Article

Learning about Sustainable Mobility in Primary Schools from a Playful Perspective: A Focus Group Approach

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Abstract: Nowadays, educational activities need to be oriented towards sustainable mobility as a tool to guarantee a better future for younger generations. Two focus groups (FGs) of children aged 10–12 years were formed, for the design, development, and evaluation of educational tools for gamification techniques on the subject of sustainable mobility. The study involved a group of children from three classes in the fifth-year of primary education at a school in the City of Burgos (Spain). The first focus group revealed the cognitive perceptions of the children toward sustainable mobility and their cognitive understanding of its need. The information was used in the design of learning activities of gamification techniques. The children in the second focus group, after the educational experience, were evaluated with regard to the knowledge they had acquired on the topic and changes in their attitudes. The basic knowledge of children before their participation in the research was limited to the environmental aspects of sustainable mobility, as we observed in the first focus group. Through the use of the gamification tools, the children acquired new concepts that clarified the importance of social and economic components linked to sustainable mobility, and they started to develop an awareness of how to play an active role in changing their behavior.

Keywords: sustainable mobility education; focus group; gamification; early education

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1. Introduction

In recent decades, interest in the environmental crisis has been growing and the concept of "sustainability" has become the cornerstone and objective of environmental education, stimulating an increase in interest in changing individual behavior. One of the fundamental needs of present-day society consists of establishing educational activities oriented towards sustainability education as a tool to better guarantee a future for future generations.

The present investigation seeks to incorporate a methodological scientific contribution, by studying how to promote sustainable mobility education, and taking steps to implement these educational activities.

The main objective consists of discovering what the children know and think of sustainable mobility, in order to establish training plans and to propose tools for the evaluation of learning.

The choice of experimenting with focus groups (FGs) composed of primary school children is because the techniques of these groups facilitate the exploration of opinions, perspectives and knowledge of the topic.

This study is part of a broader research project of which the general aim is to experiment with gamification techniques in order to stimulate learning related to sustainable mobility among children in the fifth year of primary education.

In this study, the authors propose to reflect upon and discuss the application of the FG techniques to a sample of children aged 10–12 years, both before and after the learning activity. Both previous and acquired perceptions and knowledge of sustainable mobility among the children will be analyzed, and positive contributions and stumbling blocks will be identified. The present article will be structured into five sections to achieve that objective. Following the introduction, in Section 2, a general review of the literature will be presented on the use of FGs with children, and on sustainable mobility. In Section 3, the methodology will be presented and the case study will be described. The results will be presented in Section 4. Finally, the conclusions will be advanced in Section 5.

2. Literature Review

Focus groups (FGs) are widely used in social studies, and represent a qualitative tool with which information can be gathered on almost any topic under study. Their use has been increasing over the years because the interaction between the participants stimulates the expression of opinions and points of view on previously defined topics [1].

The FG method offers an opportunity for participants to exchange information that facilitates a dynamic educational process [2]. The development of this technique, its use and its evolution are present in various investigations and texts that, in the majority of cases, consider the adult as a participant [3–12]. Bogardus [3] and Merton and Kendall [4] are considered the first sociologists to use focal interviews in their social investigations. Stewart and Shamdasani [5], in their social science texts on focus groups, drew attention to focus groups for the manner in which they involve the interaction of group participants with each other, as well as with the researcher/moderator, and that it is the compilation of this type of interactive data that distinguishes focus groups from individual interviews. Krueger and Morgan [6–8] focused attention on the evaluation side of the program, since focus groups have become an important tool in qualitative evaluation research, which includes not only post-program evaluation, but also needs assessment and strategic planning. Many aspects of focus groups (e.g., the role of the moderator, the specific focus of the group, the setting in which they meet) have been considered by various authors in different settings, such as marketing [9] and political [10]. Fern [11], and Puchata and Potter [12] in their handbook of FGs, summarize all the characteristics and steps to be taken to use this methodology, and explain that there are several types of FGs for different fields of research.

Over recent decades, investigations have increasingly used FGs with children, because their ability to collaborate and to hold their own opinions is recognized. Children should be understood as competent creators, interpreters and reporters of their experiences with the right to be heard [13–15]. Many researchers have come to understand that the views of a child can be more varied and sophisticated than the explanations of adults with regard to the perspectives of children, and that it should, therefore, be gathered directly from the children [13,16].

Recognizing that children have the right and the capability to participate in an investigation is not to say that the interviews with children are conducted in the same way as adult interviews [17–19]. In that sense, Gómez [20] affirmed that the presence of children as individual observers requires the design of specific techniques and the adaptation of conventional ones, and the implementation of those techniques has to be carefully planned, due to the cognitive, linguistic and psychological differences between children and adults [21].

It is essential, for the proper functioning of a FG composed of children, to use an appropriate language among group members, to formulate the questions as clearly as possible, to be an active listener in their presence, to respect what they say, to inter-relate the topics that arise with others that are of interest to the investigation, not to interrupt or to reject what they say and not to adopt a

preeminent position in any discussion around the table. Those points constitute examples of behavioral practices to which any group should subscribe [9,22–24].

In the field of sustainable mobility research, it is worth highlighting that many studies exist on processes of public participation using FGs to introduce sustainable transport into urban environment, most of which are directed towards adults. One example is the study of Ibeas et al. [25], in which a participative methodology was proposed based on the completion of mega focal groups (MFGs) and FGs, in order to establish both the opinions and the perceptions of individual members of the public towards sustainable mobility in the urban built-environment. In this study, the way that an FG permits the reproduction of social discourse is evinced on a small scale. It is constituted on the basis of an appropriate selection of the participants defined in accordance with the objectives of the study.

In the field of sustainable mobility and infancy, J. Barker et al. [26] completed an investigation into the state of the question, in which they highlighted the limitations that exist within this field in relation to infancy both on a theoretical and an empirical plane. In that regard, Gilbert et al. [27] also affirmed that, despite the existence of numerous investigations referring to non-sustainable modes of urban transport, the active contribution of children to these trends in sustainable mobility is very limited. In that sense, the problematic issue has yet to be clearly addressed, insofar as children are part of the solution, capable of becoming active agents for changes to mobility patterns in urban environments. To that end, MacDonald [28] underlined in his study that it is of great importance within the field of sustainable mobility and sustainable development to generate new spaces in infancy for the participation of the younger generation, where children form part of the solution to the problem, taking into account their opinions and perceptions, in order to establish policies in accordance with their needs.

In recent years, research has begun to center on gamification frameworks, and some works have recently outlined the promising results of using gamification techniques to influence individual behavior in relation to changes in sustainable mobility patterns [29].

There are increasing numbers of studies on the application of gamification as a means of persuading the public to engage in collective action that is socially beneficial [30]. Holleis et al. [31] observed that direct feedback, which is obtained through the use of gamification, can have a positive influence on the behavior of individual mobility, and that social influence is probably the most powerful factor behind changes in human behavior.

The learning process associated with feedback opens new opportunities for educators, because they can offer new experiences through the application of gamification in education [32]. Wells et al. [33] proposed a gamification model to motivate users to adopt sustainable mobility through the analysis of a person's mobility behavior and the proposal of stepped challenges based on actual progress.

The present investigation provides the possibility of creating a system that will enable and help children to become active agents of change towards mobility that is more sustainable, as Tonucci [34] suggested.

3. Methodology

The principal objective of the whole investigation is to estimate perceptions, to ascertain previous and acquired knowledge and to create didactic activities on sustainable mobility, establishing various aspects as a starting point: sustainability, mobility, transport, contamination and energy.

The following steps were taken to complete the investigation:

1. Initial FG and data collection;
2. Analysis of the initial FG data, design of activities with the use of gamification techniques and implementation of the didactic activity with children;
3. Final FG and data collection;
4. Conclusions.

3.1. Procedure

Investigations with children, especially in groups, require patience, enthusiasm, comprehension and organizational capacity, for which some "guidelines" have been prepared for the two FGs that both the moderator and the observer will apply in their respective activities.

Taking into account the difficulties relating to the use of a very specific language with standard terminology from the field of engineering, we opted for the use of visual techniques in both FGs of our study, in order to stimulate the opinions of the children on sustainable mobility. Visual techniques can be especially effective at facilitating the success of those learning objectives [20]. The same author suggested that flashcards are popular because of their potential as a complementary instrument that assists the participants to express their value judgments through the communication of their perceptions on the circumstances that are reflected in them.

Visual techniques can be understood in two ways. On some occasions, the completion of drawings by the children themselves is proposed, in order to gain a visual picture of an individual testimony and/or some replies to relevant questions in the study. In a study by Madden and Liang [35], the FG technique was used both before and after an activity, in order to gain at a better description of the understanding of environmental sustainability among young children. In other examples, it is a question of gaining insight into the ideas of interviewees with regard to particular topics on the basis of visual stimuli previously designed by the researchers (such as drawings, paintings, photographs and videos, as used in this study.

Specifically, a series of printed images without any categorizations was used. The images represented various aspects of mobility that children normally observe around them: transport (various types and modes), urban spaces (gardens, streets, pedestrian areas, bus line and facilities) and extra-urban spaces (factories, highways). The discussions that followed observation of the images were only slightly structured; the moderator and the observer guided the discussion so that all the children contributed, clarified their answers and sought additional information in their minds whenever possible. The pupils had 60 minutes available to them for the completion of both FGs.

Considering that the aim was to ascertain the knowledge the children held on sustainable mobility, they were given no previous information in either the first or the second FG, in view of the study's evaluative nature. The two FG sessions were conducted as if they were games, and the "rules of the game" were therefore explained and space was given to the pupils to reflect on the proposals that were progressively offered. After the first FG, the investigative group was able to design a series of activities on the knowledge that the students would be expected to acquire.

The activities were proposed with the use of a new learning methodology: gamification, using the Classcraft web-based application. Classcraft is a customized web-based application that permits teachers to direct a role play in which the pupils assume different characters. In the role-playing game, the idea is that the pupils involve themselves in a game where the development of their characters is related to their capabilities at school and their collaboration in the classroom. The basic application is free for teachers and students, and includes the possibility of parental involvement. Designed by a secondary education science teacher, Shawn Young, in 2011, Classcraft [36,37] is based on video-game roles [36]. It is a very visual and attractive platform that conjures up a world of avatars (wizards, healers and warriors) that have to cooperate and participate in missions to win points and gold with which to improve their team. The objective is for students to advance in a collaborative way at the same time as learning and developing their knowledge. The teachers have access to an interface where they can prepare a story and design a set of activities that the pupils have to negotiate to win points and gain rewards. The pupils have a private online profile where they can see the badges they have received, whatever their activities. They are expected to follow the suggestions from the teacher, and they then receive points and rewards in recognition of their work. We specifically designed a story on how to save an island from pollution. All the children had promised to study the story, in eco-hero roles, and to find solutions in response to the problems of the island's inhabitants. Activities of various typologies

were prepared and presented: crosswords, letter soups, images, mathematical problems, informative videos and documentaries, stories, chat discussions and real examples, as shown in Figure 1.
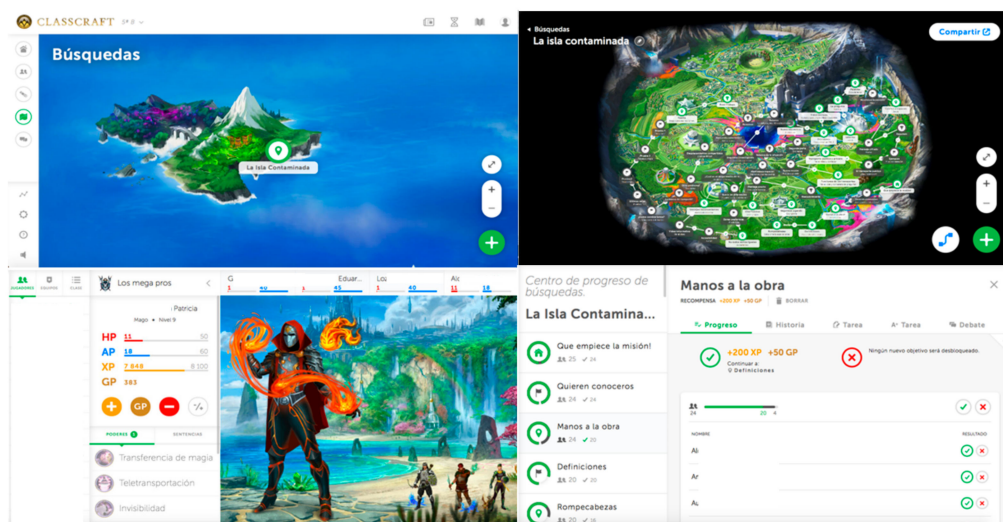

Figure 1. Screenshots of the proposed activity. [37].

As the participants of the study were children, written parental consent had previously been sought in all cases. Audio recordings of the FG sessions were made for the subsequent transcription of the information that had been gathered, thereby facilitating a proper analysis of special and vital importance for the study. It is worth mentioning that the use of images and voices recorded in the FGs remained anonymous, and for the sole and exclusive purposes of the present study. At no time, therefore, was the identity of the participants revealed.

3.2. Participants

The protagonists of the investigation were students from the fifth year of primary education (10–12 years old) from the Colegio Marista Liceo Castilla de Burgos. The investigation was made in 2018 and lasted three months. The sample in this study was composed of 75 pupils divided into three classes (each of 25), although the research team conducted the FGs in groups of nine children. Various authors have specified that small FGs are a good way of gathering data, because they reproduce a natural and familiar form of communication [16,38]. Despite the use of small FGs, a general evaluation was also conducted of the learning acquired by all the students. The groups were composed in accordance with the following guidelines:

(a) numerical criteria (nine members, three from each class);
(b) gender balance (half boys and half girls);
(c) academic level (low, medium and high performance in equal number);
(d) behavioral style;
(e) different mobility habits to go to school.

Those guidelines were communicated to the teacher-tutors of the three classes involved in the study who were asked to select the children, because they knew them best, thereby achieving better interaction between the participants without rejecting space for the differences that might occur in the transmission of ideas [10]. The authors consider that this selection model was very positive for various reasons, including that a comfortable scenario was created in which the children felt uninhibited and prepared for communication, and that the heterogeneity and emotional proximity of each child was sufficient to outweigh the symbolic power of the adult moderator. With the assistance of the head of studies, a suitable place was chosen for the activity to take place, outside of the classroom [39] where the children could freely sit down.

4. Results

We shall consider each FG separately and will afterwards analyze the differences between both in relation to the educational activities that were proposed.

4.1. First FG, Previous Knowledge

In the first place, the group members were given the possibility of introducing themselves one by one, after the moderators had asked some initial questions that accompanied brainstorming sessions on select mobility concepts, and the following observations may be highlighted.

With respect to the concept of "collective transport": the children were unaware or unable to contextualize its meaning.

The concept of "sustainable transport" was perfectly defined for them, and associated with "little pollution". However, their reasons were restricted to expenditure on gasoline, little pollution, and so on, while nothing was said on the reduction of private vehicles (that do pollute) in favor of sustainable transport, associated with the idea that a bus carries more passengers than a car and has lower maintenance costs (many cars cost more than a single bus).

After this first step, a game was proposed where the children were expected to comment and to position some pictures in a diagram on the blackboard for their classifications as "sustainable" or "non-sustainable". Equally, inquiries into the responses of each child to the images examined various essential concepts in depth, such as sustainability, public transport, congestion, bike lanes, accessibility, environment, and so on. Doubts were raised with regard to the concepts of "sustainable" and "sustainability". The students who raised no doubts identified sustainability with a "place" or a "site", in other words, a delimited area. More specifically, the pupils identified it as a place that is not very polluted, where pollution is prohibited and nature is respected. They associated the concept of "little pollution" with green places and green zones.

It is worth highlighting that there was a mistaken concept of sustainability in matters concerning the accessibility of people with reduced mobility (PRM), where children were presented with an image in which a group of people are helping another person with reduced mobility to access an underground station down the stairs because there is no lift or access ramp. In this case, the children associated the idea of "helping citizens" with a "sustainable" situation, but they were unable to perceive the difficulties of accessibility linked to inadequate infrastructure as something negative.

An analysis of the game with pictures marked as "sustainable" or "non-sustainable" concluded with the following aspects and associations of ideas:

NON-SUSTAINABLE pictures. Within this concept, the students distinguished between non-sustainable and very unsustainable, recognizing that they perceive "different degrees of non-sustainable circumstances". Hence, pictures of factories that pollute the environment, the atmosphere and green zones, and places you cannot breathe, were all identified as "non-sustainable", as were pictures with a lot of noisy cars polluting and creating congestion, streets with no pedestrian crossings, untidy cities, pictures of areas with neither public transport not bike lanes, and so on.

SUSTAINABLE pictures. Sustainable images were identified as those that, according to the pupils, presented the following characteristics: the presence of non-pollutant electric cars that neither consume gasoline nor waste money, the presence of green zones with trees, non-polluting modes of transport (such as bicycles), bike lanes, zones where traffic is regulated, zebra-crossings, parking with free spaces, access ramps to bus and underground stations, pedestrian zones, and so on.

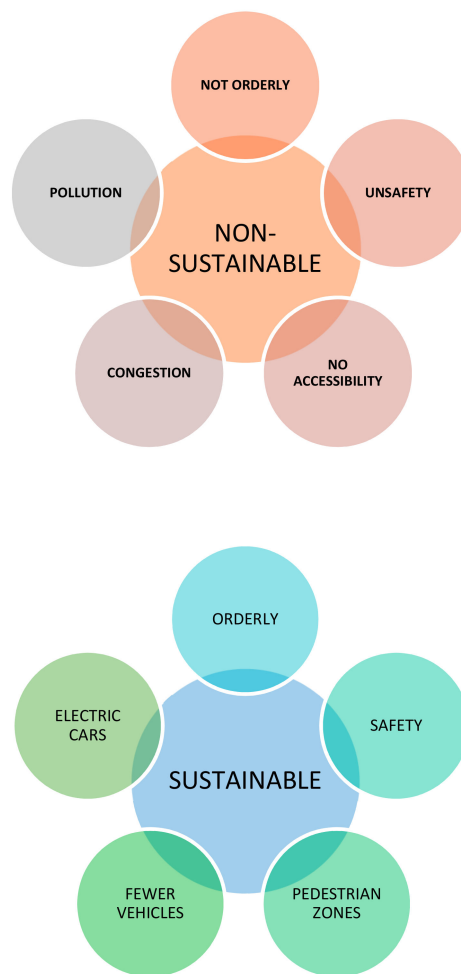All of this may be summarized in a diagram, as shown in Figure 2.

Figure 2. Urban mobility contexts: "sustainable" and "non-sustainable".

Seeing that many references in the discussion were to the environment, the children were asked for their opinions on the matter. They perceived of this concept as a place or space associated with green zones, nature, trees and animals, and they likewise affirmed that people have to take care of that area. These ideas were reflected in their words and are shown in Figure 3.

Figure 3. Final plan of the "environment" concept.

At the end of this FG session, we concluded that pupils had some quite good general knowledge on sustainable mobility, but their concept of sustainability was biased towards environmental problems, with little knowledge of the social and the economic components that global sustainability represents. All of the above means that we need to design this tool by placing an emphasis on these two last topics, without forgetting the environmental component.

4.2. Second FG, Acquired Knowledge

The same group as the first FG met again after the didactic intervention carried out over three months. In the first place, an effort was made to review the standard terms of sustainable mobility and their meanings within an exercise of classification proposed by the monitor through the use of pictures. It was noted that the children recognized and classified the transport modes with greater certainty when they were asked to place them in a general classification (land, air or maritime).

They classified transport as polluting or non-polluting, and made reference or alluded to the typology saying that they can transport people, animals and goods. They also referred to motorized transport and to non-motorized transport, specifying "non-motorized" as more sustainable.

With regard to the distinction between public and private transport, the children recognized the difference between the two, and the concepts that emerged were "collective or individual use", property, cost, capacity and number of people that are transported and the sustainability of public and private transport. In that sense, practically all the children in the FG were clear about the meaning of both terms, something that never occurred during the first FG.

The discussion on modes of transport also involved reflection on the benefits and disadvantages of each mode of transport: on foot, by bike, in a car, by bus and by other means.

Among others, the benefits sought were sustainability from environmental, social, economic and health perspectives. There again, the problems that each mode of transport posed for the environment, economy and society were all argued. Among them all, four modes of transport were highlighted: on foot, by bike, by bus as public transport and in a car as private transport.

All of the children were in agreement when they affirmed that "going on foot" or "going by bike" was more healthy than "taking the car" or "taking the bus", because it permits exercise and keeps a person in good health, while also presenting disadvantages such as not being able to travel long distances, safety issues due to problems with infrastructure and cars and an inability to carry a lot of weight. They also affirmed that "going on foot", "going by bike" and "going by bus" were more-sustainable modes of transport than "taking the car" for various reasons, including that they do not pollute, the bus can carry more people, areas can be designated as shared spaces because there are no cars and savings on gasoline. In the end, they were all in agreement that "taking the car" was the least healthy and sustainable of all modes of transport, and that only if shared with other people when going together to school and not each with their own family can the car be turned into something more sustainable. In Tables 1–4, all the results of the discussion are summarized by each mode of transport.

When it came to the specific topic of infrastructures for circulation by each mode of transport discussed, it was observed that the children held specific knowledge concerning the spatial division of each one, recognizing such terms as bus lane, bike lane, pedestrian zone, roads and lanes, surface and underground, motorways, dual carriageways, roads, parking, traffic directions, and so on. With regard to universal accessibility to transport, unlike the beliefs expressed in the first FG, the children clearly appreciated that public transport should be accessible to everyone, recognizing a series of infrastructures such as access ramps and lifts so as to achieve greater sustainability and equality in mobility.

Table 1. Advantages and disadvantages of "going by bike".

GOING BY BIKE	
Benefits/Advantages	**Problems/Disadvantages**
Healthy:*It helps to do exercises. It keeps you healthy* **Sustainable:***No pollution*	**Comfort**: *Pedaling is tiring. It's a bit boring.* **Safety**: *It's inconvenient because you have to wear protective gear and a helmet, knee pads, etc. And if you don't wear them and you fall, then you have an accident.* *If you go by bike on the road you can be runover by a car* **Travel time**: *You take longer on a bike than taking a car or going by bus.* **Distances**: *If you are far away from where you want to go, it's better to take another means of transport.* **Infrastructure**: *There are no bike lanes across the city.* *There are no bike parks anywhere and sometimes the bike is stolen. Where there is no bike lane, the rider may have to go on the pavement if they don't want to go on the road, and they bother pedestrians or even knock them over.* **Possibility of carrying bags**: *You can't carry very much with you.*

Table 2. Advantages and disadvantages of "going on foot".

ON FOOT	
Benefits	**Problems**
Healthy:*It helps you to do exercises. It keeps you healthy.* **Sustainable:***No pollution. Areas can be set aside to relax and be with other people.*	**Distances**: *The bad thing is that you get tired out, if you travel a long way.* **Travel time:** *When you go to a place that is far away, you cannot walk because you'll arrive late.*

Table 3. Advantages and disadvantages of "going by bus".

GOING BY BUS	
Benefits	**Problems**
Sustainable: *Not very polluting, can be electric. The bus carries more people than a car.* **Appropriate times**: *If it comes at the time you need it, the bus is fine.* **Short distance between bus stops**: *The good thing about the bus is that you have bus stops very close to each other and so it is very easy to take it wherever you are. They can connect with other sorts of public transport.*	**Comfort**: *The good thing is that people without a car can use it and, if you are shopping and carrying heavy bags, then it is very convenient.* **Times**: *The bad thing is that sometimes you have to wait a long time for the bus to pass and in the car you don't wait because it's yours. (The value of time). The bad thing is that you have to get up early to take the bus and if you go by car you don't have to wake up early.* **Trips**: *The bad thing about the bus is that it takes a long time to arrive at a place, because it's always stopping and doesn't take the shortest route.*

Table 4. Advantages and disadvantages of "taking the car".

TAKING THE CAR	
Benefits	**Problems**
Comfort and convenience: *You can go where you want to straight away.* **Shared car:** *You can share your car with other people to pollute less and share costs.*	**Congestion**: *You can be in a lot of traffic jams.* **Sustainability**: *Pollutes a lot.* **Costs**: *You have to pay all the repairs, the insurance, in comparison with public transport which costs less.*

In the last part of the session, a game was proposed referring to a city that was not very sustainable, where they had to be the planners. The idea was for them to link up the knowledge learnt and to create a more sustainable city associating ideas and knowledge, playing the role of planners.

This situation was explained to them:

"Imagine a city that is not very sustainable (images), with a lot of cars and traffic jams, with a lot of roads, streets and parking places, where all the mums and dads take each of their children to school in a car, and the children can hardly play in the street, and there is a lot of pollution. There is no park because there are a lot of parking places for cars. As you are the city planners, I want you to tell me what you can think of to solve these problems, so that mobility improves in this city!"

They were asked some questions:

What type of city do you think is the most sustainable and livable in?

What do the people in charge of managing and designing the cities have to do, so that these places may be more sustainable?

The children were asked to imagine themselves as mayors and expert engineers to make decisions on how to plan a more sustainable city. In the discussion, priorities were identified that a sustainable city should try to have (e.g., pedestrians, cyclists, cars, bus, trams, underground, etc.); the pupils wrote down words and set up a series of explanatory images to organize a sustainable city. In the end, the children argued that, in order to plan a sustainable city, certain conditions had to be laid out:

- At the level of **urban planning** (green zones and parks, pedestrian zones, lanes for the exclusive use of buses, bikes, incentives for underground transport);
- At a **behavioral** level (reduce pollution, use bikes, electric vehicles and shared cars, walk more, use public transport).

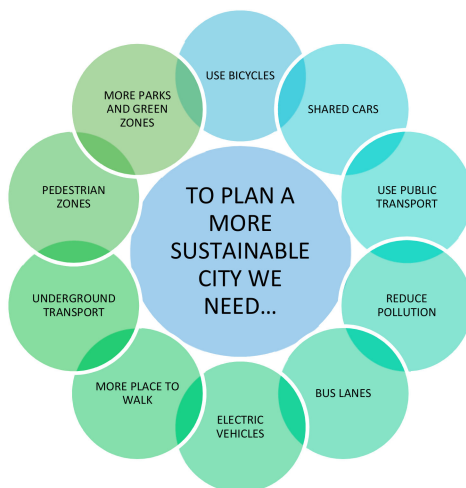They then drew a scheme to represent it, as shown in Figure 4.

Figure 4. Planning situations for a more sustainable city.

4.3. Comparison between the First and the Second FG in Relation to the Gamified Didactic Activities

Comparing the results of the first FG with those of the second, it may be seen that there are enormous differences and an evolution in the knowledge of sustainable mobility among the children.

Conceptually, above all, the children managed to link up a whole series of key concepts such as, for example, sustainability, accessibility, types of areas, transport types, transport modes, and so on. They were able to reflect on the importance of taking into account the three components that have to be considered to achieve sustainable mobility—not only environmental, as at first, but also social and economic aspects. A summary is shown below that contains the three spheres (a priori knowledge, gamification game, a posteriori knowledge) (Table 5).

Table 5. Comparison of knowledge before and after the gamified activity.

FOCUS GROUP 1 (PREVIOUS KNOWLEDGE)	GAMIFICATION ACTIVITY	FOCUS GROUP 2 (SUBSEQUENT KNOWLEDGE)
The children do not define or do not know the concepts of: • **Transport mode;** • **Transport type;** • **Collective transport and its social and economic component;** • **Sustainable transport and its social and economic component.** • Concept of **"sustainable"** and **"sustainability"**: the children identify sustainability with "a place" or a "site", in other words, a territory with limits. For them, it is not a very polluted place, where there are rules on not polluting and where nature is respected. • **Lanes and spaces**: the children associate bike lanes with a sustainable space. Some children are unaware of the concept, while others are aware of it. • **Pedestrian Zones**: a stimulus to social and economic relations. • **Accessibility for people with reduced mobility (PRM)**: the children never appreciated that transport should be accessible as such, they merely expressed the opinions that it is good to help people in wheelchairs. • **Transport planning**: the children were completely unaware of its meaning.	• Video and definitions • Puzzles • Crosswords • Soup of letters • Group classification games • Mathematical problems • Stories • Game "Find the Differences" • Game "Advantages and Disadvantages" • Comments on photos in chats • "Planners": exercise in which they themselves must plan sustainable transport in their city. • Sustainable Urban Mobility Plan (SUMP) reports • Conceptual schemes	With regard to the **modes of transport**, they can be categorized as: pollutant, non-pollutant, with a motor, without a motor, electric . . . The children are capable of classifying and distinguishing the **transport types**: land, air, maritime, public, private, electric, diesel, gasoline. Under the concept **functionality of transport**, they classified transport as the transport of people, goods and collective transport. Concepts emerged such as **"collective or individual"** usage, including property, cost, capacity and number of people transported, and the sustainability of public transport with regard to private transport. It is seen that the children have properly defined what "sustainable transport" is, likening it to a window on the way to move around. The children are quite clear and perceive a series of advantages and disadvantages (of an environmental, social and economic nature) for each mode of transport, and their relationships with sustainable mobility. The children recognize **the spaces dedicated to each transport type** (lanes). **The children already recognize and know** that accessible spaces should exist for people with reduced mobility, both for access to stops as well as on the means of transport. They associate this concept with social wellbeing and as something very positive. The concept of transport planning was not completely grasped by all the children. In that sense, the children have acted as planners, promoting actions and measures that have occurred to them on the basis of the knowledge acquired during the development of the game from their directed experiences.

An evolution in the terminology of this topic was also observed, a considerable increase of words linked to typical concepts of sustainable mobility that is evident from the following word cloud (Figure 5).

| (a) | (b) |

Figure 5. Word clouds before (**a**) and after (**b**) both FGs.

5. Discussion

Our experience has contributed to an understanding of the effect that this type of methodology can have to improve the perception of concepts of sustainable mobility in all its aspects. The main lessons we have learned through this experience are be summarized below.

The use of FGs has been important for children, since they were able to express their opinions without being judged, having a small feedback of their contribution throughout the experience. To carry out an FG, teachers must have basic knowledge on sustainable mobility and gamification supported by an expert on FGs.

We have found that many problems and good practices are common when performing FGs with children and adults. For example, the various group activities we employed had parallels with adult FGs in terms of the use of vignettes, photographs and declaration cards, which were used in a similar way to stimulate debate, increase participation and provide a welcome change in format [10]. The problems of group composition, timid and dominant members and handling of sensitive issues and moments are more-general problems of FG research [10]. Similarly, the recommended practice of having both a facilitator and an assistant was generally considered appropriate by the facilitators for the overall functioning of the group, and allowed the pace and interest level to be maintained.

In terms of the perceived educational value of the whole experience, the comments of teachers and children were generally positive.

We consider our research a starting point for future research that takes more into account:

- the reflection of the results in the mode of transport adopted in the daily trips to the children's school, adopting sustainable ways of getting to school;
- a follow-up questionnaire measuring whether the concepts acquired were maintained after the end of the game activity;
- a questionnaire for parents on what can be verified as sustainable behavior ithat s also generalized to other contexts, such as free time and family trips;
- a questionnaire about teachers' opinions about the experience;
- future studies are also needed to determine if our findings can be generalized to a wider population. Different results could be expected when considering other populations.

6. Conclusions

Having completed our intervention, the importance of the FGs as a foundation for direct observation and data collection has become clear, in order to extract the previous knowledge of the children involved in this investigation. The development of this methodology represents a fundamental tool with which to introduce new, difficult and strange topics, such as sustainable mobility, at an early age, which gives a better understanding of reality to children, and a chance to study possible educational opportunities.

The FG has shown itself to be very useful for establishing a starting line for knowledge and power to assist in the evolution and creation of competences in the field of sustainable mobility among children. An analysis has been offered in the study of the perceptions of the children on the topic under study before and after a learning-activity based on gamification. Both the FG technique and the gamification activities have presented important results.

Despite the problems of concentration in some children, we find that the majority can reach a more nuanced understanding both of sustainable mobility and of what a more sustainable city should look like, after having implemented the proposed activities. The basic knowledge of the children before their participation in the educational activity focused solely on the environmental aspects of sustainable mobility, completely ignoring the social and the economic aspects. Teaching for change implies that the children identify a problem on all sides, learn more about it and, finally, take steps to resolve it. With the use of gamified tools and well-structured activities that approach all aspects of sustainable mobility, the students acquired new concepts clarifying the importance of both the social and the economic components linked to sustainable mobility, and they started to develop an awareness of how to play an active role in changing their conduct.

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