Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram

Sustainability and education through social networks. Presence and visibility of the school garden on Twitter, Facebook and Instagram

Juan-Francisco Álvarez-Herrero.
Universidad de Alicante.
juanfran.alvarez@ua.es

Mayra Urrea-Solano.
Universidad de Alicante.
mayra.urrea@ua.es

Rosabel Martinez-Roig.
Universidad de Alicante.
rmr67@gcloud.ua.es

RESUMEN.
El uso del huerto escolar como práctica educativa en los centros educativos españoles ha recobrado en los últimos tiempos un mayor protagonismo y trascendencia, especialmente en el marco de la Agenda 2030 sobre el Desarrollo Sostenible. Sin embargo, la presencia, visibilidad y usos que los centros hacen de los huertos escolares sigue siendo algo poco conocido para la comunidad educativa. Por otro lado, en un mundo donde lo digital e Internet están cada vez más presentes en nuestras vidas, las redes sociales son unas fantásticas herramientas para dar visibilidad y comunicar las acciones educativas que tienen lugar en los centros educativos. Con la idea de conocer cómo de visibles y presentes están los huertos escolares en las redes sociales, así como los usos que de ellos se hacen en los centros educativos, llevamos a cabo la recolección y el análisis de las 100 últimas publicaciones que con el hashtag #huertoescolar se produjeron en tres redes sociales: Twitter, Facebook e Instagram. De los resultados obtenidos se desprende que los centros educativos dejan constancia de estas prácticas preferentemente en Twitter, después en Facebook y por último en Instagram y que los usos que dan a los huertos escolares son mayoritariamente como aplicación práctica de los contenidos teóricos de diferentes materias académicas y para la sensibilización medioambiental del alumnado. Se echa en falta un mayor uso de estos para trabajar los Objetivos de Desarrollo Sostenible.

PALABRAS CLAVE.
Huertos escolares, redes sociales, educación ambiental, educación en nutrición, desarrollo sostenible, escuelas.

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

ABSTRACT.
The use of school gardens as an educational practice in Spanish educational centers has recently regained greater prominence and significance, especially within the framework of the 2030 Agenda on Sustainable Development. However, the presence and visibility of school gardens as well as the ways in which centers use them remain little known to the educational community. Furthermore, in a world where our lives are increasingly governed by the digital and the Internet, social networks arise as fantastic tools to give prominence and disseminate the educational actions which take place in schools. Seeking to ascertain the extent to which school gardens are visible and present on social media, as well as how schools use those school gardens, we carried out the collection and analysis of the last 100 posts appearing with the hashtag #huertoescolar on three social networks: Twitter, Facebook and Instagram. It follows from the results obtained not only those educational centers record these practices preferably on Twitter, then on Facebook and finally on Instagram, but also that they utilize school gardens mostly to ensure the practical application of the theoretical contents taught in different academic subjects as well as to encourage students' environmental awareness. Greater use of school gardens is still needed to work on Sustainable Development Goals, though.

KEY WORDS.
School gardens, social networks, environmental education, nutrition education, sustainable development, schools.

1. Introduction.

The utilization of school gardens as an educational practice which permits to generate learning offers a broad range of pedagogical possibilities when it comes to training learners at various educational stages. This practice, which has long been known, is currently becoming more popular in educational centers (Ozer, 2007). Its use has never stopped increasing since it first entered classrooms in the early nineteenth century (Doerfler, 2011). As a matter of fact, broad evidence exists about the frequent creation of local, regional or national school gardens that may even become international sometimes (Morales & Ferguson, 2017).

Amongst the most important functions attributed to the school garden stand out the following:

- It allows the (multidisciplinary) practical application of the theoretical contents taught in the different areas, but especially in the area of environmental studies (Álvarez-Herrero & Valls-Bautista, 2019; Aragón et al., 2020; Castaneda, 2019; Ceballos, 2017; Williams et al., 2018).
- It favors environmental education as well as a sensitization towards a sustainable environment (García, 2020; Papadopoulou et al., 2020; Rodríguez et al., 2015; Rodríguez et al., 2021).
- It promotes a healthy diet within which students eat the food grown in their school gardens (Cairns, 2017; Morgan et al., 2010; Shrestha et al., 2020).
- It encourages social relationships (Armienta et al., 2019; Barrón & Muñoz, 2015; Lohr et al., 2020).

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

- It raises awareness about solidarity and community service (Aftandilian & Dart, 2013; Rekondo et al., 2015).
- It encourages the use of active methodologies such as Project-based Learning (PBL), collaborative work, Service-Learning and Inquiry-based Learning (Rivera, 2017; Vílchez & Escobar, 2014).

These possibilities offered by school gardens are not mutually exclusive and actually converge on most occasions (Fischer et al., 2019; Graham et al., 2005). Moreover, numerous studies advocate the utilization of school gardens in the classroom on the grounds that they lead to significant improvements not only in learners' performance and attention levels but also in their enthusiasm to learn (Blair, 2009; Graham et al., 2005; Ozer, 2007; Pineda, 2019; Williams et al., 2018). Nevertheless, it is worth highlighting that such improvements can only take place by undertaking the use of school gardens on the basis of previous planning; they must be conceived as a practical activity which permits to make the content of the different subjects involved somewhat less abstract, stimulating students' senses and thus increasing the notion of significance (Christensen & Wistoft, 2019). Likewise, it is very important to acquire first-hand knowledge of the impressions and perceptions that the true protagonists —students— have about the adoption of the aforesaid practices (Reina et al., 2017). This will make it possible to identify not only the strengths of using school gardens but also its lacks and problems so that they can be solved (Huys et al., 2017).

However, the continuity of these practices is actually not guaranteed. Some centers implement such educational practices during a single academic year, whereas others —the least numerous— use them on a longer-term basis. Even so, it is very risky to speak about figures or to make maps about the presence of these practices beyond specific cases. A need exists for educational policies that support and guarantee these types of practices, providing those resources which become essential to implement them, including, amongst others, time (Burt et al., 2017a), financing (Plaka & Skanavis, 2016) and high-quality training in such school garden programs or projects (de Alba, 2019). It may prove interesting to analyze school gardens using tools such as GREEN (Burt et al., 2017b) and thus have the chance to detect the factors thanks to which they can not only be maintained but also remain present and fully integrated into educational institutions.

Likewise, the current context determined by the worldwide COVID-19 pandemic makes it necessary to rethink education as a whole (Hernández-Ortega y Álvarez-Herrero, 2021) and particularly the way in which school gardens are utilized. The situation of home lockdown faced by both students and teachers is posing great difficulties for the use of school gardens. Numerous centers have seen how school gardens were abandoned during the lockdown period and did not subsequently resume their activity. Others instead have seen in the present-day situation, which requires a proper ventilation and a social distancing that are hard to maintain inside classrooms, an ideal opportunity to go out, in the open air, where these two premises can be satisfactorily fulfilled (Durmuşoğlu, 2021). This has allowed the birth or rebirth of school garden projects which make it possible to comply with the health measures against COVID-19. School gardens enable us to teach students outdoors, which in turn improves their well-being (Dyg & Wistoft, 2017; Lam et al., 2019). Another option which has been

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

implemented after the appearance of the COVID-19 pandemic has been the revival of virtual school gardens "taken" to the homes of learners and teachers. The key to this concept of virtual school garden lies in the fact that students (even though teachers also become involved in this practice) plant their school garden and use digital resources (e.g. videos, photos, videoconferences…) to participate in a virtual communication scheme as well as in an exchange about their own gardens with the rest of the educational community (Lochner et al., 2019). Similarly, we are starting to witness a proliferation of firms which offer boxes or kits by means of which students can install the school garden in their own homes. Any citizen initiatives that promote environmental education and sustainability become increasingly necessary (Baena-Morales et al., 2020; Callado et al., 2015; Moreno-Fernández & Navarro-Díaz, 2015; Villarruel-Fuentes, 2017).

As can be seen, the utilization of school gardens in educational centers can be considered as a didactic strategy to work on the Sustainable Development Objectives (SDOs) and not only to attain them but also, in turn, to integrate all the functions mentioned above. Faced with all of this, educational centers are provided with a fantastic opportunity to be able to maintain or develop school gardens and thus favor their students' learning, to promote healthy diets and habits and boost environmental education alongside the awareness towards sustainable development, as well as to cultivate social relationships and the sense of community; and it all done from active methodologies (Ching-Chiang & Fernández-Cárdenas, 2020; Hood, 2017; Segura-Robles et al., 2020) where students acquire special prominence in the construction of their own learning. Having available a school garden program or a project to develop one also encourages a higher valuation by families when the time comes to choose a specific educational center (Álvarez-Herrero & Roig-Vila, 2019; Bur, 2014). One of the premises required in all active methodologies is the dissemination of the learning outcomes achieved through them. Thus, disseminating or informing about the school garden projects that they carry out brings centers innumerable benefits. In this regard, when it comes to dissemination and communication, and even more so in today's information society, social media and the Internet play a key role (Roig-Vila & Álvarez-Herrero, 2019), above all due to the widespread use of mobile phones (Roig-Vila et al., 2020; Roig-Vila et al., 2021).

Amongst the social media with the most users in Spain and with a higher level of activity per minute on the Internet stand out Facebook, Twitter and Instagram. In 2020, every minute, 1.3 million users visited Facebook, 694,444 Instagram users checked the posts which were being uploaded, and 194,444 Twitter users were tweeting (Lewis & Callaham, 2020). According to the most recent study by We are social and Hootsuite (2021), the percentages of 16-to-64-year-old users of these networks —with values 79% (Facebook), 65% (Instagram) and 53% (Twitter)— are only surpassed by YouTube (89%) and WhatsApp (86%). A large number of centers have their own accounts and channels on these and other social networks, which they use to give visibility to all the activities performed in the center (González, 2016). Furthermore, social media help and favor not only learning (Martínez-Roig et al., 2020) but also research and the development of various basic skills such as critical thinking (Camas et al., 2021; Peñalba, 2020; Rodríguez, 2016; Roig-Vila et al., 2015).

Being aware that not every educational center has social media accounts and that use patterns are uneven, and bearing in mind too that not all the centers which have school

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

gardens make it public, either through those networks or by other means, we did want to know the extent to which school gardens are present on the most important social networks within the educational world (Facebook, Twitter and Instagram) with the aim of analyzing a variety of aspects and identifying the main goals or purposes sought with their implementation.
In conclusion, this research work has as its main objective to check the visibility and presence of school gardens on such media, which in turn will allow us to know them from the different variables and functions around which their operation revolves.

2. Material and methods.

Three social networks —Facebook, Twitter and Instagram— were selected for the analysis undertaken in this research. All three of them, together with WhatsApp and YouTube, are amongst the most frequently used and stand out for having the highest number of users, both in Spain and around the world. Furthermore, these three networks, unlike others such as WhatsApp, permit to follow and see the posts uploaded to them from open accounts. That is, of course, provided that those posts are made from accounts which do not restrict the visualization of what they upload and their monitorization of a private group of accounts.
In order to locate the posts referred to school gardens, a decision was made to homogenize the method of analysis, choosing a single keyword or hashtag with which the search would be performed. This made it possible to avoid diversification in the sample collected, which could imply a risk for the reliability and significance of our research. We thus opted for the hashtag #huertoescolar after having verified on all three social networks that it was the one with the most results, as opposed to others which were discarded such as #huertosescolares, #huertoeducativo, #jardínescolar or #ecohuerto.

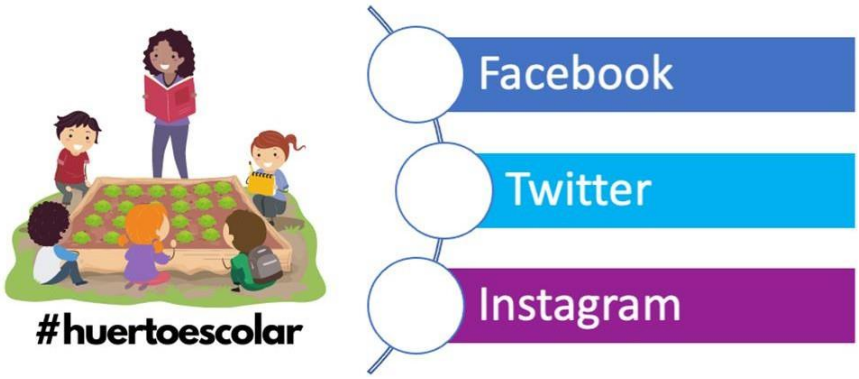


Figure 1. Hashtag #huertoescolar on the social networks Facebook, Twitter and Instagram.

Likewise, seeking to be consistent with the method of analysis on the three selected social networks, a decision was made to examine the last one hundred posts made with free access from a specific date, February 24th, 2001, backwards, in inverse chronological order. The different impact regarding the number of posts identified on each one of these networks made us go back to December 20th, 2020 on Twitter, to December 1st, 2020 on Facebook, and to February 19th, 2021 on Instagram.

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

The data were collected in a coded format on Excel spreadsheets and taking into account a wide range of variables which are grouped together around the three types listed below:

- Sociodemographic data: account name, postdate, location, type of center (public, private or private with a state subsidy) or individual (teacher's, family or personal account).
- Details about the account on the social network: account ID; likes; retweets, reposts or times in which the post was shared; post content: text, links, images, videos…
- Function of the school garden: educational (academic contents); ecological-environmental; community-service; sustainability; healthy diet and habits; and others.

On the other hand, it is worth highlighting that, from the 100 posts meant to be analyzed, we had to discard those which did not unmistakably refer to a school garden strictly speaking, since some posts of companies and individuals used the hashtag #huertoescolar to advertise themselves or to give visibility to their actions, opinions or pieces of advice.

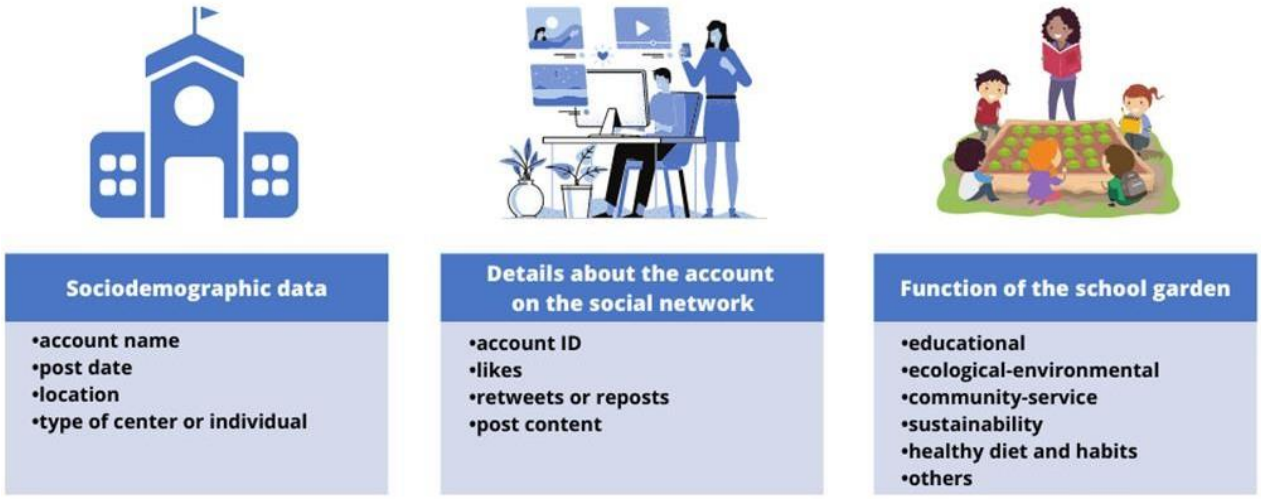


Figure 2. Types of variables considered in the posts on #huertoescolar.

3. Result analysis.

As explained above, an initial screening of data consisted in checking which of the 100 posts on each social network unmistakably referred to school gardens, as shown in Table 1 below.

Table 1. Unequivocal posts on #huertoescolar.

	Twitter	Instagram	Facebook
Number of unequivocal posts on #huertoescolar	90	42	79

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

As for the other posts, that is, those unrelated to this theme and to the educational community in school gardens, although the percentage is low on Twitter and Facebook —10% and 21% respectively— it reaches ca. 58% on Instagram. These posts have nothing to do with our research object despite being tagged with the hashtag #huertoescolar. On all three social networks, such posts come either from private individuals and associations that give advice and recommendations on the cultivation and maintenance of urban gardens or from companies trying to sell all sorts of products related to growing and farming (we even found a company on Instagram which commercializes the sale of land for agricultural use).

In a second step, attention was paid to the number and types of accounts which have made those posts on #huertoescolar, since we realized that, on some occasions, more than one post was uploaded during the analysis period from a single account, which results in a lack of correspondence between the number of posts and the number of separate accounts. Table 2 shows the results of the different accounts that uploaded posts with the hashtag #huertoescolar, additionally distinguishing the ownership of the corresponding account: NC: total number of accounts; EI: school that teaches the first cycle of pre-school education; CEIP: public pre-school and primary education center; IES: public high school (secondary education center), CC: private center which receives a state subsidy; CP: private center; CE: special education center; D: teacher; AMPA: students' parents' association; P: unidentified individual (father, mother, teacher…); and AD: educational administration or public institution (regional department of education, town council, provincial government…).

Table 2. Separate accounts that make posts with the hashtag #huertoescolar and ownership thereof.

Social Network	NC	EI	CEIP	IES	CC	CP	CE	D	AMPA	P	AD
Twitter	66	0	31	9	16	0	2	4	1	1	2
Instagram	28	1	10	5	6	2	0	2	1	0	1
Facebook	54	3	18	2	17	1	0	6	2	3	2

It follows from the results collected in Table 2 that school gardens are more visible and present on Twitter, since we find a greater number of accounts (66) which upload contents much more intensively (90 posts) than on Instagram (28 accounts and 42 posts) and Facebook (54 accounts and 79 posts). Moreover, it also becomes evident that practically every educational stage and all types of centers are represented, albeit unevenly. Thus, the presence of centers that teach the first cycle of pre-school educations, as well as that of private centers and special education centers, is symbolic. Public pre-school and primary education centers have a strong presence, particularly on Twitter; however, public high schools (secondary education centers) are represented to a lesser extent on Facebook, and as regards private schools with state subsidies, despite their presence on Twitter and Facebook, they are surprisingly rather absent on Instagram. It also deserves to be mentioned that some accounts echo the topic of school gardens without actually belonging to educational centers or institutions, although their appearance is mostly symbolic: examples include students' parents' associations, teachers'

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

associations, teachers, educational administrations and public institutions, as well as private individuals that cannot be identified.

Note that evidence exists sometimes of Twitter, Instagram and Facebook accounts which are connected —the three or two of them— in such a way that the same post appearing on one of them appears in another or in all three too. Even though such cases exist, they are quite scarce and it does not affect our research either, since our ultimate aim consists in detecting the presence and visibility of the educational practice known as school gardens on social media.

As for the location or provenance of the different accounts, Table 3 collects the results obtained.

Table 3. Provenance of the accounts that make posts on #huertoescolar on social media.

Social network	**Provenance**
Twitter	Andalusia (18) Aragón (8) Canary Islands (3) Castile and León (4) Castile-La Mancha (4) Valencian Region (7) Madrid (9) Murcia (8) Basque Country (3) Unspecified (2)
Instagram	Andalusia (10) Castile and León (1) Catalonia (1) Valencian Region (5) Extremadura (1) Madrid (4) Murcia (4) Venezuela (1) Unspecified (1)

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

Social network	Provenance
Facebook	Andalusia (15) Canary Islands (8) Castile and León (2) Castile-La Mancha (3) Valencian Region (9) Extremadura (2) Madrid (4) Murcia (5) Basque Country (1) Cuba (2) El Salvador (1) Unspecified (2)

The distribution of posts between the three social networks attests that school gardens are absent on social networks in regions such as Asturias, La Rioja, Navarre, the Balearic Islands and Galicia. There is a symbolic presence of regions which have a large number of educational centers but fail to make their school garden practices visible, amongst them the Basque Country and Catalonia. In this regard, such results seem surprising and an effort should be made to analyze in greater detail why all that happens.

Concerning the number of times that contents have been retweeted or shared or reposted (terms used in each one of these social networks), or the number of followers or accounts followed by each one of the accounts under examination, those aspects do not provide any information of excessive interest for this research in our opinion.

It does seem important for us to analyze the different functions or objectives pursued with school gardens in educational centers which can be inferred from the posts made on the three social networks under study. This is done from the texts, photographs, hashtags, links and any other post contents, within which we have distinguished three broad areas:

- Environmental education and ecology (EA)
- Service-Learning and learning for the community (APS)
- Sustainability (SOS)
- Practical application of theoretical knowledge from subjects in the curriculum (PRA)

Note that, when coding results, we took into account that more than one function may take place at the same time and also that others not foreseen in our classification are likely to appear. In that case, some of them are dealt with, because of their particularity and originality, within the section “others” (OTROS) in Table 4.

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

Table 4. School garden functions highlighted by the different accounts identified in social network posts.

Social network	EA	APS	SOS	PRA	OTROS
Twitter	33	2	14	53	(8) Healthy diet and habits (4) Group awareness and socialization (1) Biodiversity
Instagram	11	1	5	18	(6) Healthy diet and habits (1) Group awareness and socialization
Facebook	21	4	9	39	(7) Healthy diet and habits (2) Group awareness and socialization

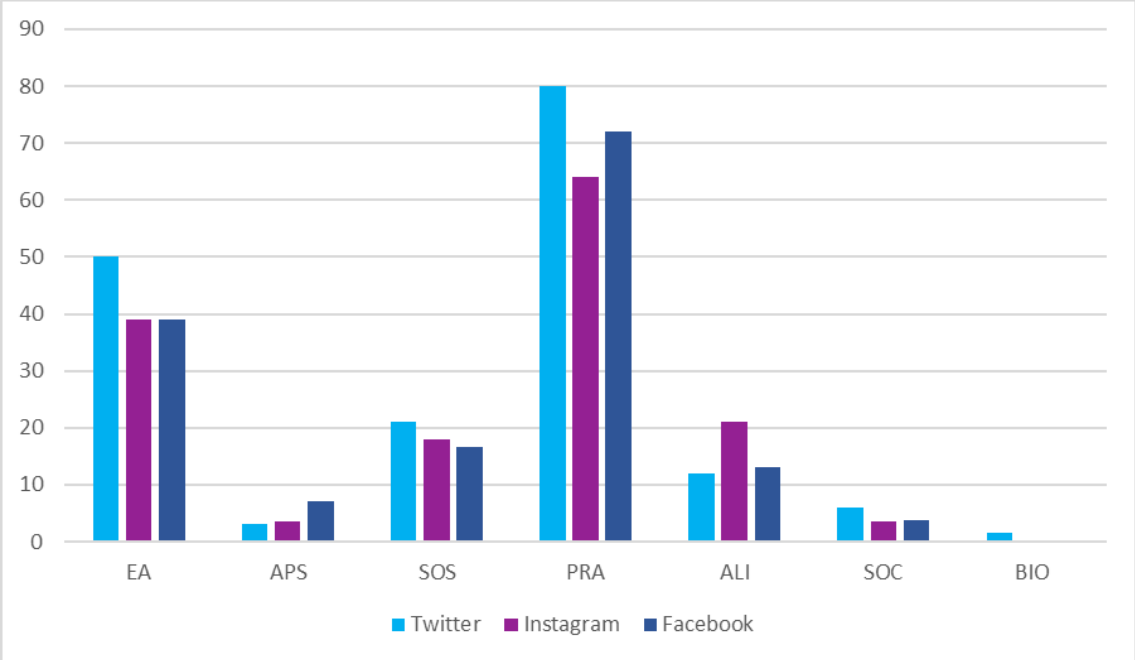
As can be seen in Table 4, educational centers mainly use school gardens as practical applications of the theoretical contents taught in the different curricular subjects and, especially, those most closely linked to natural or experimental sciences. Or expressed differently, they represent a pedagogical utilization of these educational practices and, although it is difficult to ascertain based exclusively on the posts examined whether these gardens are used only on specific occasions or on a constant and long-lasting basis, evidence seems to exist of greater dedication on the part of teachers. The second most frequently identified function is the one that takes advantage of school garden use to create and enhance awareness amongst the students concerned about environmental problems. Thanks to this, learners develop not only an ecological spirit but also an interest in preserving the environment. Thirdly, school gardens arise as spaces of awareness towards a more sustainable world, where the shortage of resources suggests the convenience of meeting today's needs without compromising those of the future. Many of the posts where this function became visible paid attention to all these aspects, from generating the actual compost to fertilize the garden to the way of collecting and delivering the products obtained without resorting to non-biodegradable plastics or wrappings. Nonetheless, it did come as a surprise to check that the Sustainable Development Objectives (SDOs) are hardly ever mentioned in the posts, since the latter provide an excellent opportunity to disseminate those objectives in educational centers through these school garden practices. Finally, some posts refer to the fact that school gardens are exploited as a chance to bring service-learning into classrooms. Students are thus encouraged to feel useful for the community by making their contribution to improve it with the products obtained from the school garden.

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

As already anticipated above, the section "OTROS" gathers those functions which do not completely fit into any of the four purposes most often present in school gardens. Thus, the one which appears most repeatedly on all three social networks is that in which, apart from promoting and ensuring a healthy diet, as well as healthy habits, students sow, grow and harvest the products that they will subsequently eat. In two of these cases, emphasis is additionally placed on the availability of agroecological products; that is to say, the grown products are not treated with any chemicals, which in turn allows students to become familiar with much healthier products than those which are usually commercialized. Likewise, examples appear of school gardens where cooperative work is encouraged amongst everyone involved together with social awareness, thus generating well-being, good behavior and a feeling of group membership. And last but not least, there is one case on Twitter which attests that the school garden makes it possible to preserve the biodiversity of the different species, raising students' awareness of this problem.

Comparing the percentages recorded on each social network according to the total number of accounts analyzed allows us to see in Graph 1 that very similar percentages appear for each one of the functions identified and on all three social networks under study, although Twitter always stands out with higher percentages. Only in the function referred to healthy diet and habits does Instagram outperform the other two networks.

Graph 1. Compared percentages corresponding to school garden functions of the different accounts identified in social network posts.



Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

In addition to the variables analyzed, we would also like to highlight a number of relevant aspects observed while examining the results in quantitative terms. The individual analysis of posts enabled us to identify some initiatives worthy of mention:

- An initiative to map all the school gardens existing in Spain which, with the hashtag #mapeohuertosescolares, is promoted by the accounts @germinando_isa and @CultivarteAgro (Figure 3). Thanks to its presence on networks such as Instagram and Twitter, it has managed to bring together in a map (http://cutt.ly/Pk10D4A) not only the school gardens of many Spanish provinces but also regional and local school garden networks.

Figure 3. Tweet of @ColegioElRegato which echoes the initiative #mapeohuertosescolares.

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

- The initiative #RetoHuertoCOVID19 with which the environment department of Saragossa's Town Council seeks to promote an educational use of the school gardens available in the educational centers of the Aragonese capital and which, in addition to publicizing them on Twitter (Figure 4), does so on its own web page, where the competition rules can be found too: http://bit.ly/2MxMkP9

Figure 4. Tweet of @medioamienteZ which echoes #RetoHuertoCOVID19.

- The initiative of local school garden networks, such as those in Móstoles or Murcia, to quote but two.

4. Discussion and conclusions.

Social media are an excellent ally to give school gardens visibility and presence. As proven during our research, many centers (mostly, though also other agents such as teachers and students' parents' associations, amongst others) use their accounts on social networks to disseminate the implementation of these educational practices, through which they not only provide evidence of what is done in the centers but also succeed in empowering students,

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

who share the initiatives and feel as protagonists of the actions performed, simultaneously generating highly positive assessments towards all of it. At the same time, digital technology is serving as a useful resource to achieve significant learning (Cabero-Almenara & Roig-Vila, 2019).

The utilization of social media by educational centers is not widespread; neither do all centers —regardless of whether they have a school garden or not— coincide in having accounts on social networks on in publicizing their gardens on them. Nevertheless, this research has allowed us to approach those centers which have a school garden and provide it with visibility on social media, thanks to which it was possible for us to make well-grounded assumptions on what type of centers they are and on what they use school gardens for.

Our findings have eventually verified that school gardens are highly visible and present on the social networks under study, i.e. Twitter, Facebook and Instagram, following this same order when it comes to the preference for using one or another. Although the research work could have been broadened considering other related hashtags, the choice of "#huertoescolar" is more than appropriate, since, in addition to providing a greater number of posts than the other options, it appears as the hashtag accepted and established on the Internet par excellence. Neither did we randomly select the dates on which research took place, we actually made it overlap with the ideal time for sowing. It deserves to be highlighted in this respect that, although incorporating the data of South American countries into the analysis would not have been a problem, the fact that this period coincided with the summer holidays in that part of the world led us to refrain from presenting posts from these countries which used the same hashtag too.

In the social network Instagram, there is a greater interference from companies and/or individuals outside the school reality, who use the hashtag #huertoescolar to participate and become visible on the network. On the other hand, on Facebook and mainly on Twitter, this interference is not so pronounced, and most of the publications come from schools or their environment.

It follows from the results obtained that the utilization of school gardens has a stronger impact on the pre-school and primary education stages. Secondary education also acquires prominence in this field, though analyzing the results in greater depth allowed us to check that school garden use always takes place during the earlier years of this stage (1st and 2nd year of Compulsory Secondary Education) or in the classrooms of students with special educational needs or within the so-called Programs for the Improvement of Learning and Performance (PMAR for their initials in Spanish). Albeit symbolically, it is positive to check the existence of centers teaching the first cycle of pre-school education and special education centers which decide to set their school garden initiatives in motion. On the other hand, we regretted not having found any posts about school gardens in vocational training stages (when training cycles exist that offer specialties closely related to the contents which can be dealt with from school gardens) and at university, where numerous degrees would largely benefit from the implementation of a school garden, not only when it comes to knowledge learning but also concerning the acquisition of skills by all those students (Urrea-Solano et al., 2020). It also seemed strange to us that no cases of school gardens appeared in any of the teacher training degrees taught at Spanish or South American universities.

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

The functions verified in this research match those identified in previous studies which already referred to a higher impact caused by the use of school gardens as a way to reinforce the theoretical contents of different subjects as well to enhance environmental sensibility and awareness amongst students (Ceballos, 2017). We also missed a more common utilization of school gardens as opportunities to work on the SDOs, as is also stressed by Estrella (2020). School gardens are a magnificent opportunity to bring sustainability and the SDGs to schools and more specifically to their students. There are so important not only in their awareness, but also in their necessary implementation, from small actions as these school gardens, to participation in larger campaigns and actions. It is necessary to raise awareness and make students participate in the problems that invade us and where social networks should be the engine of visibility and dissemination of this type of initiatives.

In this case, evidence has been provided that using social media helps centers become familiar with a variety of initiatives, such as the aforesaid school garden networks, to which they would hardly have access otherwise. Furthermore, educational administrations and public institutions have at their disposal an excellent resource to promote and give visibility to contests and similar initiatives, as well as to inform about any of the functions made possible through the presence of school gardens in educational centers, namely: sustainable development, environmental education, learning improvement through the practical application of theoretical contents, and so on and so forth.

Despite all the limitations faced in this research work, the results obtained therein permit to trace the presence of school gardens in Spanish educational centers, checking both what gardens are used for and the extent to which they are given visibility on the social media with a higher number of users in Spain. Amongst future lines of research stands out the search for a larger sample where the data could be triangulated using a questionnaire administered across centers with the aim of checking not only the presence of school gardens but also their specific functions, alongside other aspects (methodologies used, organization, management…). Likewise, the need exists to ascertain the reason for the scarce presence of social network posts in the centers located in those regions which are absent on social media or whose presence is far below their potential. Neither can we forget that it would be very interesting to know whether these practices and the involvement therein are merely symbolic or, on the contrary, they appear on a regular basis: the participation of students together with the uses given to school gardens arise as very important factors for the learning extracted from these practices to become significant and long-lasting or to end up being superfluous. Similarly, we would like to know if these types of practices are undertaken on a longer-term basis or only take place at specific points in time. And finally, we do not rule out promoting training and proposals to bring school gardens to classrooms of any educational stage with the main objective of raising awareness about the need to live in a more sustainable world and more respectful of nature and its resources. Counting, how could it be otherwise, with social networks to make these actions visible.

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

References.

- Aftandilian, D. & Dart, L. (2013). Using Garden-Based Service-Learning to Work Toward Food Justice, Better Educate Students, and Strengthen Campus-Community Ties. *Journal of Community Engagement and Scholarship, 6*(1), 9, 55-69.
- Aragón, L., Sánchez, S., & Enríquez, J. M. (2020). El discurso científico en la etapa de infantil en el contexto del huerto ecológico escolar. *Revista Eureka Sobre Enseñanza Y Divulgación De Las Ciencias, 18*(1), 1103. https://doi.org/10.25267/Rev_Eureka_ensen_divulg_cienc.2021.v18.i1.1103
- Álvarez-Herrero, J. F. & Roig-Vila, R. (2019). Las páginas web de los centros educativos. Análisis de la situación actual en la Comunidad Valenciana. *Revista de Comunicación de la SEECI*, 50, 129-147. https://doi.org/10.15198/seeci.2019.50.129-147
- Álvarez-Herrero, J. F. & Valls-Bautista, C. (2019). Didáctica de las ciencias, ¿de dónde venimos y hacia dónde vamos? *Revista de Tecnología Educativa, 1*(2), 5-19. https://doi.org/10.17345/ute.2019.2.2704
- Armienta Moreno, D. E., Keck, C., Ferguson, B. G., & Saldívar Moreno, A. (2019). Huertos escolares como espacios para el cultivo de relaciones. *Innovación educativa (México, DF), 19*(80), 161-178.
- Baena-Morales, S., Martinez-Roig, R., & Hernádez-Amorós, M. J. (2020). Sustainability and Educational Technology. A Description of the Teaching Self-Concept. *Sustainability, 12*(24), 10309. https://doi.org/10.3390/su122410309
- Barrón Ruiz, Á. & Muñoz Rodríguez, J. M. (2015). Los huertos escolares comunitarios: fraguando espacios socioeducativos en y para la sostenibilidad. *Foro de Educación, 13*(19), 213-239. http://dx.doi.org/10.14516/fde.2015.013.019.010
- Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. *The journal of environmental education, 40*(2), 15-38. https://doi.org/10.3200/JOEE.40.2.15-38
- Bur, A. (2014). Marketing educativo. Cómo captar, retener y fidelizar alumnos. *Reflexión Académica en diseño y comunicación*, 22, 47-50.
- Burt, K. G., Koch, P., & Contento, I. (2017a). Implementing and sustaining school gardens by integrating the curriculum. *Health Behavior and Policy Review, 4*(5), 427-435. https://doi.org/10.14485/HBPR.4.5.2
- Burt, K. G., Koch, P., & Contento, I. (2017b). Development of the GREEN (Garden Resources, Education, and Environment Nexus) tool: an evidence-based model for school garden integration. *Journal of the Academy of Nutrition and Dietetics, 117*(10), 1517-1527. https://doi.org/10.1016/j.jand.2017.02.008
- Cabero-Almenara, J. & Roig-Vila, R. (2019). The Motivation of Technological Scenarios in Augmented Reality (AR): Results of Different Experiments. *Applied Sciences*, 9(14). https://doi.org/10.3390/app9142907
- Cairns, K. (2017). Connecting to food: cultivating children in the school garden. *Children's Geographies, 15*(3), 304-318. https://doi.org/10.1080/14733285.2016.1221058

Fecha de recepción: 18 05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

- Callado Moreno, J., Molina Jaén, M., Pérez Navío, E., & Rodríguez Moreno, J. (2015). Inclusive education in schools in rural areas. *Journal of New Approaches in Educational Research, 4*(2), 107-114. http://dx.doi.org/10.7821/naer.2015.4.120
- Camas, L., Valero, A., & Vendrell, M. (2021). The Teacher-Student Relationship in the Use of Social Network Sites for Educational Purposes: A Systematic Review. *Journal of New Approaches in Educational Research*, *10*(1), 137-156. http://dx.doi.org/10.7821/naer.2021.1.591
- Castaneda, M. T. (2019). El huerto escolar como herramienta pedagógica para la asignatura de Ciencia Salud y Medio Ambiente en el Tercer ciclo del Centro Escolar Instituto Nacional de Santa Ana. *Conocimiento Educativo*, 6, 69-85. https://doi.org/10.5377/ce.v6i0.8042
- Ceballos, M. (2017). Aprovechamiento didáctico de los huertos escolares en centros de Sevilla. *Enseñanza de las ciencias*, (Extra), 787-792.
- Ching-Chiang, L. & Fernández-Cárdenas, J. (2020). Analysing Dialogue in STEM Classrooms in Ecuador: A Dual Socioeconomic Context in a High School. *Journal of New Approaches in Educational Research, 9*(2), 194-215. http://dx.doi.org/10.7821/naer.2020.7.529
- Christensen, J.H. & Wistoft, K. (2019). Investigating the effectiveness of subject-integrated school garden teaching. *Journal of Outdoor and Environmental Education*, 22, 237–251. https://doi.org/10.1007/s42322-019-00043-5
- de Alba, S. (2019). School garden programs: benefits and challenges. [Thesis]. Faculty of California State University, Stanislaus.
- Doerfler, H. A. (2011). *Using school gardens as a vehicle for health promotion for elementary school youth: a review of the literature*. Master of Public Health University of Pittsburgh.
- Durmuşoğlu Saltalı, N. (2021). Risk Factors of the COVID-19 Pandemic in the Development of Preschool Children and Protective Factors. *Journal of Teacher Education and Lifelong Learning, 3*(1), 1-8.
- Dyg, P. M. & Wistoft, K. (2018). Wellbeing in school gardens – the case of the Gardens for Bellies food and environmental education program. *Environmental Education Research, 24*(8), 1177-1191. https://doi.org/10.1080/13504622.2018.1434869
- Estrella Torres, A. (2020). Educación para la ciudadanía global: Los huertos escolares y los ODS. *Comillas Journal of International Relations*, 19, 91-99. https://doi.org/10.14422/cir.i19.y2020.007
- Fischer, L. K., Brinkmeyer, D., Karle, S. J., Cremer, K., Huttner, E., Seebauer, M., Nowikow, U., Schütze, B., Voigt, P., Völker, S., & Kowarik, I. (2019). Biodiverse edible schools: Linking healthy food, school gardens and local urban biodiversity. *Urban Forestry & Urban Greening*, 40, 35-43. https://doi.org/10.1016/j.ufug.2018.02.015
- García Carrasco, J. (2020). Lejos de la naturaleza, la cultura se torna insostenible. Cultivar nos acerca a la naturaleza. *Foro de Educación, 18*(1), 125-146. https://doi.org/10.14516/fde.689

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

- González, E. (2016). La necesidad de educar en comunicación digital en la sociedad global. *Revista Linhas, 17*(33), 8 - 28.
- Graham, H., Beall, D. L., Lussier, M., McLaughlin, P., & Zidenberg-Cherr, S. (2005). Use of school gardens in academic instruction. *Journal of Nutrition Education and behavior, 37*(3), 147-151. https://doi.org/10.1016/S1499-4046(06)60269-8
- Hernández-Ortega, J. & Álvarez-Herrero, J. F. (2021). Gestión educativa del confinamiento por COVID-19: percepción del docente en España. *Revista Española de Educación Comparada, 0*(38), 129-150. https://doi.org/10.5944/reec.38.2021.29017
- Hood Cattaneo, K. (2017). Telling Active Learning Pedagogies Apart: from theory to practice. *Journal of New Approaches in Educational Research, 6*(2), 144-152. http://dx.doi.org/10.7821/naer.2017.7.237
- Huys, N., De Cocker, K., De Craemer, M., Roesbeke, M., Cardon, G., & De Lepeleere, S. (2017). School Gardens: A Qualitative Study on Implementation Practices. *International Journal of Environmental Research and Public Health, 14*(12),1454. https://doi.org/10.3390/ijerph14121454
- Lam, V., Romses, K., & Renwick, K. (2019). Exploring the Relationship between School Gardens, Food Literacy and Mental Well-Being in Youth Using Photovoice. *Nutrients, 11*(6), 1354. https://doi.org/10.3390/nu11061354
- Lewis, L. & Callahan, C. (2020). 2020: This is what Happens in an Internet minute. Lori Lewis Media. https://lorilewismedia.com/
- Lochner, J., Rieckmann, M., & Robischon, M. (2019). Any Sign of Virtual School Garden Exchanges? Education for Sustainable Development in School Gardens since 1992: A Systematic Literature Review. *Journal of Education for Sustainable Development, 13*(2), 168-192. https://doi.org/10.1177/0973408219872070
- Lohr, A. M., Krause, K. C., McClelland, D. J., Van Gorden, N., Gerald, L. B., Del Casino Jr, V., Wilkinson-Lee, A., & Carvajal, S. C. (2020). The impact of school gardens on youth social and emotional learning: a scoping review. *Journal of Adventure Education and Outdoor Learning*, 1-14. https://doi.org/10.1080/14729679.2020.1838935
- Martinez-Roig, R., Urrea-Solano, M., & Merma-Molina, G. (2020). Propuestas didácticas para la formación inicial del profesorado en torno a los canales de youtubers infantiles. In D. Cobos-Sanchiz, E. López-Meneses, L. Molina-García, A. Jaén-Martínez, & A.H. Martín-Padilla (Eds.), *Claves para la innovación pedagógica ante los nuevos retos: respuestas en la vanguardia de la práctica educativa* (pp. 3448-3457). Octaedro.
- Morales, H. & Ferguson, B. G. (2017). La Red Internacional de Huertos Escolares. *Decisio. Saberes para la acción en educación de adultos*, 46, 8-16.
- Moreno-Fernández, O. & Navarro-Díaz, M. (2015). Educación ambiental, ciudadanía y participación. *IJERI: International Journal of Educational Research and Innovation*, 4, 175–186. https://www.upo.es/revistas/index.php/IJERI/article/view/1470
- Morgan, P. J., Warren, J. M., Lubans, D. R., Saunders, K. L., Quick, G. I., & Collins, C. E. (2010). The impact of nutrition education with and without a school garden on knowledge, vegetable intake and preferences and quality of school life among primary-school students. *Public health nutrition, 13*(11), 1931-1940. https://doi.org/10.1017/S1368980010000959

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

- Ozer, E. J. (2007). The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy development. *Health Education & Behavior, 34*(6), 846-863. https://doi.org/10.1177/1090198106289002
- Papadopoulou, A., Kazana, A., & Armakolas, S. (2020). Education for sustainability development via school garden. *European Journal of Education Studies, 7*(9), 194-206. http://dx.doi.org/10.46827/ejes.v7i9.3247
- Peñalba, E. (2020). Students' learning performance and acceptance of web 2.0 technologies based on media richness properties. *IJERI: International Journal of Educational Research and Innovation*, 14, 290-303. https://doi.org/10.46661/ijeri.4269
- Pineda, J. (2019). Huertos escolares: Una necesidad para trasformar y educar al futuro. *Logos Boletín Científico De La Escuela Preparatoria, 2, 6*(12), 18-19.
- Plaka, V. & Skanavis, C. (2016). The feasibility of school gardens as an educational approach in Greece: a survey of Greek schools. *International Journal of Innovation and Sustainable Development, 10*(2), 141-159. https://doi.org/10.1504/IJISD.2016.075546
- Reina, M., Vílchez, J. E., Ceballos, M., & López, J. M. (2017). Análisis de un proyecto de huerto escolar en secundaria a partir de las percepciones de los estudiantes. *Enseñanza de las ciencias: revista de investigación y experiencias didácticas*, (Extra), 1491-1496.
- Rekondo, M., Espinet, M., & Llerena, G. (2015). La construcción discursiva de la competencia eco-ciudadana en la escuela: La realización de un diseño tecnológico colaborativo en agroecología escolar. *Investigación en la Escuela*, 86, 7-19. https://doi.org/10.12795/IE.2015.i86.01
- Rivera, G. C. (2017). Proyecto interdisciplinario de matemáticas y ciencias ambientales: Rescatando el huerto escolar sembrando conciencia. In *Actas XVIII Congreso Internacional de Investigación Educativa: interdisciplinariedad y transferencia (AIDIPE, 2017)*, (pp. 1441-1448). Asociación Interuniversitaria de Investigación Pedagógica (AIDIPE).
- Rodríguez Marín, F., Fernández Arroyo, J., & García Díaz, J. E. (2015). El huerto escolar ecológico como herramienta para la educación en y para el decrecimiento. *Investigación En La Escuela*, 86. https://doi.org/10.12795/IE.2015.i86.03
- Rodríguez Marín, F., Portillo Guerrero, M. A., & Puig Gutiérrez, M. (2021). El Huerto Escolar como recurso para iniciar la Alfabetización Ambiental en Educación Infantil. *Revista Eureka Sobre Enseñanza Y Divulgación De Las Ciencias, 18*(2), 2501. https://doi.org/10.25267/Rev_Eureka_ensen_divulg_cienc.2021.v18.i2.2501
- Rodríguez Prieto, R. (2016). Una experiencia de interacción crítica y reflexiva a propósito de una campaña sobre Twitter en la asignatura de Teoría del Derecho. *IJERI: International Journal of Educational Research and Innovation*, 7, 186-201. https://www.upo.es/revistas/index.php/IJERI/article/view/2324
- Roig-Vila, R. & Álvarez-Herrero, J. F. (2019). Repercusión en Twitter de las metodologías activas ABP, Flipped Classroom y Gamificación. *RIED. Revista Iberoamericana de Educación a Distancia, 22*(2), 79-96. https://doi.org/10.5944/ried.22.2.23272

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940

- Roig-Vila, R., Mondéjar, L., & Lorenzo Lledó, G. (2015). Redes sociales científicas. La Web social al servicio de la investigación. *IJERI: International Journal of Educational Research and Innovation*, 5, 170–183. https://www.upo.es/revistas/index.php/IJERI/article/view/1615
- Roig-Vila, R., Prendes-Espinosa, P., & Urrea-Solano, M. (2020). Problematic Smartphone Use in Spanish and Italian University Students. *Sustainability*, *12*(24), 10255. https://doi.org/10.3390/su122410255
- Roig-Vila, R., López Padrón, A. & Urrea-Solano, M. (2021). Perfil del uso académico del smartphone entre estudiantes noveles universitarios españoles e iberoamericanos. *American Journal of Distance Education*, *35*(1). https://doi.org/10.1080/08923647.2021.1880730
- Segura-Robles, A., Parra-González, M., & Gallardo-Vigil, M. (2020). Bibliometric and Collaborative Network Analysis on Active Methodologies in Education. *Journal of New Approaches in Educational Research,* *9*(2), 259-274. http://dx.doi.org/10.7821/naer.2020.7.575
- Shrestha, A., Schindler, C., Odermatt, P., Gerold, J., Erismann, S., Sharma, S., Koju, R., Utzinger, J. & Cissé, G. (2020). Nutritional and health status of children 15months after integrated school garden, nutrition, and water, sanitation and hygiene interventions: a cluster-randomised controlled trial in Nepal. *BMC Public Health, 20*(1), 158. https://doi.org/10.1186/s12889-019-8027-z
- Urrea-Solano, M., Martinez-Roig, R., & Gavilán-Martín, D. (2020). La formación en TIC: experiencias y propuestas del futuro profesorado de Educación Infantil. In D. Cobos-Sanchiz, E. López-Meneses, L. Molina-García, A. Jaén-Martínez, & A.H. Martín-Padilla (Eds.), *Claves para la innovación pedagógica ante los nuevos retos: respuestas en la vanguardia de la práctica educativa* (pp. 3550-3559). Octaedro.
- Vílchez, J. E. & Escobar, T. (2014). Uso de laboratorio, huerto escolar y visitas a centros de naturaleza en Primaria: Percepción de los futuros maestros durante sus prácticas docentes. *Revista Electrónica de Enseñanza de las Ciencias, 13*(2), 222-241.
- Villarruel-Fuentes, M. (2017). Educar para la sostenibilidad: el nuevo mantra de la educación agrícola en América Latina. *IJERI: International Journal of Educational Research and Innovation*, *9,* 316-332. https://www.upo.es/revistas/index.php/IJERI/article/view/2551
- We are social and Hootsuite (February 10, 2021). *Digital 2021: España. We are social*. https://datareportal.com/reports/digital-2021-spain
- Williams, D. R., Brule, H., Kelley, S. S., & Skinner, E. A. (2018). Science in the Learning Gardens (SciLG): A study of students' motivation, achievement, and science identity in low-income middle schools. *International journal of STEM education, 5*(1), 1-14. https://doi.org/10.1186/s40594-018-0104-9

Fecha de recepción: 18-05-2021 Fecha de aceptación: 19-05-2021
Álvarez-Herrero, J. F. Urrea-Solano, M. & Martinez-Roig, R. (2021). Sostenibilidad y educación a través de las redes sociales. Presencia y visibilidad del huerto escolar en Twitter, Facebook e Instagram.
International Journal of Educational Research and Innovation (IJERI), 16, 122-141
ISSN: 2386-4303 DOI https://doi.org/10.46661/ijeri.5940