

## PREPRINT: Incorporation of Geolocation Devices in Educational Centers

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**Abstract: Introduction.** Schools have been self-constrained in outdoor activities due to the fear of students getting lost. It is a limitation for the school staff, and a constraint for students. However, few studies are developed regarding the possibilities of geolocation as a solution. **Aim.** The aim of the study is to explore this brand-new issue that could benefit the management of 21<sup>st</sup> century schools. The study was developed from a qualitative perspective with a sample of 51 members of an educational community. **Methodology.** The methodology included surveys to analyze the level of students' autonomy and the security felt by parents, teachers, directive team and students when using these devices. **Results.** Show that using geolocation devices in field trips improves the sense of security and allows for students to develop autonomous skills. **Conclusion.** Geolocation in education from an organizational point of view has a lot of potential but it is an understudied field that needs more research.

**Keywords:** school management, geolocation devices, security, GPS, autonomy.

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**Resumo: Introdução.** As escolas têm sido limitadas em atividades ao ar livre devido ao medo de os estudantes serem perdidos. É uma limitação para o pessoal da escola e uma restrição para os alunos. No entanto, poucos estudos são realizados sobre as possibilidades de geolocalização como solução. **Objetivo.** O objetivo do estudo é explorar esse novo tópico que poderia beneficiar a gestão das escolas no século XXI. O estudo foi desenvolvido a partir de uma abordagem qualitativa com uma amostra de 51 membros de uma comunidade educacional. **Metodologia.** A metodologia incluiu pesquisas para analisar o nível de autonomia dos alunos e a segurança que pais, professores, equipe de gestão e alunos sentem ao usar esses dispositivos. **Resultados.** Os resultados mostram que o uso de dispositivos de geolocalização em excursões melhora a sensação de segurança e permite que os alunos desenvolvam habilidades autônomas. **Conclusão.** A geolocalização na educação do ponto de vista organizacional tem muito potencial, mas é um campo pouco estudado que precisa de mais pesquisa.

**Palavras chave:** gestão escolar, dispositivos de geolocalização, segurança, GPS, autonomia.

**Resumen: Introducción.** Las escuelas se han visto limitadas en actividades al aire libre debido al temor de que los estudiantes se pierdan. Es una limitación para el personal de la escuela y una restricción para los estudiantes. Sin embargo, se desarrollan pocos estudios sobre las posibilidades de geolocalización como solución. **Objetivo.** El objetivo del estudio es explorar este nuevo tema que podría beneficiar la gestión de las escuelas del siglo XXI. El estudio se desarrolló desde un enfoque cualitativo con una muestra de 51 miembros de una comunidad educativa. **Metodología.** La metodología incluyó encuestas para analizar el nivel de autonomía de los estudiantes y la seguridad que sienten los padres, los maestros, el equipo directivo y los estudiantes cuando usan estos dispositivos. **Resultados.** Los resultados muestran que el uso de

dispositivos de geolocalización en excursiones mejora la sensación de seguridad y permite a los estudiantes desarrollar habilidades autónomas. **Conclusión.** La geolocalización en educación desde el punto de vista organizacional tiene mucho potencial, pero es un campo poco estudiado que necesita más investigación.

**Palabras clave:** gestión escolar, dispositivos de geolocalización, seguridad, GPS, autonomía.

## Introduction

In this ever-changing world where technology is becoming more present in our lives, attention should be paid to the advantages that technology can offer to all fields. The sociologist [Bauman \(2000\)](#) suggested that we are a liquid society that is dynamic, flexible and changing. Therefore, people have to adapt to changes to survive, quoting Darwin “it is not the strongest of the species that survives but the most adaptable to changes” ([Beltrán, 2015, p.99](#)). Therefore, we bring innovation with the tools or strategies to solve problems. Evolution comes from being able to solve problems and education is not far from this idea. If we think about technology to make lives and daily problems easier, we could think about introducing technology to improve the educational experiences.

The connection of education with new technology should be empowered because of the multiple benefits it could bring to the classroom. This relation has quickly evolved throughout the years, especially in the use of it inside the classroom. Technology has been introduced gradually in education. First came ICT (Information and Communication Technologies), when technology was a source of information. Then, TLK (Technology for Learning and Knowledge) appeared to emphasize the use of technology as an instrument of learning. Nevertheless, apart from using technology for didactic purposes, it should be applied in other educational areas of study as well.

This paper attempts to examine the effectiveness that the introduction of geolocation devices could provide to school organization, mainly outdoor activities and field trips. Interaction with the real context plays a vital role in students' learning process. While some of them are able to get involved in such activities, some others might not because of the responsibilities and work it entails. Hence, depending on the school, children can benefit more from this kind of experiences. To date, the problem has received scarce attention in the research literature and the incorporation of technology has not been considered to ameliorate the situation.

## Geolocation

Geolocation is a term quite new in society and in some countries even more than others. Although it is hard to find a dictionary where Geolocation is defined, the Internet is quicker in being updated and we have other sources to find a definition. The [Oxford online dictionary \(2019, parr.1\)](#) states that geolocation is "the process or technique of finding the exact location of a person or device using the internet". Meanwhile, the acronym GPS does appear in the dictionary as a system which allows knowing the position of an object due to the reception of signals sent out by satellites. This is curious considering that GPS is just an instrument within the theoretical concept of geolocation ([Beltrán, 2015](#)).

The different positioning systems that exist must be analyzed to, later on, precise which one would be the most adequate for education. Drawing from [Rodríguez \(2011\)](#), the positioning systems existing nowadays are:

- Location through satellites. Uses satellites to create satellites networks like GPS (Global Positioning System) that receive information of the time that last satellites' signals need to reach the object.
- Location through mobile phone network. It uses the same process followed with satellites but with BTS (Base Transceiver Station) allowing wireless communication between a network and a user equipment.

- Location through wireless networks. It is used when satellites' signals have enough power to reach devices or BTS have enough prediction, Bluetooth, Wi-Fi and RFID (radio-frequency identification devices) technologies.
- Location through IP address. the IP (Internet Protocol address) is used as a numerical label stored by Internet suppliers and assigned to all devices connected to a network.

It is obvious the broadness of the topic of geolocation and the multiple technologies that emerge from it. This technology has been a huge step in the evolution of society. However, it also comes with some critical issues that should be considered as it is in the case of privacy. People may have privacy concerns related to geographic tracking (Junglas and Spitzmuller, 2005; Kaasinen, 2003; Minch, 2004). However, it is remarkable that privacy concerns seem to diminish somehow in a student population regarding *pop-out* messages which they accept without previous checking (Olmsted-Hawala and Nichols, 2018). The European Convention on Human Rights (1948, p.4) stated, "no one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honor and reputation". Thus, all people have the "right to the protection of the law against such interference or attacks" (p.4). Years ago, any intrusion could be punished and so could now.

Privacy is linked to the obtainment, distribution and the non-authorized use of personal information (Wang et al., 1998 cited in Flavián and Guinalú, 2006). It goes hand in hand with the perceived security that people have of believing that their personal information will not be manipulated (Flavián and Guinalú, 2006), even though there is a possibility that people could access to the geolocation data collected. Therefore, worries can emerge because of personal information implied and people becoming more vulnerable, consequently. However, as it has been argued above, this would be a violation of the law and would be punished.

The use of geolocation devices in the school can be a controversial topic. On one hand, it can generate some insecurity due to the fact of sharing your location without being 100% sure that nobody will get this data for an unlawful purpose. On the other hand, it can be an enormous source of security for parents as they ensure their children are localized and cannot get lost. In fact, this was put into practice in different cities, such as China ([Huang et al., 2014](#)), to deal with parents' worry about children's security. Geolocation was introduced as a control tool, not in education but in all fields where the children were involved. A mobile monitoring system was tested to allow guardians of children to view their positions. The purpose was to keep the child in the guardians' eyesight but did not have accurate data of the orientation of the child. This means that as less information can be collected about the children's position, there is a higher level of data security. But, therefore, it is less precise.

All possible measures could be put into practice to avoid any interference and even more in an educational environment. As it was done with the Safety Monitoring system for children used in China, the monitoring system could belong to different departments, and children's parents, guardians or other people would not have the right to use them. However, it is really hard to ensure 100% privacy because, as in all fields, there can be people violating the law. Any type of intrusion against the right of privacy is documented as criminal records ([Spanish Agency of Data Protection, 2019](#)) and can be sanctioned depending on the kind of offence, the consequences caused and intentionality.

### **Geolocation in education**

Geolocation in education is a freshly, wide and little covered topic. More used in didactics area than in school organization, as proposed in this study. From a pedagogic perspective, a further explored use of geolocation is the contextualization of knowledge: using any instrument to locate themselves or topics studied geographically ([Gros and Forés, 2013](#)), starting with physical maps

and evolving with the introduction of technology as google maps. Another utility of geolocation has been in the well-known activities of geocaching, very extended with the expansion of gamification in education.

In terms of school organization and management, little research exists about the topic, so there is no clear evidence of possible uses. Considering that school organization impacts positively in students' performance as it constructs the environment where students' learning occurs (Gutiérrez, et al., 2017). The tools used in management, therefore, are essential for successful results. Robinson, et al. (2009, p.44) suggested that "it is the role of leadership not only to select or develop tools but to ensure that they actually help the users achieve the intended purposes". The use of geolocation can be beneficial if it is used adequately with specific and clear purposes.

Education must be adapted to the needs of students and society. Technologies are already a big part of everyone's lives as we are living in a digital era and many fields are changing with the introduction of technology. In the education field, it could also be introduced in terms of school management to benefit from it to promote a key element, autonomy. Educational professionals support the theory of socio-constructivism studied by Vygotsky (1978) as the education base. Therefore, learning should come from students' active role, experience, interaction and autonomy (Gros and Fores, 2013; Leiva and Moreno, 2011). All students should be autonomously competent as it is a key element in education that underpins an individual's ability to make choices, personally evaluated as *good* and which is, in fact, affected by the school management and organization.

The self-determination theory notes that students' academic functioning depends on autonomy (León, et al., 2018; Cooke et al., 2018) claim that children dislike rules restricting their behavior and are likely to break them due to their feeling of obligation. Despite the consciousness about the importance of autonomy in learning, there is no clear of it. All in all, it is agreed that an autonomous learner does not react to teachers' stimuli but adopt an active role

in learning (Thanasoulas, 2000). It is not letting things happen but being involved, interacting with the world. In education, Omaggio, (1978), cited in Thanasoulas, (2000) suggests awareness of their learning styles, active role, maturation and risk-taking to improve autonomy. Following a critical and constructivist theory where self-directed learning is promoted to allow students to build up knowledge, learner's autonomy assumes a more social and political character. That is, they realize the social context in which their learning is embedded and all it means, students become independent, undeceiving preconceived ideas and constructing their own thoughts (Thanasoulas, 2000).

Although there are few studies on using geolocation services as a tool to organize field trips, there are already some applications for this purpose. Nevertheless, schools have not taken part in this new trend. In 2018 the application called RoundApp Kids was presented by Mildmac Advanced Solutions which can identify when a child moves out from the previously established area of work. Other important tools that have been used in some countries are Smartwatches which do not only give information about the children's location but also can broadcast what is happening around them. Unfortunately, the easiness to spy children because of the big amount of information provided by those devices and their multiple functions were important issues leading to its removal. Germany is a good illustration of this, parents' use of Smartwatches to listen to teachers' lectures caused its prohibition in 2017. Nevertheless, the trigger was that third persons' privacy rights were being transgressed. Hence, a responsible and correct children's monitoring system which does not involve other people should exclusively include children's location.

A lot of uncertainty exists about resources that could be used in schools because of the lack of engagement of schools with this innovation. However, with a cautious search, few location services can be found, for instance, SOS-KIDS, a business run by a group of three Catalan entrepreneurs. It stocks schools with devices similar to medals that students have to wear, and which are connected with a specific application. Teachers having the application can track students at

all times. All in all, it can be affirmed that there is a lack of studies regarding the use of geolocation to facilitate school organization, an issue very important to deal with in the 21st century.

## Method

This paper has the purpose to analyze whether the introduction of geolocation in the organization of school field trips could be positive and beneficial. The aim is (1) comparing the security felt by parents, teachers, students and members of the directive team having students carrying geolocation devices; and (2) analyzing the level of autonomy students perceive when using geolocation devices.

In order to obtain information about the objectives presented, a study case was carried out. [Murillo and Roman \(2011\)](#) maintain the opinion that all the participants involved in school activities should be recognized to promote a learning environment free from setbacks. Therefore, for this study, qualitative research was developed. It was considered a good source of information about the topic under discussion as many agents in the school would be affected by the feasible integration of geolocation devices.

The instrument used to collect all the data was an online survey that required justified answers. On the one hand, for teachers, directive team and parents the survey was self-administrated because of participants' availability. On the other hand, students answered the survey face-to-face with the author of the study. It was necessary to collect information in person because students may not express themselves as well in written.

The sample was composed of 51 people who were grouped into four groups. There were 27 parents, 6 students, 5 members of the directive team, and 13 teachers. All of them were from a state-subsidized school located in Barcelona (Spain). In order to collect information about the two objectives, surveys including

questions about both topics were distributed to the four groups. Some of the questions were similar but they all were adapted to the role each agent has in the school.

Parents' survey consisted of ten questions going from general issues related to their feeling of security to more specific issues related to the possible use of geolocation devices in the school environment. For teachers' survey, the questionnaire embraced the same number of questions and had a similar structure than the one answered by the parents. Evidently, they were asked for different things such as grading the amount of pressure they feel due to their responsibility of controlling all pupils. The opinion of the directive team was considered crucial as they have a determining role in the organization of field trips and, moreover, in the decision on the possible incorporation of geolocation devices. In this particular case, they had twelve questions to answer and assembled similar to the two previous surveys. Finally, students had to respond to thirteen questions. It must be said that when selecting students was important to have pupils from diverse grades and, therefore, ages (6-11 years old) because the older students are the more autonomous ones in field trips.

## **Results**

### **Security**

Multiple items on the questionnaire measured the extent to which the different agents involved in the school feel secure during field trips and their thoughts on geolocation tools. It is suggested that students and parents are keen on the introduction of geolocation devices as almost everyone answered positively to the possible incorporation. Meanwhile, teachers and the directive team have diverse opinions. Some of them support the idea of incorporating this innovative equipment, yet the rest rejects it. Following this, the greatest amount of people would be in favor of the change proposed in the paper.

Students and parents commented they would feel much calmer if they knew that pupils could be localized easily during school trips. Considering that all students interviewed admitted experimenting fear about the possibility of getting lost, they all used the term *tranquility* to describe a situation where geolocation devices were used. Furthermore, parents agreed on the fact that they suffer when their children go on an excursion and, even more, two of them explained a situation they went through where their children got lost.

There was quite high support on the incorporation of geolocation tools since they highlighted that they would feel more relieved. As one interviewee put it: *We could expand the area in which students move and we would be even more relaxed* (Teacher 8). Nevertheless, a small number, of those interviewed argued that would be too much control or that controlling students is a job to be done by teachers. Tied to these arguments against the incorporation of geolocation devices appeared the fear of using technology to manage private information.

Furthermore, it appears that parents differ in the level of trust they place in the teachers' supervision. Closer inspection allows seeing that few parents trust 100% their children's school. Although no parent showed a low trust in teachers' supervision (level 1 or 2) when grading from 1 (very low) to 5 (very high) their trust in teachers' supervision, most of them revealed in other questions that they believed teachers are not able to control all children or have them at sight. Some parents even answered using terms such as *impossible* or difficult.

Generally, parents recognized being aware of the troubles in controlling students because of pupils' tendency to get distracted. They noted it is teachers' obligation and they should be prepared. However, they apparently are not completely sure all the teachers accomplish this requirement. On the other hand, the majority in the directive team shared the same opinion regarding trust, stating a very high level of reliance. Only one member of the target group considered trusting in a level above average. Meanwhile, a high number of teachers recognized how profoundly difficult is to maintain all children at sight.

Regarding the possible issues, they imagine those devices could have, but the participants did not find any. There were 5 issues echoed. The two that came up the most were the excess of control children would experience and the excessive reliance on the devices and, hence, the increase of distractions. Talking about these ones, some interviewees said: *There are no drawbacks for the school, but I am not very comfortable with the idea that children become robots...* (Parent 19) and *Teachers may rely too much on the devices and lower one's guard* (Parent 16). This can be summarized in a word used oddly by the teachers and not the parents which is *privacy*. However, just two of the parents involved in the study considered this as an obstacle for the introduction of the devices.

Other concerns arisen were on the possible mechanical failures or the increase in costs. The last inconvenient was exposed by a parent and, in fact, not expected. A participant reported that *it does not promote the responsibility and autonomy of students* (Parent 11) and the same utterance was used by two teachers. This statement would contradict one of our objectives and, therefore, there was even more reason to inquire into the topic of autonomy. Interestingly, members from the directive team were the ones who pinpointed fewer problems in case of using geolocation, in fact, the only worry highlighted by one member was *the lack of improvement of students' responsibility* (Directive team 5).

In spite, all the directive team declared they have no difficulties when organizing, half of them considered that introducing geolocation could reduce possible issues emerging from it. Concerning teachers, a common view amongst interviewees was that they feel they can carry out the activities planned during field trips because they do not spend much time dealing with troubles in terms of management.

Contrary to the previous answers a considerable amount of those who were interviewed indicated that geolocation would be advantageous to reduce difficulties arisen while arranging outdoor activities. Furthermore, some of them reaffirmed their answer with terms such as *totally*.

When participants were asked for their willingness to have geolocation devices incorporated in the school, a good acceptance to this possible change and innovation arose. However, the difference between variables (yes or no) differs among the three groups (parents, directive team and teachers). A greater distinction between variables is visible with parents' and teachers. In the case of the directive team, special attention should be given to those hesitating which agreed on having a practical trial with the devices before giving a definite response.

Furthermore, some of the respondents whose answer was yes highlighted that the technology should be used in specific activities, mainly in outdoors and large areas. Wholly, whilst a minority mentioned that they would not want these devices saying *there should be specific and positive arguments for me to support the idea because I think it is too much control* (Parent 21), a significant majority agreed on the introduction commenting that *it would be interesting to try them* (Parent 3, Teacher 6 and 9), *I would love it* (Parent 23), *I would like to have them available when needed* (Parent 15) or *Yes, if it is helpful for teachers and avoids students getting lost* (Parent 8).

### **Autonomy**

So far, the focus has been on the security felt by the four groups taken as a sample. Below, results will be shown related to students' autonomy. When pupils answered the question concerning their sensation about having opportunities to make decisions during field trips, it was noticeable the increase of responsibility they have as they grow. Those whose response was *sometimes* were the ones in higher grades. Although this latter comment, all participants admitted they have few chances to decide.

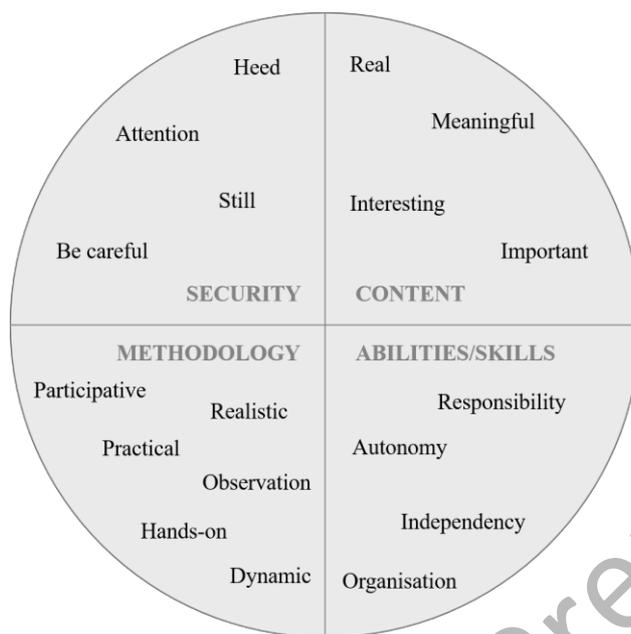
When talking about the conditions that teachers put during field trips, all students stated there were several requisites to follow. The one concerning them

the most was the size of the area where they can move around. Interviewees shared the opinion that they would like a bigger zone where they could move. A general awareness of the necessity to have some limitations were visible but, at the same time, they appeared to be sure there are too many. Participants suggested having a larger area destined to work or pass their free time during school trips would be positive. What is striking, it is a mention of liberty. Two students talked about the relationship between a large area and freedom. One individual reported *If we had a bigger area, I would feel freer but also scared to get lost* (Student 5). They value that having a big area would provide more freedom and autonomy to them, but they acknowledge the risks it can bring.

In association with this, strong evidence of their willingness to have a bigger space to go across came into sight. In response to the question concerning the size of the area, all those interviewed indicated that they would like it. Talking about this issue different participants said: *Yes, because we can play more, discover and investigate* (Student 2), *Yes, because we are too close to each other* (Student 3), *It is more interesting because you can investigate more and different things, you can share your discoveries and then learn from everyone and about everything* (Student 5), and *I would feel freer and we could take a look to diverse things* (Student 6).

What is more, students were asked to give an argument why field trips should be promoted. They all coincide with each other saying that it is a way to learn in a different manner from the routines to which they are accustomed to. Nevertheless, one student stressed the idea of workload in the management of school trips. Quoting her own words, *although field trips are interesting for learning, their organization implies a lot of work in terms of authorizations, teachers, among others* (Student 5).

**Figure 1.** Students' words about field trips benefits



**Note:** Compilation based on the data analyzed by the authors.

Finally, participants had to tell at least the first three words that came into their minds when thinking about field trips and, afterwards, what or how they can learn during those outdoor activities. Those words were collected and organized in four different groups, as in [Figure 1](#), labelled with methodology, security, content and abilities/skills. For the first one, all the words related to how the learning is were included, for instance practical. Insecurity was gathered those linked to actions they have to do in outdoor activities to ensure protection, such as attention. For content, there are the ones which give information about the type of knowledge they can achieve, by way of illustration it is meaningful. In the case of abilities/skills, there are the learnings and personal growth they affirm doing during school trips as autonomy.

## Discussion and Conclusions

The goal of this study was to go in-depth into a brand-new issue that could benefit 21st-century schools which are greater and greater including technology in their daily functioning. One of the aims was to compare the security felt by

different agents involved in the school when using geolocation devices.

Results show that more than half of the sample would be keen on the idea as a common term to describe their sensations were *tranquility*. At the same time, all students support the idea which may be explained by the fact they are only aware of the fear they feel when getting lost rather than the negative aspects those devices could bring. Another group which greatly supports the idea is one of the parents, considering that levels of trust in teachers' supervision were not the highest they could be. However, they see a few disadvantages, highlighting that would be good if it helps the teachers. Considering the arguments against, it might be good to combine geolocation devices with regular control to ensure teachers do not get distracted due to an excess of reliance on the devices.

Moreover, as some parents and teachers find a bit overwhelming having children so controlled, the incorporation of these devices could be done in specific cases where the organization of activities is harder. In the case of teachers, they are more reticent to the possible change. Hence, considering that some teachers stated they have it all under control in field trips and that they are not under much pressure, it could conceivably be hypothesized that they feel judged for the work they do. A similar situation appears with the directive team that seems to be proud of their whole functioning in terms of school trips and half of it does not see the necessity to use technology. Nevertheless, teachers, contrary to the directive team, seem to be more open to the introduction of geolocation devices. Two possible explanations can be that the directive team is not directly dealing with the control of children or due to school ownership and funding. This could be the reason why one of the most common inconvenient found is the cost that can entail. Thus, not all the budget comes from the state and they should have to face it.

Surprisingly, the issue of privacy has not been considered that much, in fact, even more teachers than parents appear concerned for having information manipulated (Flavián and Guinalú, 2006). They all remark this drawback, but they look at the use of these devices from another perspective, as a source of

security as it happened in China rather than a tool to violate a human right (Huang et al., 2014).

On the other hand, regarding autonomy, it is interesting to note that the term appeared in different moments during the investigation. Everyone's awareness that autonomy highly affects students' academic functioning (León et al., 2017) is confirmed by this. First, it was considered as an inconvenience because students may rely too much on the devices and because they are controlled all the time. However, it is gripping to see that students themselves break that myth of dependency relationship between geolocation devices and the development of autonomous abilities.

The words given by students about skills linked to autonomy, and comments such as *If we had a bigger area I would feel much freer but also scared to get lost* (Student 5) corroborate that giving the possibility to have a large space where they can self- direct their learning, take risks and interact with the world would be beneficial for them to mature (Thanasoulas, 2000). Nevertheless, this could be done having a support tool to control children in case any unexpected event happens. It is not about removing teachers' control but providing an instrument to assist them.

Furthermore, autonomy arose as a key element all participants wanted to develop in the students. Teachers but also students, as it is shown in their answers, believe that independence and allowing them to make decisions can deeply enrich learning. Nonetheless, until now, the idea to promote it through the use of a greater area to go across was not conceived due to the possible problems with controlling children and the workload in organizing. Perhaps now some members are contemplating the option to include geolocation devices to foster autonomous learning. Thus, it is greatly interesting to see what students think field trips can provide them. In Figure 1, powerful words in learning are exposed next to security ones that should not be eliminated but assisted with all the possibilities of geolocation devices.

This study has identified that although the majority of the participants recognizes geolocation systems' high accuracy, there are some interviewees hesitating. Therefore, it would be satisfying for everyone if the technology used is the most precise existing nowadays, for instance, geolocation through satellites (Rodríguez, 2011). Although results tip the scales in favor of the incorporation of geolocation tools, the opinion of those against it should be considered so as to adapt the use of the devices to the majority. Therefore, as several participants asked, a trial should be considered to allow them to see the well-functioning. Since most of them were opposed to it because they could not imagine it functioning. Hence, some already available resources and services examined in the paper could be considered by schools willing to set forth this innovation, for instance, SOS-KIDS.

Overall, the research has not encountered many limitations, but the lack of study developed in the field. Furthermore, if a bigger sample could have been analyzed, results could have been even more representative. Nevertheless, this study offers a first approach to the field for further research. Notwithstanding limitations, the study suggests the incorporation of geolocation devices for field trips could be beneficial with a previous consideration of all its implications and trying to attain most of the requirements of those involved in the change.

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