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The Physical Model of Schools Based on the Fundamental Transformation Document (Adaptation of Nair's Physical Models)*

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Problem statement: Many countries, including Iran, have developed fundamental educational reform documents promoting new life skills. While changing educational values necessitates changing educational environments, there has been no transformation in the environments in Iran.

Research objective: This study aims to realize the spatial requirements set by the transformation document. By developing a physical model, the research seeks to demonstrate how educational environments can support the implementation of the document.

Research method: This applied research utilizes an analytical-argumentative approach. Information was gathered through library and document research. Initially, content models were extracted from national documents. Prakash Nair's physical models were then used as a basis and compared with these content models. The results were further validated and adjusted through comparison with an elite questionnaire to measure and correct its deviation from the elite standard. Ultimately, the selected models were adapted and prioritized based on the educational stages.

Conclusion: The research findings can be applied in two main dimensions: determining and adapting the physical model and classifying the models based on the educational stages. The wall-less model can support the content models of the transformation document, provided it includes movable walls to convert flexibility into adaptability. The consulting model and the learning street model are also compatible. In general, all workshop models have the potential for integration. Realizing the content models of the transformation document, particularly teacher-centered and active learning methods, and social educational aspects requires flexible, varied environments. These should include integrated spaces and a diverse array of facilities and environments. For the first and second stages of primary school, the consulting and the wall-less model are recommended, respectively. For the first and second stages of high school and the second stage of vocational school, the wall-less model and the learning street model are recommended, respectively.

Keywords: *Innovative, Educational, Environments, Future, Schools, Flexibility.*

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Introduction

A changing world poses numerous challenges to the educational systems. In response to these challenges, most countries have embarked on the provision of new and innovative schools. Some of them are the "BER" education revolution, Australia's "ANAO 2010" infrastructure program, future schools in England and Wales (DfES 2003), and future learning spaces in Canada and New Zealand (OECD 2017). Schools constructed under these programs are intended to develop new learning spaces that enhance the acquisition of learning skills and dispositions for 21st-century learning, including communication, collaboration, critical thinking, and creativity. These skills can be adapted to future requirements (Deppeler & Aikenz, 2020). Various factors have influenced the revision and modification of educational documents, but the most significant driver is the need to adapt to changing societal conditions. New educational systems are designed to prepare students for an ever-changing future. As a result, these systems emphasize the creation of knowledge rather than mere memorization of content or solutions, leading to an expansion of student-centered learning. Prosperity belongs to those who are agile and capable of navigating the unpredictable forces of the market, data, and events (Nair et al., 2009). Nair attributes the transformation of industrial and modern schools to Taylor's industrial model. Taylor's system divided specialized work into multi-part processes with uniform tasks yielding consistent results. Schools mirrored this system, creating environments where individuals perform predetermined tasks. David Warlick believes that, until 10 years later, we will continue to produce graduates equipped for the 1950s (Nair, 2014). Numerous strategies have been proposed to reform the educational system. These strategies have shared elements, such as focusing on altering the role of the teacher, the environment, and the educational approach. There is extensive research literature that addresses school change, including policy-focused studies by Priestley et al., (2011) and Hargreaves (2002), as well as school initiatives by Ouston et al., (1991) and Thomson et al., (2009). In Iran, the past half-century has seen five significant educational reforms: the educational revolution of 1961, the primary fundamental changes of the revolution and the 1980s, the reforms at the beginning and end of the 1990s, and the comprehensive transformations of the 2000s and 2010s (Hosseini, 2019, citing in Ebrahimi, 2019). Ultimately, the lack of alignment between society's rapid changes and the education system led to the creation of the Fundamental transformation document of education (2011). Despite these reforms, the structure of schools has remained unchanged. Since the onset of modernism in Iran, schools have adhered to a specific format, with classrooms arranged along corridors. School architecture developments are shaped by national educational documents and visions. The Fundamental Transformation Document has raised numerous questions and ambiguities regarding the architecture and educational environments of schools.

Problem Statement

The content models of national educational documents significantly impact school environments, raising numerous questions: Are nurturing and education distinct from each other? Which school environments are nurturing, and which are scientific? Does the integration of nurturing and education necessitate an integrated environment? What kind of environment is required for interdisciplinary studies? Is the school a united community, or does it represent a fragmented and divisive environment? How can schools simulate a virtuous life? How can the educational environment support various learning methods? How can the social and nurturing aspects of the school become key indicators? These questions and ambiguities arise from the content models of the transformation document, which form the backbone of research on the physical model of schools. These content models determine the main orientation of the physical model. Given that the transformation document has reshaped and advanced educational outlook and values, the lack of foundational research on the relationship between content models and physical models complicates the problem to a

great extent. Thus, the overarching question is: What is the physical model of the school conforming to the transformation document? No domestic research has fully identified content and physical models. Furthermore, no attempt has been made to prioritize the models based on educational stages. This research aims to evaluate, adapt, and prioritize innovative physical models according to the educational stage and the content models of the transformation document.

Research Background

The research evidence that physical spaces make a difference in learning is complex and not yet fully understood (Woolner et al., 2018). Nevertheless, research suggests that innovative physical environments can influence teaching practices and students' learning (Bradbeer et al., 2019). Previous research has suggested the potential of open and flexible learning environments by examining how different spatial arrangements affect teaching practices and students' learning experiences (Imms & Byers, 2017). The design philosophy of open learning spaces is characterized by flexibility, aesthetics, and comfort to enable different arrangements that support a wider variety of teaching and learning experiences (Jackson & Banade, 2017). In open (flexible) educational environments, there are no set programs that have to be followed. However, constant communication and Interaction between teachers and students and students themselves allows users to search for or develop educational contexts and environments that are suitable for them (Kokko & Hirsto, 2021). Reinius et al., (2021) showed that flexible design can lead to better interaction between teachers and students as well as improve knowledge sharing. Although the learning environment alone does not ensure change, it allows for new forms of interaction and collaborative learning activities. These activities include joint learning and teaching, working in pairs or small groups, collaborative learning, and increased mobility. Research in Iran has also addressed these issues. Saghafi (2016) found that conventional school models offer some advantages in terms of smaller environments and lower costs, but they have significant limitations in nurturing multiple intelligences and supporting diverse teaching methods. Hessari et al., (2020) revealed that the low flexibility of Iranian schools hinders the implementation of active learning approaches and proposed solutions such as flexible learning spaces, flexible furniture, adaptability through movable walls, and flexible public spaces to enhance the flexibility of Iranian schools. Saeedi Kia (2018) compared the architecture of contemporary Iranian schools to that of prisons. Saffarheidari & Hossainnjad (2014) pointed out that the themes in the transformation document are unrealistic and cannot be implemented in the current school infrastructure and classroom designs. The analysis of previous internal research reveals that such studies were performed without taking into account the existing innovative physical models and the content models of the transformation document. Since each content model can affect the environment, it is necessary to extract all content models from the transformation document as exhaustively as possible and evaluate their compliance with physical models. These models must be localized (correction) to reach the maximum level of efficiency. Therefore, the research question and hypothesis can be formulated as follows:

Research Question: What principles or physical models can be recommended for the national educational outlook or what model is compatible with the national educational outlook?

The physical model is built from constituent parts (which are considered the building blocks of the educational environment and the simplest example is the classroom), and the optimal constituents are those that are compatible with the largest number of learning methods. Thus, flexible workshops (with movable walls) are most suitable for the greatest number of learning methods. However, this is the case when the learning methods highlighted in the transformation document are the same as Nair's methods, as the effectiveness of Nair's learning method in flexible workshops has already been assessed. In case of compliance, this constituent component is chosen as the building component of the physical model. In discussing content models, we can consider a dual-axis framework: one axis is closed and conventional,

and the other is open and innovative. If the content models that dominate the educational process are open and innovative, the pinnacle of innovative models, the wall-less model, will probably be chosen as the most preferable one, despite the possible shortcomings in the results-based evaluations and teacher orientation. After this, the consulting model, which is slightly more restricted compared to the wall-less model, and the learning street model are the most suitable second and third options. The priority of each model may also depend on the education stage. Therefore, for the first and second stages of primary school, the appropriate models are the consulting and the wall-less models, respectively. For the first and second stages of high school and the second stage of vocational school, the appropriate models are the wall-less, learning street, and wall-less models, respectively.

Research Method

This research is practical in purpose and employs an analytical-argumentative approach. Data was collected through available resources and documents. Initially, content models of the school were extracted from the transformation document and other national documents. To enhance accuracy in examining certain content models within educational methods, a questionnaire was administered to 30 teachers. Subsequently, the physical model was extracted from famous Nair architecture models. Their compatibility with the content models was assessed through a questionnaire given to 10 researchers specializing in educational environments. Finally, the models were adapted and prioritized based on the school stages. This prioritization involved applying the usage coefficient of each learning approach according to the school stage to the inherent potential score of each physical model relative to the learning approach. The coefficients for the usage of learning methods and the inherent potential of physical models were obtained through questionnaires distributed to a statistical population of 30 teachers and 10 educational environment researchers.

Theoretical Foundations

- **Fundamental transformation document**

according to the Comprehensive website of the fundamental transformation document of education (2024), the Fundamental Transformation Document is the strategic blueprint for the education system, aligned with the twenty-year vision of the Islamic Republic of Iran. Approved in 2011 after 15 meetings by the Supreme Council of the Cultural Revolution, the document encompasses six fundamental subsystems: leadership and management, provision and allocation of financial resources, curriculum, provision of space, equipment, and technology, teacher training and human resources provision, and research and evaluation.

Complementing these six subsystems are additional national documents, such as the national curriculum, which support and enhance them. The transformation document and its associated subsets include a variety of conditions, rules, behavioral plans, and practical solutions, collectively referred to as content models. These content models outline the vision and perspective of the transformation document, each influencing the physical model. The core objective of the transformation document is to prepare and empower students for a successful and virtuous life. Each content model derived from the document has a significant impact on the corresponding physical model, which will be examined and explained below.

- **Transformability**

Education has gone through many changes in the past that did not address society's evolving needs, hence the call for a fundamental transformation in education. The constant ongoing changes in educational documents are indicative of the constant changes in conditions and the inherent uncertainty of society and public conditions. Active learning methods have been created as a response to this problem, which involves dynamic learning and trying in-the-moment answers instead of mere memorizing. This issue appears to be the first and most crucial driver behind the fundamental transformation of the educational system (Fundamental transformation document of education, 2011).

- **Standard islamic system**

a boundary exists that prevents the advancement of transformability of the values, ensuring that the red lines of the standard Islamic system are observed in all fields. These fields can be seen in the exemplary roles of teachers, student guidance, and gender segregation. Every country has its values, and as for Iran, these values correspond to the standard Islamic system, which regulates education within certain rules and guidelines. On the other hand, the Western world may follow humanism as its standard system (ibid.).

- **Diversification and flexibility**

The curriculum should possess the necessary flexibility to accommodate individual and gender differences, addressing the diverse needs and talents of students (National curriculum of the Islamic Republic of Iran, 2012). This approach requires the adaptation of school environments and furniture to support various learning styles and requirements. Such flexibility and diversity are hallmarks of innovative educational environments worldwide. However, in diversification and catering to different needs, it is important to maintain cohesion and unity.

- **Nurturing approach**

the primary purpose of schools is to produce worthy individuals who live virtuous lives (Program of the Islamic Republic of Iran's public official education curriculum subsystem, 2020). Nurturing is done through application and exposure to real-life situations. Therefore, school architecture should express a nurturing educationalidentity(Subsystemprogramforprovidingspace, equipment and technology for public formal education system, 2016). This approach is in line with a global trend in education that aims to prepare future citizens through learning by experience, experiential learning, and situational practice rather than relying purely on theoretical aspects.

- **Cultural and nurturing aspect**

schools are cultural and educational institutions (Subsystem for governance and management of the public education system, 2017). Educational content is based on cultural and educational values (National curriculum of the Islamic Republic of Iran, 2012). Intercultural communication and appreciation are seen in global development. The influence of cultural and educational factors is seen through the enhancement of programs and environments with cultural and educational elements.

- **Social aspect**

education should be about the acquisition of knowledge and social ethics, the development of communication skills, and the promotion of social cohesion and national unity lives (Program of the Islamic Republic of Iran's public official education curriculum subsystem, 2020). Also, it should promote social skills and group activities (National curriculum of the Islamic Republic of Iran, 2012). This is in line with a global approach where new schools are built to encourage teamwork, interactivity, participation, and communication skills. The social aspect is linked with nurturing, ergonomics, diversification, flexibility, and student-centered approaches.

- **Teacher-centered approach**

as stated in the 'transformation document', teachers are responsible for the authoritative approach to the student's learning process and the enhancement of the educational environment (ibid.). Teachers are guides and leaders in the teaching-learning process. This is in line with the philosophy of Islamic education and the Islamic standard system, which states that humans require guidance and leadership. At the same time, the teachers who facilitate student-centered learning also manage and control the learning environment, and thus, there is a balance between the two concepts without conflict.

- **Student-centered approach**

in a student-centered approach, the learner is the focus of all educational activities. This method emphasizes exploration, practical learning, and active and creative methods. The method also encourages student participation in knowledge creation (ibid.). Aiming to personalize learning, this global approach values the individual attitudes of all students while promoting active collective learning and social participation. It is interconnected closely with the principles of diversification, ergonomics, social education, participation, and teamwork.

• **Vocational skills training**

emphasizing the spirit of entrepreneurship and the attainment of professional, skillful, and artistic competencies is the foundation of productive work (Fundamental transformation document of education, 2011; Program of the Islamic Republic of Iran's public official education curriculum subsystem, 2020). This global approach affects the quantity and quality of educational environments, particularly workshops. Income and employment are necessary for a happy and virtuous life, and since the world is unpredictable and constantly evolving, the Fundamental Transformation Document considers improving one's self and job skills as crucial.

• **Information and communication technology**

the use of new educational equipment and technologies is crucial. This includes using virtual networks, online and offline services, electronic content, and communication with other educational environments (Program of the Islamic Republic of Iran's public official education curriculum subsystem, 2020). This universal approach requires environments that are fitted with a plethora of communication and video equipment, as seen in innovative schools.

• **Unity and solidarity, national identity, and cohesion**

fundamental transformation document of education, (2011) underlines the preservation of national unity and social cohesion. Contrary to the global values, which are focused on individualism, the document also emphasizes the significance of individual identity and collective cohesion. This dual focus indicates that learning environments and schools should embody both the integration of the whole and the differentiation of the parts and the mood and interests of the learners, which in turn should promote a collective and holistic-oriented community.

• **Integration of education and nurturing**

the document calls for the development of multidisciplinary curriculum modules that offer a general perspective on issues, focus on balance, comprehensiveness, and the integration of education and training (ibid.). This global approach is one of the new principles highlighted in the transformation document, asserting that education and nurturing cannot be treated as separate entities.

• **Participation and teamwork**

the Fundamental Transformation Document (ibid.) focuses on group and collective approaches encouraging student interactivity with teachers, peers, and all kinds of learning environments. This global approach boosts social, educational, and developmental elements by creating cutting-edge educational environments based on team performance, resource sharing, and mutual responsibility. It is highly cohesive with student-centered learning, as it puts diversity at the forefront regarding sites and furniture and a socially based educational model. This method supports the independence of the individual as well as the development of skills by replacing isolation and unhealthy competition with cooperation.

• **Self-evaluation**

self-evaluation enables students to understand their current and desired status and determine how they would improve themselves. It emphasizes self-management and is based on principles of continuous growth, thus motivating students to undertake self-evaluation and other methods to reach such goals (National curriculum of the Islamic Republic of Iran, 2012).

• **Result-oriented evaluation**

in a result-oriented evaluation approach, students are appraised against set standards. Depending on the strengths and weaknesses of students, the teacher modifies the course content accordingly or uses some specific method of imparting education through which a better result could be ensured for the students. Both result-oriented and process-oriented assessments are used simultaneously in high schools. The process-oriented and Result-Oriented both applied to advancing through grades at high school courses, but to assess for course completion, the result-oriented approach is implemented. This method aligns more with teacher-centered instruction and individual work (Program of the Islamic Republic of Iran's public official education curriculum subsystem, 2020).

- **Process-oriented evaluation**

this type of evaluation is mostly utilized in the grade advancement of the primary level. This method demands group teaching and active study methods whereby students are taken through exploration, teamwork, information gathering, hypothesizing, testing, and reverse learning. In this perspective, student-centered education and teamwork are nurtured. This approach is applied at the global level and calls for active learning practices similar to the premises that support a student-centered learning style (ibid.).

- **School-centered approach**

the school-centered approach emphasizes community participation in designing, producing, implementing, and evaluating the curriculum. It involves reducing centralized curriculum planning and shifting towards school-centered planning (National curriculum of the Islamic Republic of Iran, 2012). Consequently, decisions become more localized, and approaches and programs constantly evolve. The ideal environment for this approach can easily adapt to changes. this approach is global, but it is not a new one.

- **Simulation of society and virtuous life**

school experiences should reflect real-life experiences of a righteous life in a simplified form (Subsystem for governance and management of the public education system, 2017; National curriculum of the Islamic Republic of Iran, 2012). Contemporary schools attempt to offer a broad spectrum of activities, assignments, Interactions, and aspects of personal and social including practical and professional projects, interactions, and aspects of individual and social life resembling a real-world society and profession. Schools are seen as institutions preparing future citizens, embodying dynamism, and providing numerous opportunities for personal and social development. In this perspective, schools become less structured and prescriptive in their daily schedules. A school that can manage goals and approaches on a smaller and less complex level (of real society) can cultivate a virtuous life within the school. When students transition to real society, they are already prepared because they have been exposed to a small society in school. Hence, they are better equipped to succeed and achieve a noble and virtuous life.

The transformation document introduces several approaches connected with the physical model that affect the final design. These include environmental efficiency, ergonomics, and new manufacturing technologies with a flexible approach (Subsystem program for providing space, equipment and technology for public formal education system, 2016). The concept of flexibility in utilization is a universal principle in architecture that allows for the replanning and utilization of spaces in multiple ways for different purposes. Each national educational document, alongside the content models it introduces, encompasses specific educational values and goals. A central nurturing element of the transformation document is its emphasis on wisdom. These elements form the basic competencies of the curriculum. Table 1 illustrates these competencies, showing that for each nurturing competency, there are corresponding curricular and educational competencies, with some being shared and others exclusive. In Table 1, some of the nurturing competencies are shared between scientific-practical and practical-ethical educational competencies, for instance, creativity and innovation, which are common in scientific-practical educational competence. Every exclusive curricular competence is assigned to one of the scientific, practical, or ethical educational categories. For example, practical educational competence corresponds to occupation curricular competence, and ethical educational competence corresponds to identity acquisition curricular competence. Group work can be implemented in all the educational competencies. While some of these competencies are similar to the universal competencies, they are marked by the fact that they are based on faith and reason, thus creating a transcendental life guided by spiritual intelligence. Each competency is attained through specific learning approaches and educational processes, as these competencies are integrated into the educational content. Hence, environments should be designed in accordance with the content models and the learning methods.

Table 1. The values and merits of the fundamental transformation document and its subsystems. Source: Authors.

Competencies dimentions	Description of each dimension				
Diversity of competencies	Critical thinking, Creative thinking, Research Focused Approach, Problem-solving, Spiritual intelligence, Information and communication technology, Sustainable and healthy life, Respect for the environment, Unity and harmony, Cultural and intercultural understanding, Individual and social capabilities, Communication skills, Economic and job skills				
Type of competencies	Nurturing Competencies	Shared Competencies	Curricular Competencies	Shared Competencies	
Classification of competencies	Scientific merits grounded in faith and reasoning	Creativity and innovation, Media literacy competency	Competency in science, culture, history, politics, and the arts	-	
	Practical competencies rooted in faith and reasoning		Technological competence, employment and skills training, biological and health competence, communication competence	Stability in personal life, family formation, and management	Teamwork
	Moral virtues based on faith and reasoning	Identity development, personal and social nurturing, sustainable development, and environmental awareness			

- **Educational strategies and common architectural principles in educational environment design**

The national curriculum views learning as a purposeful, creative, and active process of learners engaging with the learning environments (National curriculum of the Islamic Republic of Iran, 2012). Of course, the great diversity in curriculum and learning methods is obvious. Fielding and Nair, two of the most important theorists in the field of educational environment design, have categorized all learning methods, which are outlined in Table 2. The methods above can be combined to form integrated approaches, thus leading to the formation of hybrid and diverse learning environments. Each method can help achieve the competencies of national documents, as the purpose of the student-centered approach is to the personalization of learning and each method may accommodate the individual spirits and talents of students.

- **Introducing the physical models of nair schools**

nair has introduced novel models for 21st-century educational environments that are specifically designed for student-centered approaches. These include the learning street model, the wall-less model, the finger model, the consulting model, the cafeteria-centered model, and the village model.

- **Learning street model**

according to Fig. 1, in these schools, different learning environments are located around a large, bright corridor (hall) that is filled with various types of furniture. Classrooms, styled as workshops with movable walls, are located around this corridor. Teachers can hold classes in this hall for a bit of variety. This model is ideal for group learning, social activities, and informal learning (Nair et al., 2009)

- **Wall-less model**

in Fig. 2 this model is created by transforming traditional classrooms into diverse, unique workshops without internal walls which creates an integrated environment for multiple study groups and a wide range of learning methods. In this model, classes can be set up at any location (ibid.).

- **Cafeteria-centered model**

Fig. 3 similar to the model without walls, this model organizes learning environments around several cafeterias. This model can be quite effective in enhancing social interaction and informal learning (ibid.).

- **Finger model**

in model of Fig. 4, several corridors branch off from a central corridor with a design resembling multiple fingers. The side corridors lose their traffic and serve as spaces for learning. The organization of each "finger" resembles the learning street model. Each corridor and its surrounding workshop can be considered a cluster, with every differently designed cluster creating a sense of ownership over the environment (ibid.).

- **Consulting model**

in model of Fig. 5, replaces workshops with small chambers. Each workshop has 2 to 3 chambers, where students are grouped and divided. Shared furniture and facilities are available in the spaces between cells. Each student has a work desk inside

the chambers. The desks are arranged around short to medium partitions. This setup supports group work and individual learning (ibid.).

- **Village or core schools**

Fig. 6 is created by connecting several small schools, allowing them to share certain features. It includes either

Table 2. Classification of the various Nair-Fielding learning methods. Source: Authors.

Types of approach	20 Fielding and Nair's learning approach
Practical education approach	Design-oriented learning Project-oriented learning Art-oriented learning Performance-oriented learning Game and movement-oriented learning
Theoretical education approach	Interdisciplinary studies Internet-based research Storytelling One-on-one teacher instructions Teacher presentations Independent study Student presentations
Nature approach	Nature-oriented Learning
Educational technology approach	Remote learning Software-assisted learning
Social approach	Group participation Peer teaching Roundtable discussions Team-based teaching and learning Social-emotional learning

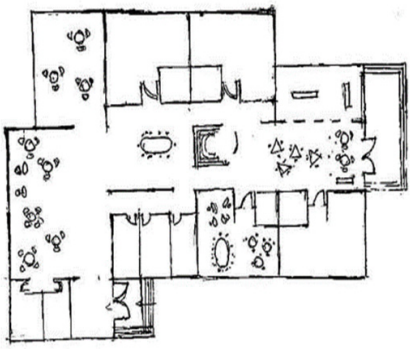

Fig. 1. Learning Street Model. Source: Authors.

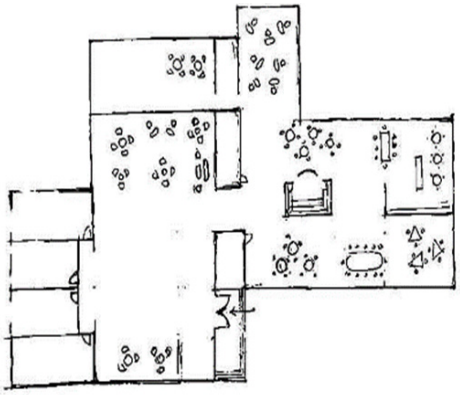

Fig. 2. Wall-less Model. Source: Authors.

Fig. 3. Cafeteria-Centered Model. Source: Authors.

Fig. 4. Finger Model. Source: Authors.

Fig. 5. Consulting Model. Source: Authors.

Fig. 6. Village Model. Source: Authors.

completely separate spaces or articulated combinations of spaces connected by corridors (Davoodi et al., 2021).

- **Independent and non-independent workshops**

an independent workshop is the smallest component in the physical model (building blocks of the educational environment). It is equipped with facilities such as a large table for group discussions, multiple tables and chairs for activities, a seating area, a relaxation space, a concentrated teaching space, and a semi-open space like a terrace. A non-independent workshop includes these facilities but can also contain movable walls or lack walls, and have varied, diverse, and non-uniform designs.

Analysis

Personalized learning is the goal of active learning. A physical model that accommodates a wide range of learning methods is suitable for personalizing learning. Regarding social intelligence and nurturing, as highlighted in the Fundamental Transformation Document, the nurturing aspects of the environment are significant. This document also looks at the nurturing of future citizens and provides different and multiple content-educational models to achieve this vision. Therefore, the most effective physical model is the one that incorporates these content-educational models. Pratt (1983) research on the social and emotional intelligence of students found that non-peer study groups are advantageous in the development of emotional and social intelligence. The multi-age groups are effective in the coordination and education of the children compared to the same-age groups that promote competition and aggression. In this system, under the teacher's leadership, students not only learn from their teachers but also benefit from the guidance of older students, while older students improve by observing younger students under teacher guidance. The Fielding-Nair methods can be compared with the ones outlined in the transformation document. Table 3[1] illustrates the correlation of these methods. The results were extracted from a questionnaire. A darker color spectrum describes a higher level of alignment, while a lighter spectrum means a lower level. These results can be important for the designation of the building component (educational environment building blocks or cells) or the core components of the physical model.

In Table 3, numerical values larger than zero indicate the use of Fielding-Nair methods in the learning approaches of the Fundamental Transformation Document. The frequent Nair methods including, team teaching and learning, peer teaching, naturalistic learning, interdisciplinary studies, storytelling, design-oriented learning, project-oriented learning, performance-oriented learning, and game- and movement-oriented learning align with the learning approaches of the transformation document. Social learning (57.9%), practical learning (65%), and naturalistic learning (66%) are the three most prevalent general approaches in the transformation document. Each of Nair's learning methods shows a high degree of alignment and application with at least one of the learning approaches in the transformation document. Table 3 demonstrates the application of said methods.

- **Physical model**

it is important to understand that the content of education and nurturing eventually incorporates each of the mentioned learning approaches. Thus, the conformity of these methods with the environment becomes vital. Given that learning methods are mostly conducted in the classroom, the classroom is the initial core for any student group. In other words, the educational environment in the school is created by linking several cells or educational cores, which are the classes. Therefore, the first step in defining the physical model is to identify the component units that form the physical model. Among the 20 learning methods, the traditional independent classroom supports two primary methods: the teacher-led presentation and the student-led presentation. However, independent workshops are more flexible and diverse compared to classrooms. Therefore In addition to the two methods mentioned above, independent workshops support internet-based research, interdisciplinary learning, learning with software, team teaching and learning, and group participation. Non-independent workshops, which have

Table 3. Correspondence between Nair-Fielding and fundamental transformation document learning approaches. Source: Authors.

Approach	Nair-Fielding learning methods	Methods & approaches of National Education Document						Amount of use of each Nair method in document approaches
		ICT	Group learning	Teacher-centered learning	Student-centered learning	Discovery-oriented learning	Practical learning	
Social	Group participation	65%	65%	25%	25%	65%	82%	54%
	Peer teaching	65%	100%	15%	65%	65%	65%	62.5%
	Roundtable discussion	15%	100%	15%	65%	82%	82%	59%
	Team-based teaching and learning	65%	100%	15%	65%	100%	82%	71%
	Social-emotional learning	15%	50%	15%	82%	50%	50%	43%
The alignment of Nair methods with document approaches		45%	83%	19%	60%	72.5%	72.5%	57.9%
Technology	Remote learning	82%	15%	100%	15%	50%	65%	54%
	Software-assisted learning	100%	32%	65%	15%	32%	82%	54%
The alignment of Nair methods with document approaches		91%	23%	82%	15%	41%	73%	54%
Nature	Nature-oriented Learning	32%	82%	50%	50%	82%	100%	66%
Theoretical	Interdisciplinary studies	65%	50%	50%	50%	82%	65%	60%
	Internet-based research	100%	15%	0	15%	65%	65%	43%
	one-on-one instruction	50%	15%	100%	65%	32%	50%	52%
	student presentations	65%	50%	15%	82%	82%	65%	59%
	teacher presentations	82%	32%	100%	15%	32%	50%	51%
	independent study	65%	0	32%	65%	65%	50%	46%
	Storytelling	50%	65%	65%	82%	50%	65%	62%
The alignment of Nair methods with document approaches		68%	32.5%	51%	53%	58%	58%	53%
Practical	Design-oriented learning	82%	82%	82%	65%	82%	65%	76%
	Project-oriented learning	82%	82%	50%	65%	65%	82%	71%
	Art-oriented learning	50%	50%	50%	65%	50%	65%	55%
	Performance-oriented learning	50%	65%	82%	65%	50%	82%	65%
	Game and movement-oriented learning	32%	82%	50%	65%	82%	82%	65%
	Show-oriented learning	32%	65%	50%	65%	65%	82%	59%
The alignment of Nair methods with document approaches		55%	71%	60%	65%	66%	76%	65%

movable walls or lack them entirely, can be integrated to form a cohesive learning environment. The diverse facilities and equipment of this environment support nearly all learning methods except game-based learning (Nair, 2014). Consequently, non-independent workshops are the optimal core or component of educational environments and physical models.

In Table 4, each of the six Nair models incorporates multiple non-independent workshops with movable walls by default. However, some models, such as the cafeteria-oriented and the wall-less models, do not have internal walls by design. The physical model can be viewed as organizing a set of learning cells (environment components or environment blocks). Therefore, the physical model can largely be considered distinct from each other by the planning and environmental interaction methods. For example:

Learning Street is comprised of workshops with movable walls, all aligned along a hall. The finger model is comprised of multiple halls of Learning

Table 4. Correspondence between Nair-Fielding and fundamental transformation document learning approaches. Source: Authors.

Document content/body templates	Learning Street Model	Wall-less Model	Cafeteria-Centered Model	Finger Schools	Consulting Schools	Village Schools
Teacher- centered	1.4	-1.6	-1.3	1.5	0.2	1.4
Student-centered	1.3	2	1.3	0.9	1.5	0.9
Active educational elements	1.1	1.5	0	1.2	1.8	1.4
Active social elements	0.7	1.9	1.8	0.7	1.4	0.7
Environmental efficiency and flexibility	0.7	1.7	0.7	0.3	1.4	-0.4
Continuity of education	0.8	1.5	0.1	1	1.4	0.2
Ergonomic design	1.3	1.8	1.4	1.6	1.4	0.9
Variety of environments and furniture	1.3	1.9	1.7	1.3	1.2	1.2
Interdisciplinary topics	0.7	1.8	1.4	1	1.5	1
Group activities and participation	1.1	1.8	1.5	1	1.5	1
Attention to individual differences and talents	1.2	1.3	0.8	1.3	1.5	0.9
Unity, solidarity, and learning community	1.1	1.6	1.4	0.1	1.4	0.4
Process-oriented evaluation	0.8	1.6	1.4	0.6	1.6	1.2
Result-oriented evaluation	1.7	-1.3	-1.5	1.6	-0.3	1.5
Job skills training	1	1.4	0.8	0.9	1.4	1.4
Information and Communication Technology	1.1	1.7	1.4	0.8	1.2	0.5
School- centered	0.9	1.8	1.1	-0.1	1.3	-0.1
Simulation of Hayat Tayyaba	1.3	1.6	-0.9	0.6	1.3	1.4
Total	19.5	24	13.1	16.3	22.7	15.5

Streets placed side by side. The consulting model is similar to the wall-less model but includes partitions as separators. The village Model is similar in flexibility to the Learning Street and Finger models. However, the outcome of the village model varies based on the use of movable walls or wall-less workshops and This affects teacher-oriented and result-oriented evaluations. In Table 4, the village model includes movable walls by default. The cafeteria-oriented model is organized with wall-less workshops. Wall-Less Model is the pinnacle of flexibility, featuring workshops without internal walls. This process creates a super workshop where all environments and equipment are simultaneously accessible, and all spaces are dedicated to learning. All these models are considered innovative educational environments.

Since the determination of the physical model is more general than the determination of the learning cell model, other components (content model) beyond the learning methods are influential. Since the student-centered approach is one of the content models of the transformation document and it requires access to all the learning methods, the physical models compatible with it can also be compatible with Fielding-Nair learning methods. The compatibility analysis of the content models in the transformation document with innovative physical models enables the extraction of an appropriate physical model. In Table 4[2], these models are assessed on a scale of 2 to -2, where 2 represents complete compatibility and -2 represents complete incompatibility. Ultimately, it is feasible to merge the appropriate learning cell model, which is compatible with Fielding-Nair learning methods, with the successful physical model from the other content models described in the transformation document. Thus, the final model can be obtained.

According to Table 4, the wall-less, consulting, and learning street models gained the highest scores. Nair's proposed model is also a wall-less design. Part of the questionnaire is dedicated to selecting models more compatible with the reconstruction of current schools. The learning street and wall-less models, with respective scores of 1.8 and 1, are deemed suitable for reconstruction. The consulting model scored 0.7, followed by the village model at 0.2, the finger model at 0.1, and the cafeteria-oriented model at 0.

Results and Findings

This research found that Nair's learning approaches conform with the learning methodologies of the document. When the physical model-building components (environment blocks or cells) are upgraded from conventional classrooms to various wall-less workshops, additional learning methods become available. Every physical model has its respective benefits and drawbacks, which were detected and emphasized through the questionnaires, paving the way for a summarized understanding of the pros and cons of each model. The cafeteria-oriented model creates three different spaces: the workshop space, the intermediate space between the workshop and cafeteria, and the cafeteria, increasing the environmental diversity. However, The cafeteria itself becomes a rigid and inflexible space. this physical model is good in strengthening informal learning and social interaction, but the cafeteria weakens the nurturing of the students and can also lead to gluttony, stopping students from achieving a simulation of a virtuous life. Focusing on the cafeteria can derail concentration on talents through distractions and a change in priorities. The village model is weak in productivity and simultaneous access to all facilities due to its dispersion. The lack of flexibility is a major drawback of the school-centered approach. However, it is suitable for naturalistic learning and is highly effective in promoting social interactions. The dispersion, however, hinders intentional and focused communications, which are replaced by sporadic, brief, and transitory encounters that occur when people move through large distances between spaces. The finger model, which is based on zoning, harms the educational social, and unity aspects. The learners become identified as soon as they get into the space from other areas. This physical model minimizes the chances of space integration and productivity. While this model allows for personalization and greater variety, it lacks integration and supports a student-centered approach. It has a highly structured environment and therefore, is not suitable for a school-centered approach and is not adaptable to change. The learning street model demonstrates moderate compatibility with the components of the transformation document and is suitable for reconstructing traditional schools with classrooms arranged along a hallway. It can be used as a successful intergenerational model for starting school changes. This model does not have to be localized or corrected and is already suitable.

The consulting model features similar chambers, which can cause fatigue and disinterest, compromising the environment's diversity and ergonomics. This model also has weaknesses in teacher-centered and result-centered approaches. To avoid redundancy for the same chambers, different and nonspecific chambers can be developed, with some transformed into larger and more versatile flexible workshops. In teacher-centered and student-centered environments, the cell partition heights can be adjusted, with tall partitions for teacher-oriented conditions and short partitions for student-oriented conditions. wall-less workshops can also be employed in fully student-centered conditions.

The wall-less model is effective in the use of all the learning approaches except teacher-centered and nature-centered learning. The integration of the environment and workshops enhances diversity and productivity. However, its main weakness is in teacher-centered methods and result-centered evaluation. This can be addressed by the use of movable walls. By temporarily enclosing the workshop with walls a focused, teacher-oriented learning environment can be created. Therefore, this model can be adjusted to meet all aspects of the transformation document.

- **Adaptation of the physical model**

although the physical models compatible with the content models of the transformation document are apparent in Table 4, these models have their strengths and weaknesses as highlighted in the questionnaire. This review included elements of modification and optimization through solution selection and viewpoint explanation. In the initial stage, the questionnaire captured the researchers' perceptions of modification and adaptation. Since the dominant viewpoints and results of the questionnaire are consistent with the researchers' perspectives, the model modification and repair process, albeit constrained (closed-ended answer), can be deemed valid and reliable

(The target group wrote open-ended views while choosing closed-ended answers). The questionnaire comprises two main parts: the first part is about compatibility, while the second part is about modification and restoration of models. Therefore, the questionnaire results contain the key ideas for changing and fixing the models. these ideas are still in their infancy and are still conceptual. The researchers of this research do not present or advise these physical models and their adaptations as the final solutions but the researchers suggest that they should be the models used as a starting point for change. Therefore, even with this modification and adaptation, these models are only primary models. The final physical models will be created using practical approaches and the process of trial and error, which is part of the process of designing innovative educational environments. It should be considered that each school will have its own physical model and environment interaction model. It is important to note that there is no assurance that the specific conditions that produced a final physical model and an environment interaction model in one school will be the same in another. Therefore, the physical model of a school is not like machines that are produced in a factory line. Flexibility can always be a lever for change. Designing a physical model for innovative schools is a permanent process of modifying, reconstructing, and adapting to the environment over multiple years. This process involves interior designers, architects, and users of the environment. It may take several years to achieve the final result and to institutionalize the physical and interaction models, which is typical for designing new educational environments. This process is commonly known as trial operation or trial execution (trial setting up).

Since the primary goal of this research is to identify models that are compatible with the content models of the transformation document, the current study does not explore existing models anymore. Some of the factors that require separate research include gender differences and climatic conditions. Moving forward, it will be possible to identify which models are more appropriate for different school stages within the classification of physical models.

In examining the strengths and weaknesses and making changes among the existing models, the wall-less model with movable walls was the most suitable to the objectives of the curriculum, educational and nurturing methods, and the strategies and values of the fundamental transformation document. The next most compatible models are the consulting and learning street models. The wall-less model provides a general vision of the school as a whole, which is similar to viewing the whole school as one classroom, this increases efficiency. Since the student-centered approach is about individualizing education, a wall-less model with movable walls, ergonomic design, and higher environmental diversity can combine different facilities, meeting more needs, talents, and interests. This model, along with the consulting model, allows for free communication and interaction of students of different ages within shared environments, thus improving the social nurturing and educational aspects of learning. Integrating education environments can increase participation and group activities among same-age and mixed-age groups. In the wall-less model and consulting models, the teacher-oriented aspects can be enhanced by enclosing spaces using movable walls and partitions of different heights respectively. The integration between different areas of education and nurturing can be done through the integration and unity of environments and at the same time applying different learning topics and methods, which is more feasible in a consultative model and wall-less model. This joint or integrated educational environment helps to promote unity and solidarity rather than isolation and thus forms a united learning community. integration environments are also suitable for interdisciplinary subjects since they enable two or more teachers with different specializations to teach different groups at the same time. Process-based evaluation corresponds to student-centered and integrated environments, while result-based evaluation corresponds to individual approaches and closed, teacher-centered environments. In a school-centered approach, changes can be made periodically due to the locality of variables. Therefore, the wall-less model and the consulting model, which

are more flexible and integrated, are more compatible with change. Information and communication technology are more suitable in more integrated but diverse environments, such as the wall-less model. This model enables the dissemination of various electronic equipment in various environments, and ergonomics is achieved through the diversity of equipment usage depending on the requirements. The wall-less and consulting models are also more effective in achieving job skills training and occupation as all the environments and equipment, including workshops, are available in an integrated environment. Eventually, the wall-less model can symbolize an active learning community and simulate a virtuous life since it can include all the content models of the transformation document.

• Correspondence between physical models and school stages

since it has not been established how closely the physical models correspond to the school stages, including the first and second stages of primary school, the first and second stages of high school, and vocational schools, which are five levels in total, it is necessary to define the compatibility of each model with these stages. This compatibility is measured based on the alignment of physical models with learning methods and strategies. Two questionnaires were used: One from a group of educational environment researchers and the other from teachers. The physical models selected are those that received higher scores in compatibility with the components of the transformation document in Table 4. Since the first stage is completed in high schools and vocational schools only contain the second stage, only one stage has been considered for vocational schools. The results are derived from the following: Table 5[2]: Obtained by distributing a questionnaire to 10 educational environments researchers. Table 6[1]: Obtained by distributing a questionnaire to 30 teachers of various educational stages.

The scores in Tables 7 to 10 are the result of the multiplication of the coefficient of use of each learning approach with the inherent potential of each physical model in relation to the learning approach. This provides the final result of the compatibility of the model with

Table 5. Inherent potential of superior physical models in relation to learning approaches, obtained from 10 educational environment researchers. Source: Authors.

Learning approaches	Learning Street	Wall-less	Consulting
Social learning approach	0.7	1.9	1.4
Technology learning approach	1.1	1.7	1.2
Nature learning approach	0	0	0
Theoretical learning approach	1.9	-0.36	1
Practical learning approach	1	1.9	1.4

Table 6. Determining the most frequent learning methods and strategies based on the school stages, obtained 30 teachers. Source: Authors.

Learning approaches	First Stage of primary school	Second Stage of primary school	First Stage of high school	Second Stage of high school	Second Stage of vocational school
Social learning approach	75%	90%	95%	70%	88%
Technology learning approach	30%	60%	85%	60%	79%
Nature learning approach	100%	70%	20%	14%	91%
Theoretical learning approach	50%	56%	82%	100%	57%
Practical learning approach	82%	70%	50%	40%	76%

Table 7. Final scores for the First stage of primary school. Source: Authors.

First stage of primary school	Learning Street	Wall-less	Consulting
Social learning approach	0.52	1.42	1.05
Technology learning approach	0.33	0.51	0.36
Nature learning approach	0	0	0
Theoretical learning approach	0.95	-0.18	0.5
Practical learning approach	0.82	1.14	1.14
Average Score	0.52	0.57	0.61

Table 8. Final scores for the second stage of primary school. Source: Authors.

Second stage of primary school	Learning Street	Wall-less	Consulting
Social learning approach	0.63	1.71	1.26
Technology learning approach	0.66	1.02	0.72
Nature learning approach	0	0	0
Theoretical learning approach	1.06	-0.2	0.56
Practical learning approach	0.7	0.98	0.98
Average Score	0.61	0.7	0.7

Table 9. Final scores for the first stage of high school. Source: Authors.

First Stage of high school	Learning Street	Wall-less	Consulting
Social learning approach	0.66	1.8	1.33
Technology learning approach	0.93	1.44	1.02
Nature learning approach	0	0	0
Theoretical learning approach	1.55	-0.29	0.82
Practical learning approach	0.5	0.95	0.7
Average Score	0.72	0.78	0.77

Table 10. Final scores for the second stage of high school. Source: Authors.

Second stage of high school	Learning Street	Wall-less	Consulting
Social learning approach	0.49	1.33	0.98
Technology learning approach	0.66	1.02	0.72
Nature learning approach	0	0	0
Theoretical learning approach	1.9	-0.36	1
Practical learning approach	0.4	0.76	0.56
Average Score	0.69	0.55	0.65

Table 11. Final scores for the second stage of vocational school. Source: Authors.

The second stage of vocational school	Learning Street	Wall-less	Consulting
Social learning approach	0.61	1.67	1.23
Technology learning approach	0.86	1.34	0.94
Nature learning approach	0	0	0
Theoretical learning approach	1.08	-0.2	0.57
Practical learning approach	0.76	1.44	1.06
Average Score	0.66	0.85	0.76

the school stage. These results are derived from the content models and learning approaches highlighted in the transformation document. Besides measurement and adaptation, it also calculates the models according to the school stage. This research takes into account the age and mentality of students in terms of learning methods. Other factors such as gender, climate conditions, and other specific conditions may also affect the determination of the physical models of schools. These factors call for another study.

The final average score tables show that there is a significant correlation between the scores obtained by the physical models and various learning methods. In the second stage of high school, where 100% theoretical learning is used, the street of learning model, which is closely connected with theoretical learning, is appropriate. On the other hand, in the first stage of high school where social learning is dominant, the wall-less model which is more suitable for social learning is more compatible. This means that the changes in the learning models could be influenced by mentality (spirit and nature). Thus, there is a relationship between the model and the mentality of the students regarding the learning approaches. During the first stage of primary school, children are not fully socialized, and theoretical lessons are not yet well developed. Therefore, the physical model used is an intermediate one, which is called the consulting model. As children become more social in the second stage of elementary school, the wall-less model becomes the most common model. The first stage of high school is the time when students enter adolescence, and the level of sociability is highest, making the wall-less model the leading model. In the second stage of high school, students are more mature and less social, preferring more individual independence. Also, the focus is more on theoretical courses, which all of these correspond to the street of learning. Although the social aspect decreases too during the vocational school stage, practical activities are mainly of a group nature, which conflicts with the theoretical aspect. As a result, the wall-less model is once again more appropriate.

The current research does not fundamentally reject other physical models; instead, it specifies, modifies, and optimizes the physical models that are most compatible with the content models of the transformation document and fine-tunes physical models based on the educational stage. However, for more accurate results, other factors that may affect the results should also be taken into consideration. Some of these factors are construction economics in educational environments, materials, gender, climatic conditions, sociology, and so on. Another important component of innovative educational environments is the culture of interacting with the environment. The culture of interacting acts like software installed on hardware. Studying this culture can be useful in improving the efficiency of a physical model in innovative educational environments. The research revealed that the learning methods of Nair are compatible with those of the transformation document. Consequently, non-independent workshops can be utilized. In response to the research question of which physical model is appropriate for the country's educational outlook, the wall-less model is deemed the most appropriate. To enhance compatibility, this model should be fitted with moveable walls, which will make the environment semi-structured. The second option, the consulting, model is a more constrained version of the wall-less model, and the learning street model is suitable for an intergenerational model to begin

change or reform in the schools. Previous research did not fully extract and identify the content models of the transformation document. This has caused previous research to reach incomplete or inaccurate conclusions that do not align with the document content models. Previous research also has not comprehensively presented Innovative physical models and the models have not been prioritized based on educational stages.

This research aimed to evaluate the correspondence of physical models while also adapting and prioritizing them and then fine-tuning them based on educational stages. Therefore, for the first and second stages of primary school, the consulting and the consulting-wall-less model are suggested, and for the first and second stages of high school and the second stage of vocational school, the wall-less model and the learning street model and wall-less are suggested, respectively.

Conclusion

This research evaluates the correspondence of physical models while also improving them. Then the models were prioritized based on educational stages. From the 6 Nair models, the wall-less model was found to be the most compatible with the content models of the transformation document. The consulting and the learning street models attained the second and the third positions. The match between Nair's learning methods and the transformation document also indicates that non-independent workshops within physical models could be used. According to the transformation document, the components that turn the school into a social nurturing and educational learning community, meaning the educational, social, and nurturing aspects, are crucial in shaping the physical model. To achieve this concept, the educational environment must be specially designed, transforming classrooms into flexible, non-independent workshops, reducing boundaries, and replacing fixed walls with transparent and mobile glass surfaces.

The wall-less model is the most environmentally compatible with the transformation document, but if applied to teacher-centered and result-based evaluation might still have some disadvantages that could be addressed through enhancing flexibility in walls. It is important to note that when adopting the wall-less model if the results are not satisfactory then one can always revert back to the traditional model or a less complex learning street model. therefore If all the workshops with moveable walls turn to enclosed mode then If the space between two rows of workshops is designed to be large It can become a learning street. In the case of reconstruction of already-existing schools, it is best to use the learning street model and then follow up with the wall-less model for new schools. Therefore, a total of three new school models and two models for reconstructed schools have been developed. These different models can be chosen depending on the stages of education that the student is in. Therefore, for the first and second stages of primary school, the consulting and the consulting-wall-less model are suggested, and for the first and second stages of high school and the second stage of vocational school, the wall-less model and the learning street model and wall-less are suggested, respectively.

Endnotes

1. The results in Table 3 & 6 were obtained from a questionnaire given to 30 teachers who specialized in learning and teaching. It was not possible to find dominant, saturated results with fewer than 30 teachers. The researchers improved the results continuously based on new responses.
2. The results in Table 4 & 5 were obtained from a questionnaire given to given to 10 researchers who specialized in educational environments. It was not possible to find dominant, saturated results with fewer than 10 researchers. The researchers improved the results continuously based on new responses.

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