Re-defining the boundaries at schools: Perspectives from teachers' interpretations of sources of spatial change

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Abstract

Purpose – Recognizing the close relation of educational philosophies and methods with the design of the built environment which accommodates them, the purpose of this paper is to bring insights to the issue through presenting the interpretations of one of the major user groups, educating staff, to determine the primary sources of the need for spatial change at primary schools in the local context.

Design/methodology/approach – A field study has been conducted with the participation of 142 teachers from 15 public primary schools located in a dense urban environment, in Bayrampasa district, Istanbul. Responses to the open-ended questions were analyzed through the use of the fuzzy analytic hierarchy process method.

Findings – The results indicate that the need for providing qualified spaces for physical activity and play as well as devoted subject-specific learning areas, utilization of outdoor spaces, accommodation of high numbers of students emerge as primary sources of the need for spatial change.

Practical implications – The contemporary child-centered and experience-based educational approaches of the twenty-first century, developed around carrying the learning activities beyond the traditional classrooms brought the formation of boundaries at schools under question. Regarding these ideas, flexibility and related concepts have become the common design aspects to come under focus for school architecture. In Turkey, there is an increasing trend in the production of educational facilities due to population growth and rapid changes in the educational system, which seems to proceed in the foreseeable future. The innovative proposals of school design indeed have the potential to contribute to the development of future school projects.

Originality/value – The study presents a unique contribution to the related literature through presenting empirical data from users' perspective.

Keywords Education, Flexibility, Primary schools, Learning space design, School design

Paper type Research paper

Introduction

Here introduced, the evidence suggests that the design of physical learning spaces can contribute to the quality of learning practices and support the pedagogy of the educational institutions. The architectural space is recognized a powerful tool for the schools to respond to the unique needs of students and support the teaching methods, whereas the built environment is even referred as a third teacher or a three dimensional textbook in many sources (Nicholson, 2012; Taylor, 1993). Regarding this idea, the contemporary child-centered and experience-based educational approaches have been introducing new typologies for school design emphasizing children's interaction with their environment. Besides, their philosophies, which propose carrying the educational activities beyond the traditional classrooms to the whole school, and even to the environment besides the school, brought the formation of boundaries in educational spaces under question. In addition to their space-defining purposes, boundaries usually have mediating roles and can even be simultaneously means of separation and communication (Madanipour, 2003). And, as Norberg-Schulz (2013) puts it, similar spatial organizations may possess different characters according to the particular treatment of boundaries as space-defining elements. Due to this strong influence of the manner in which the boundaries are architecturally articulated, their contribution to the design of educational spaces, which can reflect ideas about the

pedagogical approach they accommodate, emerges as an interesting issue. The design features such as openness, transparency, ability to allow the fluidity of movement related to the formation of boundaries are often mentioned as important tiers of flexible design strategies for schools (Sigurðardóttir and Hjartarson, 2011).

Defining the sources of the need for spatial change has crucial importance to come up with practical proposals regarding flexibility. Besides, as Woods (2018) advocates, flexibility should not be approached as just a space-related issue, and claims that without an understanding of a timescale and actors who will be responsible for the design or operation of the flexible attributes, flexibility becomes a problematic term. Kvan (2013) also underlines the importance of the valuation of qualitative dimensions of the learning-teaching experiences and outcomes of design by the users. Therefore, hearing about the experiences of users, first hand, also becomes crucial to bring new insights to learning space design.

There is an extended body of international literature on school architecture discussing pedagogical approaches and trends with architectural responses. On the other hand, the degree of compatibility of the design between teaching practices and the pedagogical approach has been put as one of the central factors to support learning, which determines its success (Gislason, 2010; Lippman, 2010; Sanoff, 2001). It may be implied from this opinion that the ideal design proposals may change according to the underlying specific needs of educational systems or local contexts they are developed within.

Recognizing the close relation of educational methods with the physical design of the learning spaces which accommodates them, this paper aims to bring insights to the issue through presenting the interpretations of one of the major user groups, teachers, to determine the primary sources of the need for spatial change at primary schools in the local context. The formation of boundaries between-within the interior and exterior spaces of learning in school settings and their possible contributions to the expansion of varying learning activities to the whole school will be discussed.

In Turkey, there is an increasing trend in the production of educational facilities due to population growth and rapid changes in the educational system, which seems to proceed in the foreseeable future. Therefore, the innovative proposals of the school design which carries learning beyond the boundaries of the traditional classrooms have the potential to contribute to the development of the future school projects or refurbishment of the existing ones.

The field study has been conducted as a part of an ongoing doctoral thesis research process. The research focuses on primary (elementary) level schools whose physical design has exceptional importance. Primary education in Turkey covers the education of children in the 6–14 age group, and the literature suggests that the age period between 5.5 and 13 is recognized as highly critical for children's socio-sensory development, and the role of their environment becomes even more influential for this period (Proshansky and Fabian 1987). In the case of primary schools, the teachers have a directing role and a legitimized power to facilitate children's learning experiences. They also have the first-hand experiences of the recent pedagogical approaches. The educating staff has a high potential to articulate the essential issues regarding the spatial use patterns. The theoretical background, methodology, and interpretations of the findings are explained in the following sections.

Traditional vs child-centered and experience-based spaces of learning
One of the primary concerns of the contemporary educational approaches has been developed around taking the focus from the teacher to children and the response in terms of spatial design which was developed accordingly through alternative proposals. In conventional teacher-centered spaces of learning defined by four walls, the dominant approach to design has been the concept of rows of desks and chairs facing the teacher's desk and the blackboard in the front (Proshansky and Fabian, 1987). As Dudek (2000) points

out, the generic school plans have been the result of relating all the learning activities to fixed-feature classrooms, and the school facilities have been characterized by these standardized spaces since the advent of mass education. In most of the cases, the layouts include double-loaded corridors with traditionally designed classrooms on either side, which is referred as the industrial assembly line model (Taylor, 1993). Lippman (2010) criticizes these type of environments for not being designed to address the variety of ways in which people acquire knowledge, but instead designed to control unwanted student behavior where teachers play an authority role enforcing rules.

In fact, the opposite attempts to the situation date back to 1960–1970s with the introduction of open plan proposals for schools which were quite popular at the time and widely practiced earlier attempts applied as a result of inquiry-based child-centered movement (Burke and Grosvenor, 2008; Hutchison, 2004; Moore and Lackney, 1994). The movement was originated in the UK and migrated to the USA, based on the belief that students will do better if they are removed from the constraints of box-like classrooms (Nair, 2014). Multiple classes were conducted simultaneously in a single large space at the schools which were built according to this idea with an intention accepting that the open, flexible layout would foster student collaboration, team teaching and interdisciplinary learning (Harrison and Hutton, 2013). However, some design features had unwanted side effects and open plan approach was then criticized for causing high levels of noise and distraction, reduced task involvement preventing the realization of the main goals of promoting team teaching and collaborative learning (Hutchison, 2004; Lange, 2018; Moore and Lackney, 1994; Sanoff, 1993). Despite the failure of the open classrooms to accommodate hundreds of students in one space, the essence of the idea is still influential today (Lippman, 2010; Nair, 2014). The contemporary alternative suggestions for plan layouts take the problems under consideration with regards to current pedagogical approaches and emphasize the improvement of spatial variation for different forms of activities.

The obsolescence of the position of the traditional classrooms has been emphasized by many researchers and design professionals (Nair, 2011; Rigolon, 2010; Taylor, 1993). Rigolon (2010), for instance, concludes his detailed study about European design types for the twenty-first century schools by pointing out that the traditional classroom can no longer be the only space for learning, since it can host only a limited number of teaching activities. Although the separate classrooms are still accepted as the core spaces for instructional methods, alternative proposals are being made regarding the enrichment of functions they accommodate, and their shape and physical-visual relations with the outside environment. The recognition of today's primary school-level students' ability to involve in everything from word processing to concept mapping, coding, robot making, drawing and animation to scientific research has also contributed to the shaping of teaching and operating cultures of schools and created shifts in the expectations of the physical learning environment. The circulation zones handled differently to provide space for informal learning (Chiles, 2015; Hertzberger, 2008; Loeffelman, 2007; Nair *et al.*, 2005) and setting up the relations between interior and outdoor spaces at schools have been referred to have strong importance in both the research and architectural examples (Hertzberger, 2008; Nair *et al.*, 2005). Searching for innovative ways of extending the learning activities beyond the boundaries of the classroom has become a central concern for the recent research on school design and architectural practice.

Prevailing approach to school design in Turkey
The design and implementation of most of the public school building projects is overseen by the Ministry of National Education in Turkey. The design form with the repetitive, identical classrooms of similar sizes along corridor has prevailed for a long time and is seen by many as the dominant venue for conventional school practice in Turkish primary schools. Besides, the production of "prototype projects" has been a common approach to public school design

for years. This situation has been criticized by many architects and professionals due to these generic projects' incompatibility to the changing needs of specific contexts and conditions of the particular environments they are located in. Most of the prototype schools have double or single-loaded plan-types with minimum-width long corridors surrounded by standard classrooms often with poor natural lighting and ventilation possibilities. It is also important to note that there are significant differences between the state-governed and privately-owned schools in terms of providing a variety of activities and qualified learning spaces to accommodate them. Private schools are often able to establish a stronger sense of belonging between the school and lesser numbers of students in comparison to public schools (Güzer, 2014). Especially in the overpopulated, dense urban environments, prototypical school projects which have a higher number of floors with less footprints and easily adaptable plan layouts to any form of building sites are preferred due to the difficulties in finding suitable areas as well as financial and time-related concerns. The spatial needs of educational activities, children's interaction with their environment and users' opinions are often neglected during the design processes.

There has been a significant increase in the production of educational facilities, especially during the last two decades following the building regulations established after the earthquake in 1999. The changes in the duration of compulsory education and the structure of the educational programs as well as the curricula improvements also became triggering factors for the increase in building activities. Rapid population growth and urbanization rate had also become causes of the need for more space for learning environments. There is a need for 77,000 new classrooms to overcome the problems related to the crowdedness by 2019 according to the claims of The Ministry officials' (2017), indicating that the increasing building trend will proceed in the near future. Identification of the problems of the current approach to school building and presenting insights from both users and designers may contribute to the development of effective design strategies.

Methodology

Prior research and evidence suggest that there is a close relation of educational practices with the design of the built environment which accommodates them. It is believed that learning about the first-hand experiences may bring valuable insights to the discussions around the formation of physical boundaries and the boundaries of learning concerning spatial design. Accordingly, this paper aims to present the interpretations of one of the primary user groups, the educating staff about the sources of the need for spatial change at public prototypically designed primary schools located in a local context, in Istanbul, Turkey. The research was conducted with the participation of primary school teachers at public school settings built according to the guidelines of the Ministry of National Education. Data were collected through surveys as well as observations and photo-documentation and the review of drawings and documents about the schools.

For the school visits, the aim was to reach a diverse sample of public school buildings in type and scale located in a dense urban environment and the same area. The most problematic cases are the prototypical schools built in districts with high population rates to serve for high numbers of students within narrow spaces. Another concern of the sampling was including more recent examples of type school projects approved by the authorities, preferably applied several times in other areas in the city. The necessary permissions from the Ministry of National Education were obtained to conduct the study in Bayrampaşa, a relatively old-settlement located in the urban centre which accommodates a compatible variety of primary school building types following the concerns of the sampling strategy. The current number of primary school students in the neighborhood is approximately 18,000 (Bayrampasa İlçe Milli Eğitim Müdürlüğü, 2019). Out of a total of 16 primary schools, 15 are public, purpose-built institutions, and the numbers emphasize the high-density of the

district regarding the proportion of the student population rate over the number of available schools. All of the schools have been built or rebuilt according to earthquake regulations after the year 2000, which became a milestone for the need and increase of new prototypical school project proposals. The buildings have physically distinct site areas with clear boundary conditions and dedicated outdoor and indoor facilities. The sample included eight different typical projects approved by the Ministry, and some of them have been frequently applied in the other regions of the city and the country. Private architecture companies produced the three specially designed type projects within the scope of the Istanbul Seismic Risk Mitigation and Emergency Preparedness project. Although there are some modest differences, the plan configurations are almost similar with two rows of square-shaped classrooms and administrative spaces along close corridors. The sizes of all the regular classrooms are similar with approximately 49 m^2 areas (7 m × 7 m). The medium-height buildings consist of two to a maximum of four floors. Indeed, the Ministry of National Education (2016) offers a similar design approach in the latest catalog of the type projects. Therefore, it is assumed that the schools in the selected area are quite representative of the current approach to school building projects located in high-density urban areas in Turkey. All of the 15 public schools located in the district have been visited, and a total number of 142 teachers were agreed to participate in the study.

The question asked to the teachers was "What do you think are the most important issues that are the source of the need for spatial changes in the short or long term at school?" The question aimed to explore the teachers' opinions about the common sources of the need for spatial change at schools and to comprehend the sources of the need for change factors and classify them according to their significance.

Analysis of the results
The research followed an exploratory approach to determine the main titles of the sources of spatial change according to the educational staff's explanations. Therefore, in order to not limit the respondents' articulation of their comments with given pre-determined categories, they were expected to answer an open-ended question with their own words. This type of data is often analyzed through content and frequency analyses in which the data are summarized and interpreted according to the determined theme sets. In this case, a more accurate method has been sought to define the factors which contribute to these issues in a detailed hierarchical order concerning their importance through converting the qualitative data to quantitative. As a result, an alternative criteria decision-making method, which based on fuzzy-set theory, fuzzy analytic hierarchy process (F-AHP) method, was decided to be appropriate for the analysis of the responses in the question forms to obtain a hierarchical order between the themes and categories under each theme. An analytic hierarchy process (AHP) may be simply defined as a multi-criteria decision-making method that helps to make decisions facing a complex problem with multiple conflicting and subjective criteria. It is usually used to derive ratio scales from paired comparisons in multilevel hierarchic structures, and the method has been successfully applied within the research in social sciences to quantify and derive measurements for intangible variables (Saatyand Vargas, 2012). In this case, the advantage of following this method was the increase in the reliability of the analysis through determining the individual impact of each factor for all the 142 valid responses separately rather than coding the answers with only "1-mentioned" or "0-not mentioned" numbers to calculate frequencies.

As a first step, the responses of the teachers were assigned into 34 categories under seven themes in a parallel approach to the similar categorizations given in the relevant literature on school design considerations. Each respondent's answers were then coded under the defined categories, and a set of data showing the frequencies for each category was obtained. These types of data sets are defined as crisp sets, in which an element is either

a member of a set or not. The results obtained from the crisp set are expressed by the packed bubble graph, as given in Figure 1, in which the dominant factors are shown in larger circular areas in proportion to their frequencies.

As the third step, the fuzzy set from the responses was produced. A fuzzy set (Zadeh, 1965) is an extension of the classical crisp sets, and it differs from the crisp sets in that it includes elements with degrees of membership. In crisp sets, an element has only two options: it either belongs or does not belong to a particular set. For example, an answer to a
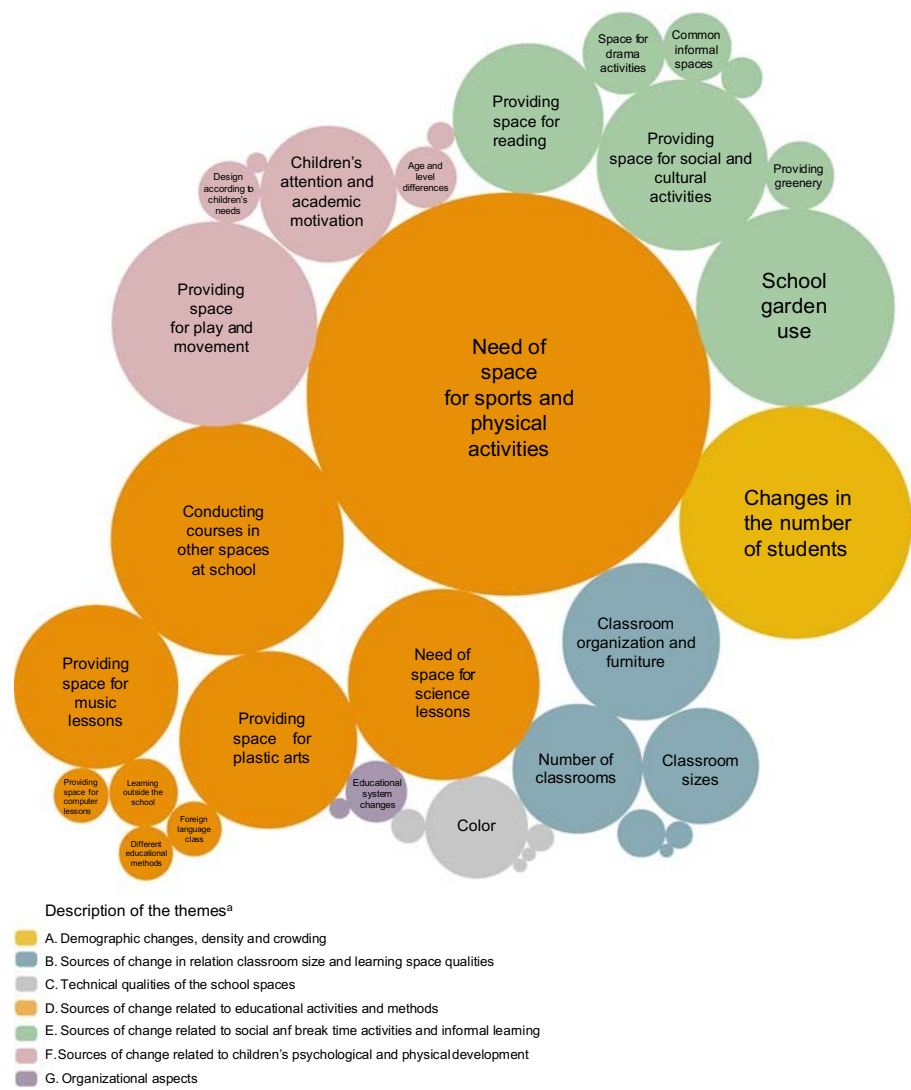

Description of the themes[a]

- A. Demographic changes, density and crowding
- B. Sources of change in relation classroom size and learning space qualities
- C. Technical qualities of the school spaces
- D. Sources of change related to educational activities and methods
- E. Sources of change related to social anf break time activities and informal learning
- F. Sources of change related to children's psychological and physical development
- G. Organizational aspects

Figure 1.
Packed bubble diagram developed according to the frequencies of the responses

Notes: [a]The themes have been identified according to the frequencies of the responses. The packed bubble path expresses the response frequencies of each category

Source: Author (2019)

question having only two options such as "yes" or "no" could be qualified as a member of a crisp set because it is either a member of "yes" set or a member of "no" set. In contrast, in fuzzy sets, an element belongs to a set for a certain degree which is specified by the fuzzy membership function. This function specifies the membership degrees from the real unit interval so that an element may belong to a set at a degree from the [0, 1] interval. For example, a person at age 40 could be a member of a young people set with a fuzzy degree of 0.7 and also could be a member of an old people set with a fuzzy degree of 0.3. If crisp sets are used instead of this person, either should be a member of young people or a member of old people which may lead to some information loss about this person's age situation. To derive the fuzzy set in the case of teachers' responses, the linguistic terms were scaled according to the level of importance determined in line with their frequencies. The scales used were defined as just equal, equally important, weakly more important and strongly more important. An AHP realizes pair-wise comparisons between categories which are affecting a decision. However, usually, categories in an AHP have some interval judgments instead of fixed value judgments due to the fuzzy nature of the data input (Demirel *et al.*, 2008). Chang (1996) used triangular fuzzy numbers for pair-wise comparisons of AHP to deal with this fuzziness. Teachers' responses with written expressions became suitable for the F-AHP method because they have fuzziness at some extent. For this reason, Chang's (1996) F-AHP methodology was applied to the data, and the hierarchical order between the themes and categories was obtained as given in Tables I–VII. Table I shows the hierarchical order between the main general themes determined according to the answers. Tables II–VI show the subtitles under each main theme again in a hierarchical order. A hierarchical order was not given for the theme regarding the demographic changes, since the title only includes a category about the changing numbers of students. Despite some minor

Themes	Fuzzy AHP weight
1. Need for spatial change to accommodate differing educational activities and methods	0.1723
2. Need for spatial change to accommodate social activities, common spaces for informal learning and spending time during recess periods	0.1629
3. Spatial needs of children's psychological and physical development and academic motivation	0.1549
4. Sources of change in relation to spatial dimensions and qualities	0.1533
5. Need for spatial change emerged due to demographic changes/increasing student numbers	0.1342
6. Need for spatial change related to indoor environmental quality and technical qualities	0.1164
7. Needs emerged due to operational and managerial concerns (changes in the educational system, safety concerns)	0.1060

Table I. Hierarchical order between the themes (according to the F-AHP process results)

Categories	Fuzzy AHP weight
Providing space for physical activities and sports	0.1753
Need for subject-specific, devoted spaces for lessons	0.1598
Need of science labs	0.1533
Providing space for music lessons	0.1501
Providing space for plastic arts lessons	
Need for being at the spaces outside the school during lessons according to the course subjects	0.1242
Need of space for foreign language lessons	0.119
Need of a computer laboratory	
Improving the design of spaces to allow the use of different educational methods	0.1183

Table II. Hierarchical order between the categories: sources of change in relation to educational activities and methods

differences, the analysis through the use of F-AHP and the packed bubble diagram developed according to the frequencies of the responses indicated a parallel tendency.

The analysis of the results showed that the teachers emphasize the sources of the need for spatial change to accommodate differing educational activities conducted during the lessons on a short-term or daily basis as a primary factor. Under this title, the need for subject-specific, devoted spaces or zones for lessons and providing space for physical activities and sports emerge as essential concerns. Concerning the first theme, the second major concern emerges as the sources of the need for spatial change to provide qualified

Table III.
Hierarchical order between the categories: need for spatial change to accommodate social activities, common spaces for informal learning and spending time during recess periods

Categories	Fuzzy AHP weight
Needs related to outdoor space use	0.1633
Providing space for social-cultural activities and additional courses	0.1579
Providing space for reading and individual studies	0.1548
Improving the social areas, common informal spaces for break-out times	0.1369
Need for a multi-purpose space with a stage for drama activities	0.1362
Providing greenery in outdoor environment	0.1309
Providing space for the exhibition of student works	0.12

Table IV.
Hierarchical order between the categories: spatial needs of children's psychological and physical development and academic motivation

Categories	Fuzzy AHP weight
Providing space for play and movement needs	0.1993
Increasing children's' attention and motivation during the lessons	0.1883
Quality of the overall design according to children's needs	0.1638
Improving the school design according to age- and classroom-level differences between students	0.1637
Providing space for observation and experimentation	0.148
Providing space for children's self-expression needs	0.137

Table V.
Hierarchical order between the categories: sources of change in relation to spatial dimensions and qualities

Categories	Fuzzy AHP weight
Allowing changes in classroom layout and organization	0.1936
Inadequate number of standard classrooms	0.1874
Inadequate size of the standard classrooms and learning spaces	0.1852
Providing variety of spaces for educational activities	0.1741
Providing general accessibility	0.1406
Providing comfort	0.1191

Table VI.
Hierarchical order between the categories: need for spatial change related to indoor environmental quality and technical qualities

Categories	Fuzzy AHP weight
Improving the selection of color choices in school spaces	0.2542
Improving heating, cooling, ventilation	0.2107
Improving lighting qualities	0.1983
Improving the accessibility of technological features and equipment	0.1714
Improving acoustic qualities and noise control	0.1654
Improving the selection of color choices in school spaces	0.2542

spaces to stage social activities and informal learning through interaction and individual study as well as spending efficient time during the recess periods. The outdoor space use, qualified outdoor spaces with greenery and accessible, qualified meeting zones for children's performances and other gatherings are mentioned as important needs by the teachers. The analyses show that teachers appreciate the role of space on children's academic motivation as well as physical and psychological development. The need for space to encourage movement and play is again emphasized under this theme. The teachers are highly aware of the experience and observation-based learning, and they also underline the factor of age and level differences which cause different spatial needs to emerge. Inadequateness of the size of standard classrooms and other gathering zones at schools to allow changes in layout and organization in line with the activities became the fourth theme claimed by the teachers. However, it should be noted that this theme is strongly related to the difficulties related to the accommodation of increasing numbers of students mentioned as the fifth theme. Teachers mentioned the long-term sources of spatial change such as changes in the curricula, safety concerns and indoor environmental quality and technical qualities as other themes of the sources of the need for spatial change at schools.

Interpretation of the findings: rethinking of the boundaries in school design
The educational staff mentioned various interrelating issues about the sources of the need for spatial change at schools. The detailed documentation of the weights of each theme is presented in the previous section. The responses of the teachers show that the varying spatial needs of different educational activities particularly during the course periods and different teaching methods constitute primary sources of short-term change. The highlights were especially around getting the students out of standard, traditionally designed classrooms for some courses including plastic arts, music and, most importantly, creating area for physical exercise and sports activities. Some of the teachers had mentioned the need for creating devoted zones according to the subjects of courses such as mathematics, science or foreign languages. However, besides their awareness about the environment's effects on children's motivation during the lessons, it may be implied from the answers that the interviewee's conception of an educational space is still more close to maintaining separate learning unit which may be modified through the use of furniture and equipment in the case of some specific branch courses. During the observation at schools, it was seen that the common approach in most of them had been the conversion of all available spaces including pre-existing art classes, science labs or other non-standard rooms to traditional classroom units to accommodate the expanding population of enrolled students. The demographic shift in terms of the increasing number of students and the subsequent problems related to this situation such as the reduction of the area per student in each classroom and the whole school has been an ongoing problem for all of the schools. The situation is also recognized and mentioned as a primary source of the need for spatial change by the teachers during the interviews. It may be implied that the standard classroom spaces do not fully support the educational activities with their current form and there is a need for subject-related zones at schools. Since minimizing the building footprint seems to

Table VII.
Hierarchical order
between the
categories: needs
emerged due to
operational and
managemental
concerns

Categories	Fuzzy AHP weight
Need of changes emerged due to the conversion of half-day education to full-day education	0.6249
Need of changes in response to safety needs	0.3751

be an inescapable problem for the schools located on narrow areas in the city center, keeping the same areas in size but increasing the spatial diversity in size, shape and equipment in core spaces of learning rather than just including repetitive traditional classrooms may present an efficient, quietly applicable solution for the design of new schools. This strategy is also found as beneficial by many sources (CABE-Ultalab, 2004; Ehrenkrantz, 1999; Genevro, 1990). Alternatively, maybe, the concept of the classroom should be re-handled and studied following the contemporary needs of education.

The traditional way of spatial configuration at schools with classroom units located around long corridors, which has also been also applied in many Turkish schools similar to the ones located in Bayrampaşa, limits the amount of accessible, efficiently used spaces by the students both during the lessons and recess periods. Nair and Gehling (2010), for instance, argue that spatial components of good public places may produce educational spaces operate like the real urban realm which offers diverse activities, spontaneous interactions and participation. The authors claim that the spaces between formal learning areas should be designed specifically for informal learning, learning from peers, learning by application and learning a range of highly sought-after "soft" skills that are increasingly demanded by the today's professional world. Hertzberger (2008) advocates that that the corridors and hallways at schools should be inhabitable as actual extensions of classrooms rather than just serving as bare circulation spaces for accessing and connecting rooms on either side of them. Bringing inspiration from these ideas, the circulation zones inside the schools may be treated to contribute to learning through constituting a stage for the exhibition of student work or providing small informal learning, socializing and playing niches with the inclusion of the necessary equipment. As also emphasized by the teachers, all the learning spaces should be designed to improve children's belonging to the school through the use of appropriate color and patterns as well as improved indoor environmental qualities. In line with this idea, the gathering zones may be carried away from dark basement floors and re-considered to be designed as accessible, living, central multi-purpose spaces at schools. As a general idea, the main concern regarding the formation of boundaries may be the school building's becoming a whole learning environment through the utilization of all the spaces for the learning practices through providing in-between areas or penetrable boundaries which easily mesh with adjacent spaces.

Another distinctly underlined issue by the teachers became the need for space in both outdoor and indoor spaces to allow play, physical activity and movement for children. Many studies recognize the significant roles of physical activity and outdoor experiences, and the teachers' responses unsurprisingly indicate a parallel need. Physical exercise and playing sessions indeed cover 15%, which is a significant amount of the total mandatory course hours according to the primary school curriculum (Ministry of National Education, 2018). Physical human movement is mentioned as an essential factor for learning processes and academic achievement where a positive relationship was found between physical activity and brain activity (Woodman, 2016). Besides, considerable evidence from prior studies has shown that the outdoor environment is a rich source of stimulation for the cognitive development of children and that the outdoor environment can be thought of as a classroom (Moore, 1987) and outdoor spaces has a serious potential to enhance children's learning experiences (Evans, 2015; OECD, 2006). However, during the study, one of the primary issues both observed and mentioned by the teachers in the current school buildings is that neither the indoor spaces beside the classrooms nor the outdoor areas provide suitable environments for children's movement and playing needs. In all of the visited schools, the outdoor space was totally covered with asphalt ground with very little or no greenery, no playgrounds or other facilities for students to learn or spend delightful time during the courses and break times (see Plate 1).

Source: Author (2019)

The neglected outdoor spaces, indeed, also have a high potential to contribute to other educational practices as well as being a stage for physical exercise and play. As Care (2015) also underlines, the blurring of boundaries may also reinforce broadening the learning to the landscape beyond. The variety of learning spaces may be enriched through including these zones as to become natural extensions indoor learning spaces. The formation of penetrable boundaries may be supported through placing open or semi-closed courtyards to the plans, giving direct access to the outdoor landscape from separate learning units or providing transparency with large openings.

Findings of the research, in fact, have a high potential to present a basis for the reconsideration of boundaries to improve the spatial qualities at schools to answer the changing needs. Rethinking of physical boundaries may bring alternative proposals to the traditional school design composed of corridors and closed boxes. Briefly, school architecture needs to be treated as a supporting background to the development of children. Identification of the problems related to the relationship between the current educational mechanism and its surrounding built environment by bringing insights from both educational practitioners and design professionals may offer valuable contributions to the dominant approach to school design in Turkey.

Conclusion and plans for further studies
The above research has been conducted as a part of an ongoing thesis study which searches for developing flexible design strategies for public primary schools in Turkey. The overall study aims to introduce insights from the opinions of the teaching staff about the relationship between the teaching/learning activities and physical learning spaces as well as the observations conducted in schools buildings and analyses of the documents to the development of flexible design strategies.

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