GLL
Geomatics, Landmanagement and Landscape No. 3 • 2024, 117–137

ISSN 2300-1496 http://dx.doi.org/10.15576/GLL/2024.3.08

Research paper

Received: 17.04.2024
Accepted: 24.05.2024
Published: 15.10.2024

Evaluation of the quality of school spaces and identification of qualitative variables in primary schools

Rayene Hafid[1], ✉ 0009-0006-8298-0947
Abida Hamouda[1] 0000-0002-2705-7547

[1] Architecture and Urbanism, Institute of Architecture and Urbanism, LEVE Laboratory, University Batna 1 Hadj Lakhdar
✉ Corresponding author: rayene.hafid@univ-batna.dz

Summary

There is a growing awareness of the influence that the design of school space has on student physical and mental health. The aim of this article is to evaluate the quality of school spaces and determine the variables that are important for their users, using the case of public primary schools in the city of Oum El Bouaghi in Algeria. We propose the following hypothesis: 'green garden, innovative school environment and ergonomics are qualitative variables of the school space that need to be taken into account to ensure the well-being of students.' To demonstrate such a hypothesis, we used a quantitative approach, based on observation, analysis and a questionnaire survey carried out on school users. The results obtained from the fieldwork highlighted multiple conceptual problems in the studied schools. The qualitative variables suggested in the hypothesis reflect the worries, desires and inclinations of the users of the school space that should guarantee their personal and professional comfort. This research may challenge other Algerian researchers and education officials to reflect more on the current and future state of school facilities in order to make them more appropriate, according to the opinions of users and to guarantee their well-being.

Keywords

evaluate • quality of spaces • qualitative variables • users • primary schools • Oum El Bouaghi

1. Introduction

School is a living and learning space, therefore its high-quality design promotes good relations between users [Mazalto 2008]. The space influences children's behavior of

when learning or playing, through its shape, dimensions, construction materials, colors and furnishings, depending on the function it fulfills [Elhalak 2017].

The school building has a symbolic function in the community. It should serve as a model for sustainability and environmental quality [Mazalto et al. 2013]. According to Bernard Quirot, 'the architect must focus primarily on the quality of space, its proportion, its light, its atmosphere.'

In reality, evaluating a school space as a quality space for users is subjective, and each study approaches it from a different angle, relying on certain variables that may not be adopted in all methods.

Over the years, the Algerian education system has undergone a number of reforms, aimed at improving the space. However, the majority of decisions or declarations of the ministry have not been realized in Algerian schools, both recent and long-term directives have yet to be implemented.

On the other hand, the importance of consultation in achieving what users want and need for their practices [Mazalto and Paltrinieri 2013] was addressed by several researchers, such as Bernard Quirot, Philippe Tournier and Florence Robine, who proposed working closely with the users to identify their objectives and to enable them to make their own decisions [Mazalto and Paltrinieri 2013]. Especially since, historically, learning spaces have been developed by practitioners, not architects, who designed forms adapted to modes of teaching and education [Mazalto 2008].

Based on these prerequisites, we conducted an exploratory fieldwork that focused on public primary schools in the city of Oum El Bouaghi.

Our research aims to determine the qualitative parameters of a school design. Therefore, the research was designed to evaluate the quality of the Algerian school space on the basis of a case study and to identify the important variables for users that qualitatively affect their school.

1.1. Literature review

The studies that investigate the qualitative variables for innovative primary schools have been examined and classified for the present study.

Numerous studies [Kutsyuruba et al. 2015, Maxwell et al. 2017, Aldridge and McChesney 2018, Tapia-Fonllem et al. 2020] have emphasized three key variables: physical elements comprising distinct spaces, academic factors including learning methodologies, and social dimensions. These variables collectively form a comprehensive three-dimensional model that has a significant influence on the quality of the school environment, thereby impacting the well-being of students and improving their academic achievements.

Retzlaff-Fürst [2021] showed in their study on the qualitative variables of a school space, the influence of green spaces and gardening, especially on the behavior of students.

In a similar context Ayoubi [2017] demonstrated that garden and green spaces serve to protect the health of children, while other researchers have proven that chlorophyll in vegetation has the ability to absorb electromagnetic waves [Guillet 1991].

A study of van Dijk-Wesselius et al. [2020] presented a project called 'Becoming an Outdoor Teacher' on elementary schools in the west of the Netherlands, all of which have a green schoolyard at the entrance, with the aim of taking classroom learning outdoors and developing a new action plan.

Other researchers have studied spatial configuration as a quality parameter, its influence on the distribution and activities of students in their free time [Kishimoto 2012].

In another context, studies have shown that quality school space is influenced by factors such as flexibility, adaptability to new reform requirements and to future changes, spatial and functional hierarchization, safety, and protection [Nakib 2015]. Paltrinieri [2013] discussed beauty and the right proportions as qualitative parameters. Ayoubi [2017] addressed the quality of a school space by considering the color, style, layout, choice of equipment, management systems, cleaning operations and construction materials. Finally, ergonomic furniture as a factor was examined by Hastings and Wood [2002].

A number of other researches have investigated other important variables in a quality school space and their effects, such as:

- The influence of new information and communication techniques on academic performance and social coherence [Tanner 2002],
- The influence of excessive noise and poor acoustic conditions on the students [Bradley 2002, Céline 2014],
- And the impact of light on the physiological and psychological development of children [Daich 2011].

However, the majority of studies determined the impact of quality variables on students as the main users of school space but have not addressed the subjective assessment of the quality of school space by all users.

2. Materials and methods

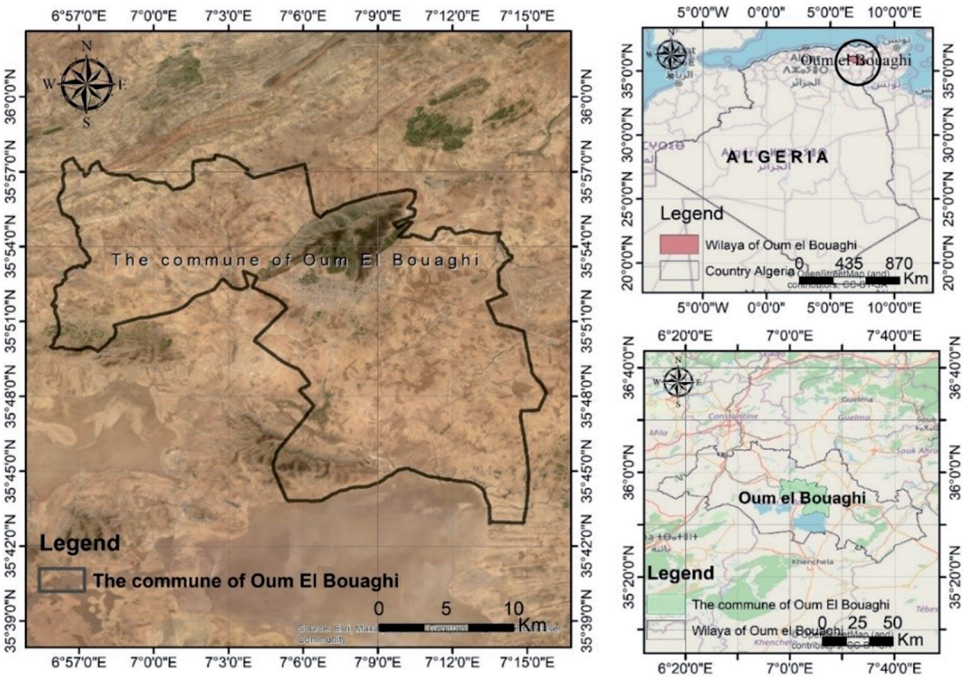
2.1. Presentation of the study area

Urban public primary schools were evaluated, all located in the city of Oum El Bouaghi, which lies in the highlands of Constantine, in the north-east of Algeria, at 35°43'–35°58'N and 06°56'–07°15'E. It is also a part of the Grand Aures, and the climate is semi-arid continental Syrian type. It occupies an area of 414 km^2 (Organisation administrative de la wilaya D'oum El Bouaghi, n.d.) with 80,359 inhabitants in 2023, according to ONS (National Statistics Office). Figure 1 presents the situation of the study area.

The research part of this study used the following phases.

2.2. The determination of the variables

The determination of qualitative variables for innovative primary schools as evaluation criteria (based on theoretical research on the subject).



Source: Author's own study, QGIS, 2024

Fig. 1. The situation of the study area

2.3. Sample selection process

A non-random sample was selected in a process of data extraction for analysis. We have collected data concerning the different dates of realization of the urban schools of the city of Oum El Bouaghi, the sum of which was 28 school groups (January 2018) with the help of the direction of programming and monitoring at the level of the direction of education and teaching of the wilaya of Oum El Bouaghi.

The sample was chosen based on two criteria. On the one hand, geographical, which ensured that the schools were representative of all the territories of the municipality of Oum El Bouaghi (shown in Fig. 2) – we therefore chose schools in the city center, the old town, the outskirts and the new town. On the other hand, we analyzed the success rate in the final exam of the primary cycle of schools (from 2006 to 2018) in order to be able to classify our establishments (on the basis of an archival cooperation with the Directorate of Orientation and Evaluation of the Wilaya, but also with the Office of Study and Pedagogy at the level of the Directorate of Education and Teaching of the Wilaya).

Finally, we have classified our public schools into four predefined periods, based on a subjective view of the architecture, as shown in Table 1. The colonial era lasted from 1830 to 1962. The postcolonial era ranged from 1963 to 2003, when the educational reform aimed at a qualitative change in the educational system (to prepare Algerian

students to integrate and participate in the new scientific, cultural and socio-economic contexts). This reform encountered a considerable deficit of school buildings and the infrastructure appropriate to accommodate the new program (UNESCO. General Director 2000). The period between 2004 and 2016 has seen a great leap forward in the field of information and communication technologies, which led to a radical transformation of learning methods and pedagogical techniques. Five schools were built in that period, which is the same number as in the period between 2017 and 2018.

For each of the four chronological periods, we highlighted two schools as examples of high and low success rate.

Table 1. The studied schools

Era	Evaluation in relation to the success rate	Name of the school	The % of success rate in the exam from 2006 to 2018	Geographic location
The colonial era	Good	El Khansa	88.42	The old city center
	Bad	Lyazid Mohamed Elsaleh	85.78	The old city
The postcolonial era until 2003	Good	Hassani Kaddour	91.74	The northeast part of the city
	Bad	Saidi Triki	73.92	The southern part of the old city
From educational reform until 2016	Good	Djarmene Houssein	93.65	The new city
	Bad	Added Azzouz	81.38	The new city
2017, 2018	Good	Abdri Ibrahim	90.00	The northwest part of the city
	Bad	Bouzid Elmeki	64.29	The new southern part

Table 2 presents each school of the schools studied.

Table 2. Presentation of the schools studied

Name of the school	Number of classrooms	Initial capacity (2019)	Total number of students (2021)	Total surface [m^2]
Elkhansa	12 D-type	396	390	2918.10
Lyazid Mohamed Saleh	12 D-type	391	410	4605.63
Hassani Kaddour	13	314	321	3100

Table 2. cont.

Name of the school	Number of classrooms	Initial capacity (2019)	Total number of students (2021)	Total surface [m²]
Saiidi Triki	16	618	700	4356.79
Djarmene Houssein	06 B-type	300	320	3500
Addad Azzouz	12 D-type	665	497	It is the largest school among the urban schools in the city
Abdri Ibrahim	06 planned type B classes, 07 existing classes	68	70	1995.67
Bouzid Elmeki	12 D-type	–	744	2044.17

2.4. The course of the study

The study began with personal observations during visits to the schools which are documented by photos and measurements to carry out architectural surveys in order to understand the different components of primary schools. Based on our grid of qualitative parameters, we decided on the type of data to be collected, An objective statistical method that focuses on numerical data was followed by collecting a large amount of data, which allowed us to propose reliable conclusions.

The selected methodology is a questionnaire for four categories of target groups: a semi-directed questionnaire for teachers, a semi-open questionnaire for parents of students in the schools surveyed, a semi-open questionnaire for students, and a questionnaire for the director of the institution. In addition to these four categories of questionnaires, semi-directed individual interviews were conducted with the various actors to understand the process of designing, constructing and financing of public primary schools, as well as their problems and aspirations.

The questionnaire (before it was submitted to the respondents) was revised and corrected by the department of training and inspection at the level of the Directorate of Education and Teaching of the Wilaya of Oum El Bouaghi. The survey determined the age of the interviewed students , because fifth graders have more comprehension abilities compared to younger groups. The total number of received valid forms was 285 (out of 400 possible in total): 8 principals, 9 teachers, 68 parents, and 200 students aged 9 to 12 years. A total of 285 participants were interviewed in April 2021.

2.4.1. The application of the questionnaire

Once the numerical evaluations of the variables had been carried out, we proceeded to the analysis of the statistical data which was carried out using the statistical software for the social sciences SPSS version 26.

We have applied two relevant analysis techniques for categorical/continuous variables. First was a varied unitary descriptive procedure, bi-varied or multivariate, which contains the frequency tables (numbers, percentages), graph (pie chart, bar chart, histogram), bar chart II and crosstab. Then, a differential statistical procedure (hypothesis test, a nonparametric test to prove the hypotheses in order to determine the conformity of the data. This allows to compare the observed values contained in our data with the expected values.

Based on the data collected and different qualitative criteria for the evaluation of school spatial design, we have determined the major criteria that influence the quality of the school.

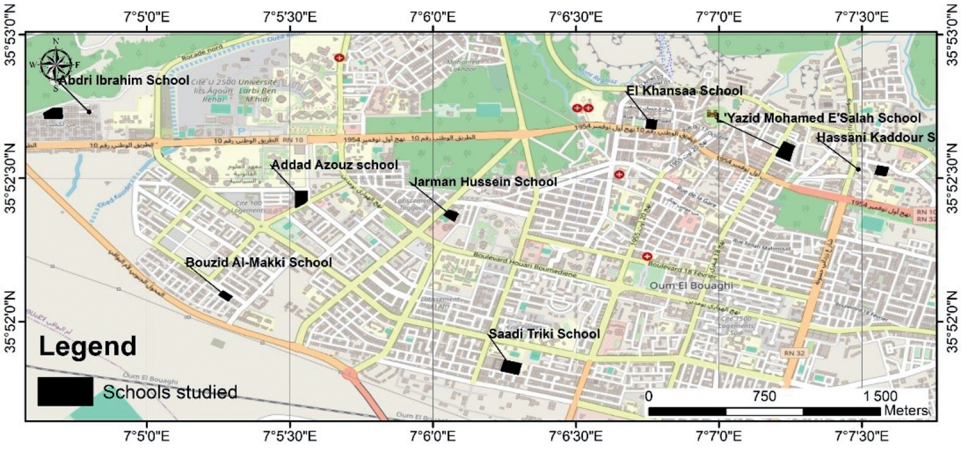
3. Results and discussion

The results are based on two approaches: analysis and questionnaire survey.

3.1. Results of the analysis

We have analyzed three qualitative factors for the school space which are:

3.1.1. The first factor: the school environment



Source: Authors' own study, QGIS, 2024

Fig. 2. Shows the studied schools in relation to the city

The results are as follows:

1. The schools are located in sites far from the major noise zones, but are affected by the noise coming from dense neighborhoods (less than 3 m).
2. Most of the schools are surrounded on three sides by houses, which are taller than the school buildings, preventing the site from taking advantage of its qualities and hindering the proper functioning of the school.

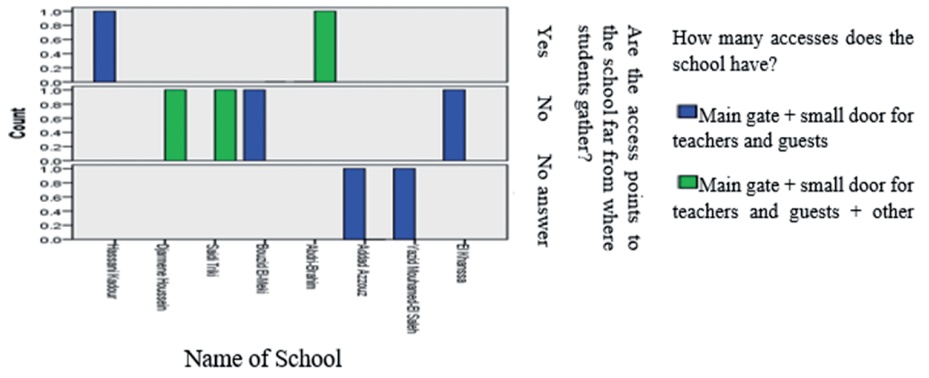
3. Most of the land adjacent to the studied schools was occupied, which restrains any future horizontal extensions.
4. The schools built since the independence until today are constructed in the reinforced concrete system (post/beam) – it is the most used building material throughout the territory; otherwise the dominant shape is the parallelepiped.
5. Schools embody an unnoticed role with the surrounding fabric in terms of façade.
6. Despite the positioning and excellent implementation of educational spaces relative to external acoustic nuisances, the neighborhood's density is nevertheless visible, despite the infrequent usage of natural barriers as a good solution to many sound concerns.
7. The period from 2004 to 2018 saw a significant urban expansion, so many sites were not designed to contain school groups, but they were built to meet the new needs in this area.

3.1.2. The second factor: accessibility

The entrances of the majority of schools faces low-flow streets and the courtyards. 62.50% of the schools have two accesses on the main facade: main gate and a small door for the staff and guests of the school (they are close to the places where students gather). The main gate plays a double role as it not only serves as access for students, but also as a mechanical access for the vehicles of the school staff.

For this reason, cars are parked where students gather, in the courtyard, for a simple reason confirmed by the following:

The multi-varied analysis of the variables is shown in the Figure 3.



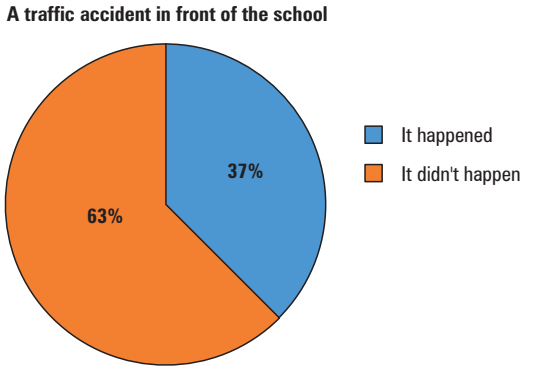
Source: Authors' own study, SPSS, 2021

Fig. 3. Bar chart of the number of accesses to schools and the distance between these accesses and the places where students gather

The schools have no emergency access, nor parking areas, nor surveillance cameras.

The presence of pedestrian crossings, signs and speed reduction devices as well as 5-meter wide sidewalks that are often used by parents as a parking spaces, have introduced multiple risks.

Our study has shown in this regard that: 37.50% of schools have recorded road accidents in front of their gates. The result of the question posed to the directors is shown in Figure 4.



Source: Authors' own study, SPSS, 2021

Fig. 4. Representation in the sector of road accidents in front of the school

3.1.3. The third factor: the spatial configuration

The figures that follow this factor represent the architectural description of the spatial organization of the schools studied through our surveys carried out with the AutoCAD architecture software are supplemented by photos and comments:

Figure 5 shows the final result of the modifications made to the school built since the colonial period.

The colonial school is a monobloc on the ground floor with floor (R + 1) located along the east-west axis, on the first floor, we find classrooms of 59.96 m^2, surrounded by a covered and open gallery of 2.55 m wide surrounding the courtyard. As for the first floor, it is intended for the official accommodation of the head of the establishment, with a surface area of more than 100 m^2.

Figure 6 shows the spatial organization of the post-colonial school.

The postcolonial school is an L-shaped building with a ground floor and a first floor (R + 1). On the first floor, there is an extracurricular class, other classrooms and administration. On the first floor there are the upper classes at the intersection of the two bars located on the east-west axis. On the north-south axis, which is perpendicular to the first axis, we can find the stairwell. The size of the classrooms varies between 52 and 55 m^2. A toilet block is situated at the end of each corridor with up to eight toilets, not to mention a functional housing away from the common areas with an independent access.

Source: Authors' own study, AutoCAD 2019

Fig. 5. The spatial organization of the studied schools of the colonial era

Source: Authors' own study, AutoCAD 2019

Fig. 6. Represents the spatial organization of the schools studied from the colonial post era until 2003

Source: Authors' own study, AutoCAD 2019

Fig. 7. Show the spatial organization of the schools studied from 2004, after the educational reform, to 2016

Source: Authors' own study, AutoCAD, 2019

Fig. 8. Displays the spatial organization of schools from 2017 to 2018

The school is located on a large plot of land with topographical challenges (large slope), which cause difficulties to pedestrian movement and pose risk to schoolchildren.

The educational reform aimed at creating a spirit of conviviality, exchange and sharing in the schools [UNESCO. Director-General 2000], so it encouraged to build them in an exploded U-shaped design, with the teaching block on a ground floor with a first floor (R + 1). The administrative block is located at the end, near the gate. It is characterized by its large surface that not only allows to accommodate more students but also to create new spaces (space for the gastronomic function and others).

The city had to become extremely urbanized in order to accommodate the population's increasing demands. The schools constructed in the period between 2017 and 2018, particularly the L-shaped schools with one or two stories on the ground floor. This design included several new spaces, an administration center with equipment, and a transition area at the entrance.

3.2. Results of the questionnaire

We analyzed the results of the questionnaire:

- Principal questionnaires according to the elements that make up the school, their opinions and aspirations;
- Teacher questionnaire according to all the components of the classroom, their problems and suggestions;
- Student parents questionnaire according to their criteria for choosing schools, their opinions;
- Student questionnaire according to their dreams, their discontents.

3.2.1. Places of meeting and socialization as a quality variable

3.2.1.1. The schoolyard

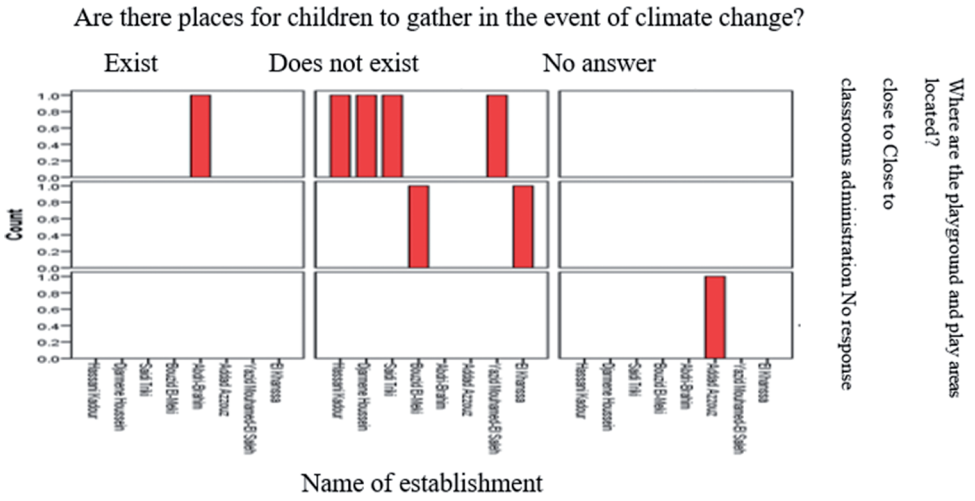
According to the results of the questionnaire for the principals, the schoolyard is the only space intended for play, meeting and gathering at school. 87.50% of the schools studied do not have playgrounds or sports activity areas.

The schools built since 2017 have their courtyards far from the entrance but still the lack of gathering places in case of bad weather is an issue, as shown in this multivariate analysis (Fig. 9).

Most of the schoolyards are located near the classrooms and there are no meeting places for students in case of bad weather (the covered galleries of the schools are passages of 2.50 m wide at most so they only allow passage).

3.2.1.2. Playgrounds, garden and green areas

Despite the significance of outdoor education and the need to have a garden and a green courtyard at the primary school level emphasized by the studies [van Dijk-Wesselius et al. 2020] only a few trees and shrubs were planted in the vicinity of the administration buildings in the studied schools.



Source: Authors' own study, SPSS, 2021

Fig. 9. Bar chart of the location of the courtyard and the playgrounds and the presence of gathering spaces in case of bad weather

The non-parametric Chi-two test was applied in order to learn the parameters that shape the dream school of the students. It was found that for all the studied schools, the students would like to have playgrounds (50% of respondents), as well as school gardens and green spaces. Some respondents indicated they desired a large, clean and well-equipped courtyard with benches and sports instruments.

The playgrounds, the school garden, a landscaped courtyard (benches and sports instruments) improve the spatial quality variable of schools.

3.2.2. Proximity to school as a quality variable

The results of the non-parametric Chi-two test confirm the hypothesis that there is a relationship between the proximity of households and the selection of schools for students.

The results also proved that 156 students, girls (n = 82) and boys (n = 74), live close to their schools, with a high percentage among girls, especially for schools located on the outskirts of the city – as in the case of the Abdri Brahim school, where 85.70% of students live in the same neighborhood as the school. Similarly was in case of Bouzid El Meki school, with 76.50%.

Although 44 students reside in nearby neighborhoods or even farther away, parents divide this number among students who attend school close to their grandparents' home, their place of employment, the home of their nanny, and another due to the school's stellar reputation.

Good reputation as a reason for choosing a school had a low percentage for all the studied schools, except for the Djarmene Houssein school with 50% due to its location

near the Wali's residence and vicinity to residential areas where intellectual class lives. The school's educational results and the low number of students is also a factor here.

So, the proximity of the home has an impact on the choice of school by parents.

According to the parents, the proximity of the school to the places of residence presents a qualitative variable of the school space.

3.2.3. Ergonomics as a quality variable

Figure 10 shows the elements that make up the classrooms of the studied schools.

Source: Authors' own study, 2019

Fig. 10. Presents the classrooms of the studied schools with their inventory

We have found that the proposals for change given by the students centers on the elements that make up their classrooms. It was found thanks to the non-parametric Chi-two test that there is a relationship between what students dream of having in class and what students want to change in the entire school. Therefore, according to the results obtained:

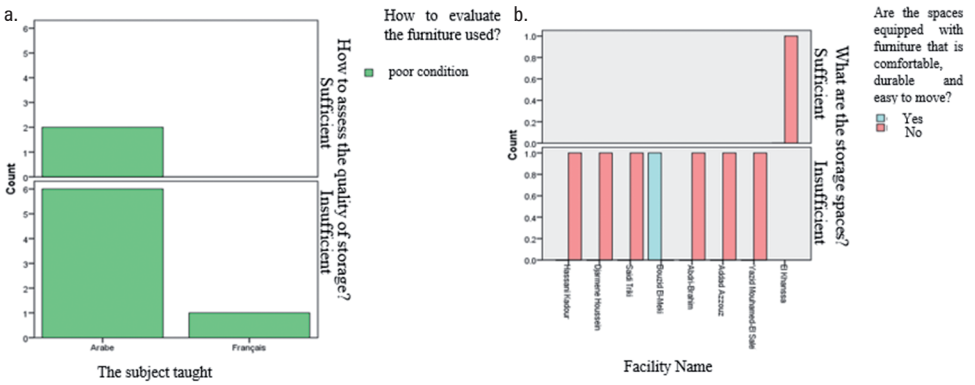
- The majority of students wish to change the things they see as bad and they miss. For example, the furniture and the painting of the walls are their great concern. They also dream of a colorful classroom, decorated very orderly, with new, comfortable desks and enough sufficient storage.
- It is necessary to build classrooms with several activity areas to satisfy the desires of the majority of students.
- According to 85.50%, so 171 out of 200 students said that the classroom of their dreams is modern (integrated with information and communication techniques), well equipped, comfortable with new desks and sufficient storage space.
- According to the students, the following parameters are variables of the quality of their school space.

3.2.3.1. Furniture and storage

Due to the large number of students in each class, most of the old double tables with attached seats in the classrooms of the schools studied are arranged in a row facing the blackboard. Preschool classrooms are usually set up with a few activity areas and individual small-scale furniture.

A teacher's desk stands by a wooden or concrete platform and a whiteboard. Sometimes there is no platform, and the suburban schools often lack other necessary equipment. Usually there is one wall cabinet per class.

The studied schools have uncomforTable old and rigid furniture, and they lack sufficient and practical storage. This was confirmed by the directors and teachers, as demonstrated by the following representations (Fig. 11).



Source: Authors' own study, SPSS, 2021

Fig. 11. a. Bar chart of the subject taught, including the quality of the furniture and the storage spaces; b. On the right figure includes the name of the school against the storage and furniture

a. This representation shows that the teachers believe that the furniture used is in poor condition. The majority mentions that the storage of the school is not sufficient. This confirms the results of our analysis and observation.
b. This answer was also confirmed by the principals. The majority of schools are not well equipped with comfortable and durable furniture, and their storage is not sufficient.

And according to the teachers' questionnaire, in the classroom, 88.90% of the students indicate various problems with thermal comfort and lighting as well as with uncomfortable furniture.

3.2.3.2. The color

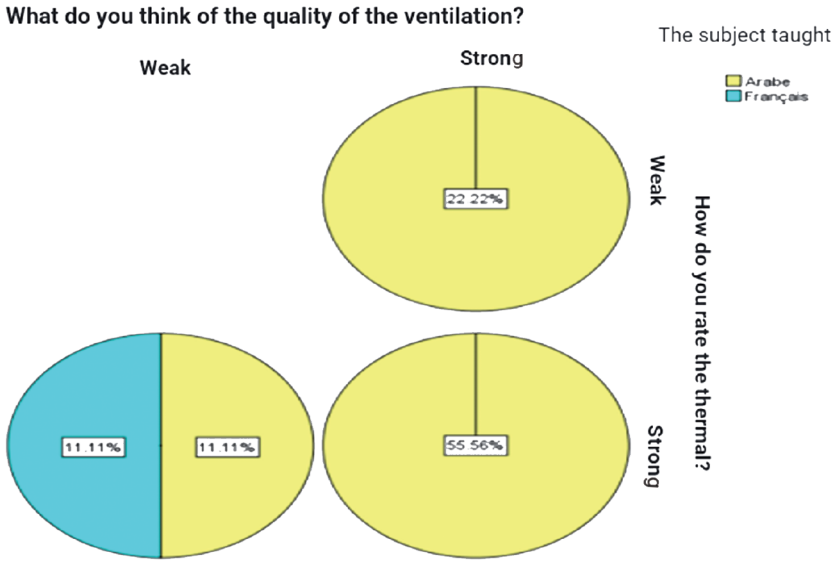
The painting of the classroom walls depends on the teacher's choice. Each year the teacher decides on the painting using their own resources.

3.2.3.3. Thermal comfort

In the majority of the colonial and postcolonial schools there is a central heating system. In newer schools it has been replaced by a gas system.

Most of rooms have cross openings. However, there are recently built schools where classrooms have no windows and are replaced by transoms.

A multivariate analysis of the variables below presents the following results (Fig. 12).



Source: Authors' own study, SPSS, 2021

Fig. 12. Representation relates the subject taught with thermal quality and aeration

Most teachers, that is 55.56%, think that the thermal control and the natural ventilation of the classrooms are good, and 44.44% have noticed a correlation between thermal control and ventilation – by increasing the ventilation by opening the transverse windows, the thermal control decreases (the gas system).

On the other hand, the classes the used the gas heater during the winter season, suffered from hyperthermia, which led to the users asking for a change of air flow in order to lower the temperature and thus, the feeling of discomfort.

The classroom environment largely depend on the teacher (their habits), which may differ from the expectations of the children. The teacher automatically assumes responsibility for managing the environment of their classrooms.

The child is a passive recipient: the environmental conditions are chosen by others. It is confirmed by the results of a Brazilian study, which has found that schoolchildren rarely make changes to their environment, because they think they need permission before interfering [Kim and de Dear 2018].

3.2.3.4. Lighting

In contrast to natural illumination Depending on the season and other variables, curtains are necessary for the wide south-facing windows in rooms that are aligned east-west; conversely, minimal artificial lighting, or virtually none at all (one fluorescent lamp that functions for each class),

After studying the variable qualities of artificial lighting and natural lighting we found that:

Most of the classes have low artificial lighting ($n = 7$), but they have low ($n = 4$) and high natural lighting ($n = 4$).

A weak or strong natural lighting depends on several factors: the season, the climate, the daytime and the orientation of the class (which was influential in the classes on the east-west axis).

3.2.3.5. Acoustic comfort

In order to find out the relationship between the classroom surface and acoustic comfort, we used the contingency test.

According to this contingency test, as long as the surface of the classroom is suitable, the acoustic quality is strong.

The classrooms built during the colonial era have an area of 59.96 m^2, while the classrooms constructed after the independence vary from 52 to 55 m^2.

The schools built after the independence suffered from poor acoustic quality, which is dependent on the surface of the classrooms and other elements, such as the construction materials, the width of the covered gallery which constitutes the circulation and transition space between the rooms and the schoolyard, especially as teachers report noise coming from the schoolyard, the outside and adjacent classrooms.

The schools from all periods suffered from external noise, noise coming from adjacent classrooms and echo inside the rooms, except for the colonial schools.

3.2.3.6. Hygiene

This bar chart of the state of the sanitary facilities and the cleaning of the school spaces shows the parents' opinion on hygiene (Fig. 13).

According to this chart, poor hygiene of the school spaces and the sanitary block is caused by the lack of staff responsible for cleaning.

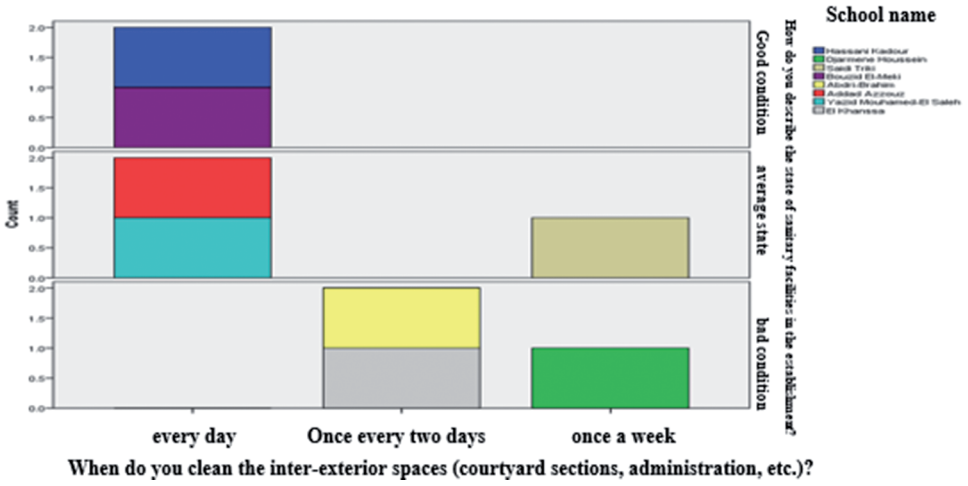
The schools that clean their spaces daily benefit from a good state of sanitary facilities, however the majority maintain the poor sanitary conditions.

The hygiene and cleanliness of schools are an essential element for the comfort of users, especially since students disprove the poor state of schools.

Clean toilets that are looked after by the students create a feeling of belonging, acceptance and responsibility, as the case of the Hassani Kaddour school where the students clean their own toilets.

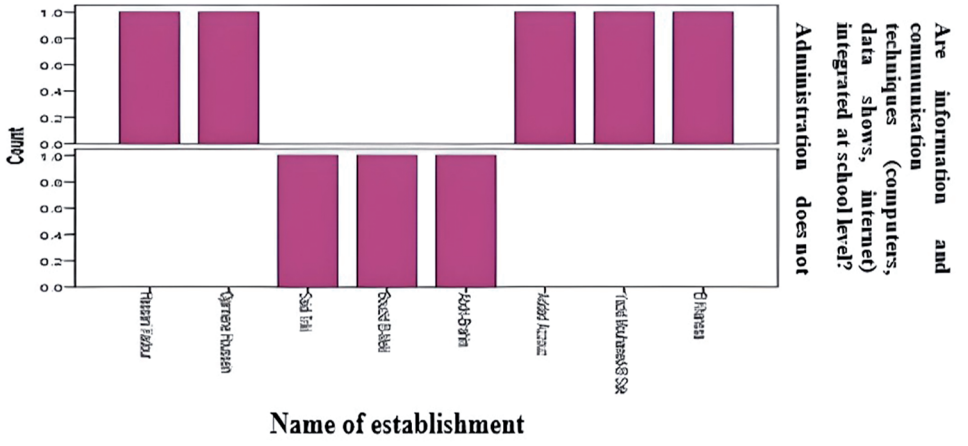
3.2.3.7. Facilities and equipment

Most schools have benefited from Wi-Fi access at the level of their administrations. Only 37.50% of schools have no access to Wi-Fi internet.



Source: Authors' own study, SPSS, 2021

Fig. 13. Bar chart of the state of the sanitary facilities and the cleaning of the school spaces



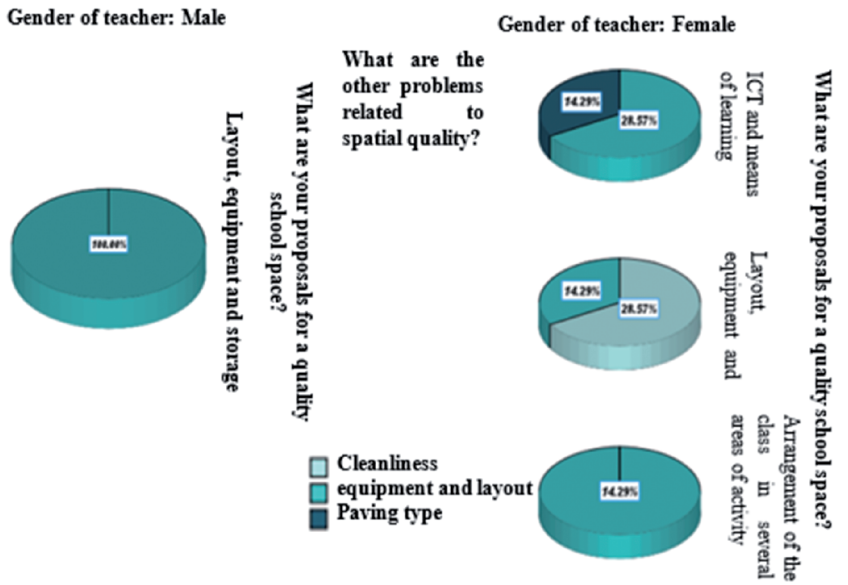
Source: Authors' own study, SPSS, 2021

Fig. 14. Bar chart of the presence of ICT

Neglecting the information and communication technologies is a major problem of primary schools in Algeria. It hinders learning opportunities.

Multivariate analysis of the variables is shown on Figure 15.

According to this diagram, a variety of facilities and modern equipment is an important quality factor for teachers.



Source: Authors' own study, SPSS, 2021

Fig. 15. Diagram that shows the problems related to spatial quality and the proposals of teachers according to gender

4. Conclusion

The studied public primary schools are still open and functional, although their buildings that date back a decade.

The unawareness of a large group of users, the negligence of the designers and the ignorance of the local authorities are causing the degradation of the primary schools in Oum El Bouaghi.

The directors and parents are also users, they use the space indirectly, they convey the worries of their children, especially the parents in their thirties who have lived with modern technologies and expect the development of school spaces.

Before building a school and designing a classroom, it is necessary to gather the opinions of the students of each level, taking into account the age, gender, their interests.

It is necessary to consider the concerns, desires and gender inclinations of the teachers for their personal and professional comfort.

The quality variables are multiple according to the users, and affect different factors or parameters:

- Security – speed bumps near schools and parking for cars are necessary; the various accesses need to be kept away from the meeting spots or the transition areas for the safety of students; surveillance cameras and devices for fire protection should be installed in all schools,

- Hygiene – to plan a budget specific to primary schools in order to constantly reform the state of hygiene of the buildings.

The distribution of students and conditions in the urban schools must be balance across the city from the center to the outskirts in order to achieve a good proportion of capacity between schools in high- and low-density areas; but the most important variables resulting from the evaluation are:

Places of meeting and socialization

- Create well-equipped areas for each age group to encourage outdoor learning, taking into account age and proximity to classrooms and administration,
- Gathering spaces in case of bad weather are necessary and must be suitable for the total number of students,
- Design a schoolyard for each age group, equipped with games and furniture according to the scale to satisfy the desires of the majority of students,
- Green spaces are essential for good physical and psychological health.

Proximity to school

- Proximity to school is the first criterion for parents and their children; a school close to home guarantees safety, the sense of security and belonging to the neighborhood,
- It is necessary to take into account the category of people with reduced mobility.

Ergonomics

- All schools must be equipped with comfortable furniture, appropriate to all users, durable, easy to move, and diverse so that it can perform several activities,
- It is necessary to ensure a well-being in terms of thermal, acoustic, lighting and color comfort,
- The integration of information technologies into primary schools.

This research offers Algerian researchers and officials an approach that allows them to examine the current and future state of school facilities according to the needs, expectations and aspirations of users.

References

Aldridge J.M., McChesney K. 2018. The relationships between school climate and adolescent mental health and wellbeing: A systematic literature review. International Journal of Educational Research, 88, 121–145.

Ayoubi N.E. 2017. Healthy, ecological schools and kindergartens of the future. Architecture for Kids, 72–79.

Bradley J.S. 2002. La conception acoustique de salles destinées à la communication orale. Institut de recherche en construction, Conseil national de recherches du Canada.

Daich S. 2011. Simulation and optimization of the light shelf system under specific climatic conditions. Case of the city of Biskra. Biskra, Algeria. http://thesis.univ-biskra.dz/id/eprint/1126

Elhalak N. 2017. Healthy ecological schools and kindergartens of the future. Architecture for Kids, 74.

Fremault Céline. 2014. http://celinefremault.be/2014/12/04/colloque-vers-un-meilleur-confort-acoustique-dans-lecole-de-demain/

Guillet J. 1991. La télédétection et ses applications pédagogiques. Bulletin de l'EPI (Enseignement Public et Informatique), Association EPI (61), 184.

Hastings N., Wood K.C. 2002. Reorganizing Primary Classroom Learning. Open University Press, Philadelphia.

Kim J., de Dear R. 2018. Thermal comfort expectations and adaptive behavioural characteristics of primary and secondary school students. Building and Environment, 127, 13–22.

Kishimoto M.T., Taguchi M. 2012. A Study on Space Configuration of Elementary Schools and Children Activity in Free Time. Proceedings: 8th International Space Syntax Symposium. Ed. M. Greene, J. Reyes, A. Castro. Santiago de Chile, PUC.

Kutsyuruba B., Klinger D.A., Hussain A. 2015. Relationships among school climate, school safety, and student achievement and well-being: A review of the literature. Review of Education, 3(2), 103–135.

Maxwell S., Reynolds K.J., Lee E., Subasic E., Bromhead D. 2017. The Impact of School Climate and School Identification on Academic Achievement: Multilevel Modeling with Student and Teacher Data, Frontiers in Psychology, 8, 2069.

Mazalto M. 2008. Architecture scolaire et réussite éducative. France.

Mazalto M., Paltrinieri L. 2013. Introduction: Espaces scolaires et projets éducatifs. France Education International, France.

Mazalto M., Paltrinieri L., Quirot B., Robine F., Tournier P., Zoughebi H. 2013. Les espaces scolaires en France. Revue internationale d'éducation de Sèvres, 64, 77–91.

Nakib F. 2015. Lieux scolaires flexibles et adaptables: Modèles conceptuels pour les écoles publiques primaires en Algérie.

Organisation administrative de la wilaya d'Oum El Bouaghi [n.d.].

Paltrinieri M.M. 2013. Introduction: Espaces scolaires et projets éducatifs. La revue internationale d'éducation de Sèvres.

Retzlaff-Fürst S.P. 2021.The School Garden: A Social and Emotional Place.

Tanner C. 2002. Essential Aspects of Designing a School. School Design and Planning Laboratory (SDPL), the University of Georgia, in architectural principles of school design and planning. http://www.coe.uga.edu/sdpl/research/principlesofdesign.html

Tapia-Fonllem C., Fraijo-Sing B., Corral-Verdugo V., Garza-Terán G., Moreno-Barahona M. 2020. School environments and elementary school children's well-being in northwestern Mexico. Frontiers in Psychology, 11, 514190.

UNESCO. 2000. Rapport mondial sur l'éducation 2000: Le droit à l'éducation; vers l'éducation pour tous, tout au long de la vie. http://www.unesco.org/education/wef/countryreports/algeria/contents.html

Van Dijk-Wesselius J.E., Van den Berg A.E., Maas J., Hovinga D. 2020. Green Schoolyards as Outdoor Learning Environments: Barriers and Solutions as Experienced by Primary School Teachers. Frontiers in Psychology, 10, 484511.