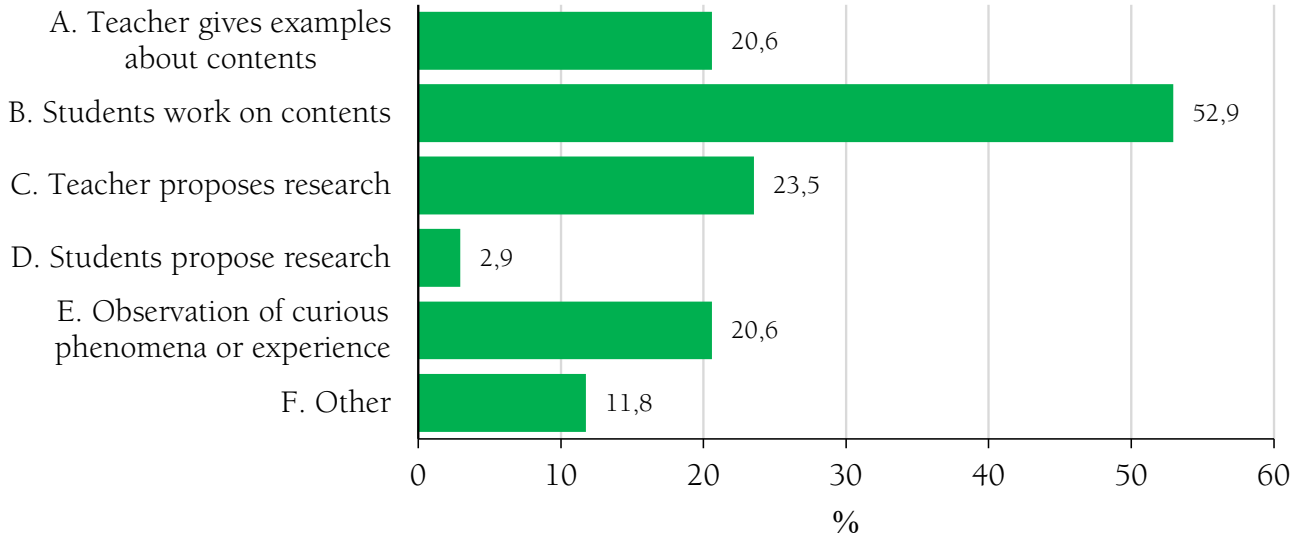
Figure 3.
Activities carried out by teachers in UGS.



Source: own elaboration.

It should be noted that, during these trips, teachers use teaching methods that go beyond the expository approach (Figure 4, Table 1) and that, although they combine different methods, in 52.9 % of the cases (method B in Figure 4), the experimental work conducted by children in UGS is based on classroom contents previously learned under the teacher's supervision. Other methods used by teachers are suggesting students to carry out an inquiry about something that has not been previously addressed in the classroom (method C: 23.5 %) or to let students suggest some research about something they have not previously learned in the classroom (method D: 2.9%). Even though expository lessons are also among the methods that teachers use when visiting UGS (method A: 20.6%; method E: 20.6%), it should be noted that, surprisingly, they are not the main teaching method in green areas.

Figure 4.
Learning methods followed by teachers in UGS.



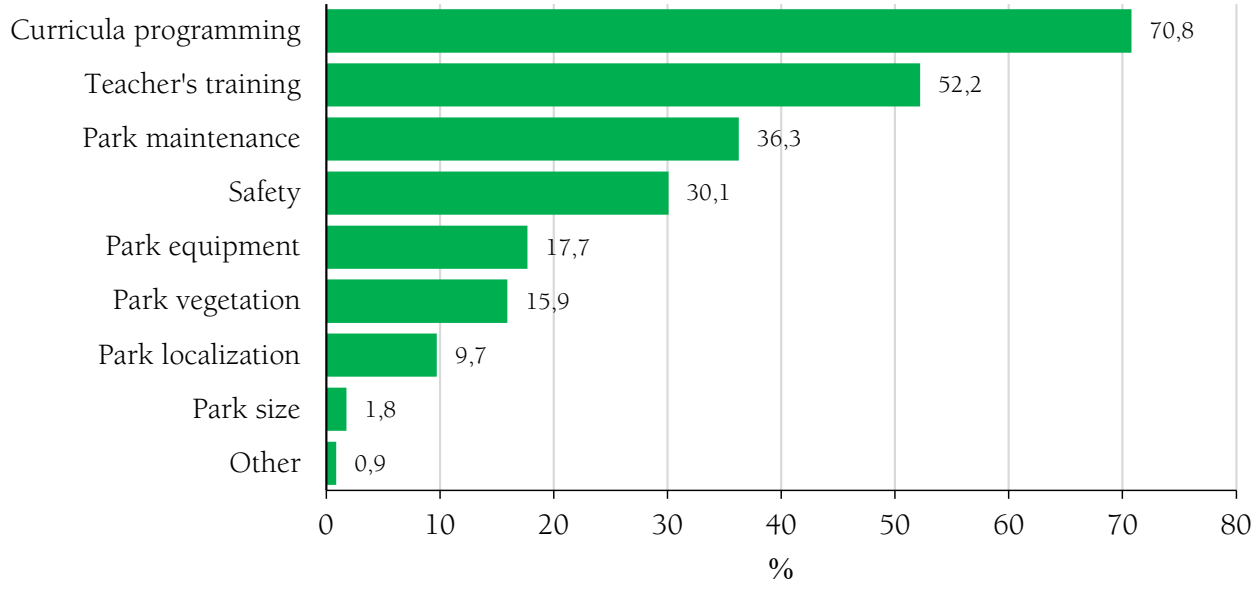
Source: own elaboration.

Note: A) Teacher gives examples related to contents previously learned in the classroom but students do not work with them in UGS; B) Students work in UGS on contents previously learned in the classroom; C) Teacher proposes a little research about something not previously taught in the classroom; D) Students suggest research about something not previously learned in the classroom; E) Observation of curious phenomena or experiences not related to contents; F) Other.

Difficulties to visit UGS

The question of why some teachers do not visit green areas was asked directly, with 70.8 % of the respondents reporting curricular planning as the main barrier to visit UGS (Figure 5, Table 1). Another reason expressed is their training (52.2 %). Likewise, park maintenance has been also indicated to be an obstacle to field trips in UGS (36.3 %). Safety appears in fourth position (30.1 %) and could be associated with the difficulties that teachers usually face when working outdoors with children.

Figure 5.
Difficulties to visit UGS.

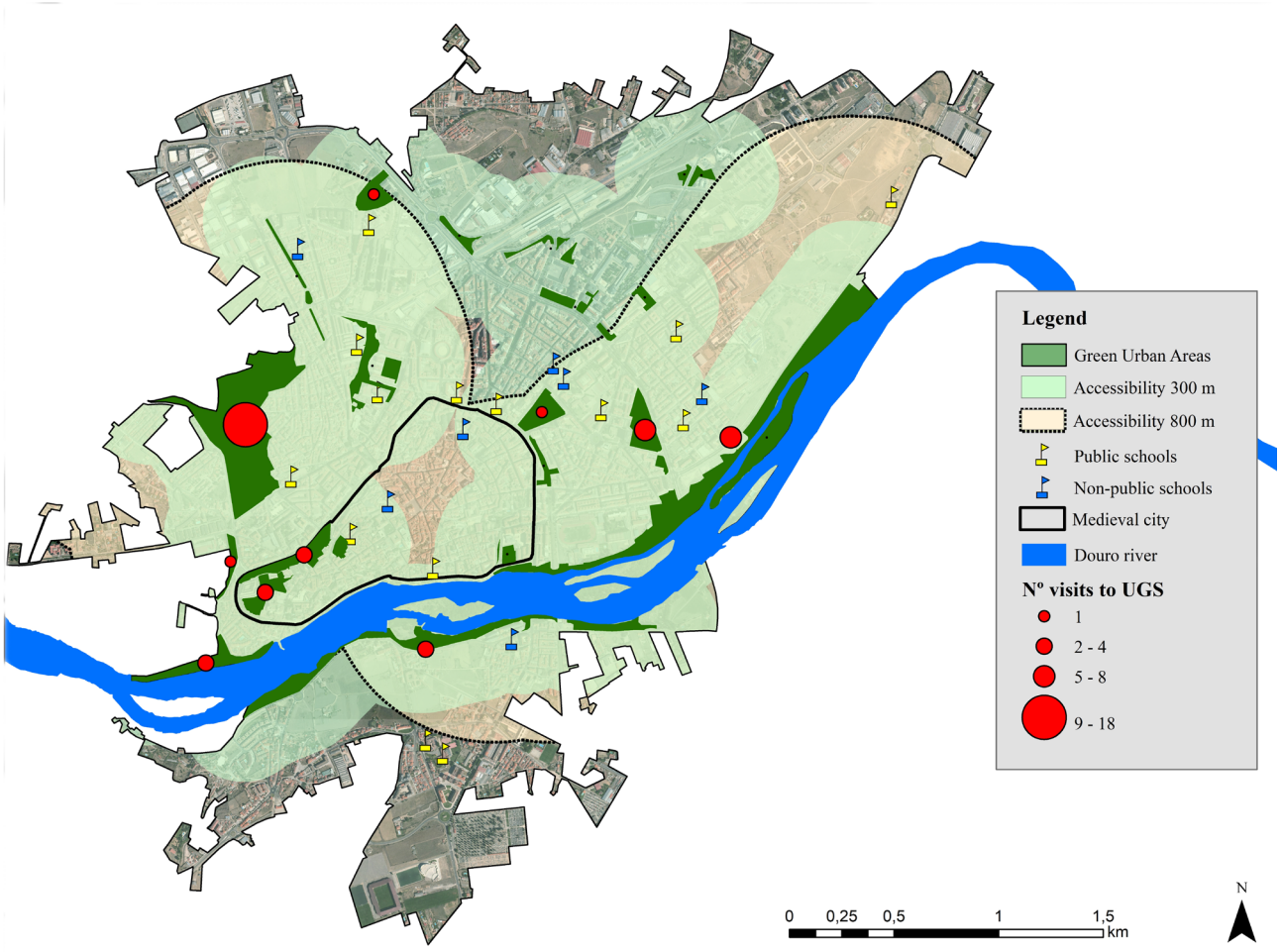


Source: own elaboration.

Distance between primary schools and UGS

We estimated accessibility from primary schools to UGS (Figure 6) and differentiated between public schools and non-public schools. According to the results, only three schools have no accessibility to UGS (14.2% of the total): two of them are in the south of the city (nº 3 and 4) and the other is located in the north-eastern limit of Zamora (nº 2). Therefore, there are 18 schools (85.8%) that have easy access to UGS, with at least one UGS less than 300m away from them. Figure 6 also shows an estimation of an 800m distance from UGS with more than 10ha, showing that all of Zamora's primary schools except two are located within this distance (90.5% of the schools have accessibility to large parks). It should be noted, however, that only two schools are located close to Valorio forest (300m or less), while one is close to the green spaces located on the right side of the Douro river and three to León Felipe park.

Figure 6.
Distance between primary schools and UGS.



Source: own elaboration.

Discussion

This research was developed in a small compact Spanish city where primary schools' accessibility to UGS is very high due to the fact that 7.9 % of the city's surface is devoted to green areas. Nevertheless, the use of Zamora's UGS by primary teachers is relatively low due to curricular constraints, teacher's training, park maintenance and growing concern about security. It could be also thought that social or urban conditions for using UGS exist. However, it has already been mentioned that Zamora is a small city, easy to walk around from end to end, and there are no marginal or dangerous neighbourhoods that complicate access to the UGS. In fact, Zamora is one of the safest cities in Spain with one of the lowest crime rates in the country (Ministerio del Interior, 2019).

Taking into account the teachers that use UGS in their daily activity, 79.1% were women and 20.8% were men, and 62.5% worked in public schools, whereas 37.5% worked in non-public schools. This could suggest that female primary school teachers visit UGS more frequently than their male colleagues, as well as public school teachers versus non-public school teachers. However, more research employing different methodologies should be done to know more about these variables, because they can be just artefacts derived from the sampling technique.

Although distance has been mentioned by students to be a determining factor for visiting UGS (Figure 2), teachers prefer to go further (800 m walk) to visit large parks (>10ha), where there is a broader variety of vegetation, or semi-natural forest areas, rather than visiting small parks that are close to schools. Therefore, there seems to be no clear correlation between distance to parks and gardens and visits to such spaces, which is not in line with the study carried out by Wolsink (2016) in Amsterdam. Van Herzele and Wiedemann (2003) have demonstrated that the size of a green area can influence the distance that people might be willing to walk to reach it. According to such authors, the distance between UGS and people's homes would be of 800m or less from UGS extending over more than 10ha. In the present paper, the visits to these UGS could be explained by the fact that teachers can go to and return to big parks within a short period of time to carry out activities, and then, continue with their daily routine. The short duration of the visits could be due to the characteristics of the Spanish primary education system, where classes have a standard duration of between 50 and 60 minutes, which means that scheduling long visits could interfere with other teachers' lessons.

UGS can be concluded to be spaces to foster inquiry-based teaching approaches and methods where teachers can work on a broad variety of contents (concepts, procedures and aptitudes), especially those related to environmental sciences. In the case of Zamora, when primary education teachers visit these spaces, they usually employ inquiry-based practices (Figure 4), which is a very different approach from the traditional expository lectures that are common and extended practices in Spanish primary schools to teach sciences. According to the Spanish Evaluation Institute (2009), 99.1% of the primary education Spanish students use textbooks in their daily school routine, even when learning environmental sciences, which promotes memorization rather than practical learning of science contents (Friedl & Koontz, 2001).

The results obtained for Zamora's UGS are very similar to those obtained by Vílchez and Escobar (2014) and Vílchez *et al.* (2019) in their analysis of the use of kitchen school garden to teach sciences in primary schools in Seville, the fourth most populated city in Spain. This could suggest that our findings could be generalized to bigger cities. According to the findings of these authors, inquiry-based methods were the most commonly used by primary teachers when working with kitchen school garden, although there was also, as in the present study, a remarkable presence of expository lessons.

Some of the barriers that could explain why teachers do not use green areas in their teaching practice could be related to curricula programming and teacher training (Figure 5). The former barrier was already identified in Spanish primary schools some years ago (Vílchez & Escobar, 2014) and it coincides with the main obstacle to developing fieldwork (Wee *et al.,* 2016; Wilks, 2010). Spanish education laws have promoted a compulsory guide on contents and procedures that teachers should work with in every single primary education course. This framework is very rigid and, in some cases, hard to comply with. As a result, it constrains outdoor-learning activities and the implementation of inquiry-based methods to teach sciences, promoting textbook-based teaching methods and traditional lessons instead. Hence, since different courses and different teachers are involved in the accomplishment of curricular programming, there are high probabilities that this framework could be conditioning visits to UGS.

It is worth noting that more than half of the survey respondents believe that teachers do not use UGS more because they lack adequate training and knowledge. This argument is linked to the main idea expressed in the Rocard Report: if teachers do not have enough training, they could have problems to conduct science lessons in a right and attractive way (Rocard, 2007). That is, to provide meaningful science and outdoor experiences for students, the teachers themselves need quality science experiences from which to draw and consequently, these have to be trained in the initial and in-service teacher education. This barrier is once again proof of the consequences of future teachers' lack of confidence in their scientific knowledge and of the precarious context of primary education classrooms, as also reported by other researchers (Cortés *et al.,* 2009; Gil *et al.,* 2008). Rickinson *et al.* (2004) stated the same three difficulties for outdoor learning that we have identified in Zamora (Figure 5), albeit in a different order: safety, teachers' training and curricular programming. Another study found poor motivation among teachers who lacked experience with field trips (Mannion *et al.*, 2013), which seems to be related to their own training.

In addition to the distance and the size of UGS, other factors that make teachers choose one Zamora's UGS over others is the lack of park equipment (playgrounds, benches, drinking fountains…), vegetation (trees, shrubs, and grass) and location in the city. These factors also appeared in other researches to explain why people prefer to visit one park rather than other (Gómez-Gonçalves *et al.,* 2014, 2018) and could contribute to explain the use of large parks as opposed to small parks. According to such argument, large parks (more than 10ha) would be better equipped and have more vegetation than small green areas. Besides, large spaces usually include areas that are far from traffic and noisy streets, making the development of educational activities easier.

Conclusion and limitations

UGS emerge as educational resources that could be used as teaching laboratories to implement inquiry-based methods. This research has shown that parks and gardens are not only educational resources for teaching natural and social sciences, but they are also areas that can facilitate the development of different curricular activities. Cross-curricular contents are usually also worked during the visits to UGS, with special dedication to road-safety or environmental education. Visits to green areas in urban settings encourage the observation of natural phenomena and plant identification and manipulation. This contact with nature can lead to create strong links with natural spaces and processes promoting respectful environmental habits.

This research shows that UGS are not only necessary because they develop ecological, economic, social, and urban functions, but also because they function as didactic resources for many primary schoolteachers. It is observed, one more time, that urban pieces do not have only one use: each group of citizens use urban spaces according to their interests and needs. To conclude, it can be said that parks, along with schools, museums, and other educational facilities, are part of the educational infrastructure that cities have.

Finally, it should be noticed that there are certain limitations to this study regarding the interpretation of the results obtained. First, the sample used is not representative of the entire reality of the city of Zamora, since the bulk of the testimonies comes from university students that have chosen a certain primary school to perform their professional practices. Future work should seek to replicate our findings using a stratified sample of Zamora's schools. It would have been interesting to examine whether an educational use of UGS contributes or not to the improvement of science learning among primary education students -analysing their course results- and to inquire if it contributes to the improvement of students' attitudes towards the environment. Another limitation is related to the quality of the data obtained: in the future it would be useful to know more about the school grades in which teachers work. Although in general is difficult to access school classrooms and teachers in the daily routine, it would be interesting to compare our data (second-hand information) with the teacher's perception (first-hand information), because second-hand data can entail potential biases. Nonetheless, despite its limitations, this study contributes to the understanding of how primary education teachers work and to the definition of the barriers that could hinder their daily work.

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Appendix 1.
Main characteristics of Zamora primary schools related to outdoor spaces.

Nº	School name	Playground	Green areas
1	CEIP Nuestra señora de la Candelaria	x	x
2	CRIE	x	x
3	CEIP Alejandro Casona	x	x
4	CEE Virgen del Castillo	x	x
5	CEIP Arias Gonzalo	x	
6	CEIP Gonzalo de Berceo	x	x
7	CEIP Jacinto Benavente	x	
8	CEIP José Galera	x	x
9	CEIP Juan XXIII	x	
10	CEIP La Hispanidad	x	
11	CEIP Obispo Nieto	x	
12	CEIP Riomanzanas	x	x
13	CEIP San José de Calasanz	x	x
14	CEIP Sancho II	x	x
15	CPC Divina Providencia	x	
16	CPC María Inmaculada	x	x
17	CPC Medalla Milagrosa	x	
18	CPC Nuestra señora del Rocío	x	x
19	CPC Sagrado corazón de Jesús	x	
20	CPC San José	x	
21	CPC Santísima Trinidad	x	

Appendix 2.
Main characteristics of Zamora urban green spaces.

Id.	Name	ha	Benches	Play-ground	Sport field	Fountain	Picnic area
a	Parque del Castillo y de la Catedral	1.9	x				
b	Verde urbano Calle de los Caballeros	0.8					
c	Parque de Olivares	3.4	x	x	x	x	x
d	Parque de la Marina	2.2	x	x		x	
e	V. u. Candelaria Ruiz del Árbol	0.8	x	x		x	
f	Margen derecha del Duero	16.5	x	x	x	x	x
g	Bosque de Valorio (urban area)	19.2	x	x	x	x	x
h	Parque de Peña Trevinca	1.9	x	x	x		
i	Jardines de la Vaguada	3.3	x	x	x	x	
j	V. u. Avda. C. Cisneros (University)	1.4	x	x			
k	Parque de San Martín	3.7	x	x		x	
l	Parque de León Felipe	3.0	x	x	x		
m	Margen izquierda del Duero	8.3	x	x		x	x
n	Isla de las Pallas	5.0					
o	Jardín Carretera de la Estación	0.9	x	x		x	
p	Verde urbano Puerta Nueva	0.6	x	x	x	x	
q	V. u. Calle N. S. de las Mercedes	0.9	x	x			
r	V. u. Avda. C. Cisneros (Eroski)	0.8	x	x			
s	Verde urbano Alto de los curas	0.8	x				

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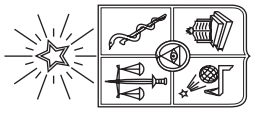

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