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Rotraut Walden *Editor*

Schools for the Future

Design Proposals from Architectural Psychology

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Design Proposals from Architectural Psychology

With a foreword by Prof. Henry Sanoff and comments by Prof. Peter Hübner & Friedensreich Hundertwasser

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Foreword

Henry Sanoff

School facilities are powerful indicators of community values and aspirations. They not only support the academic needs of students they serve, but can also address the social, educational, recreational, and personal needs of the members of the broader community. It has been argued that successful schools strengthen a community's sense of identity and coherence.

Educational reform, however, has focused primarily on what is taught, and how it is taught. As a result, curricula have been strengthened, instructional strategies improved, and learning materials updated. However, what has received too little attention is the physical environment in which education occurs. School systems find that parents are much more discerning about which school their child will attend, including the physical appearance of the school and the amount of modern technology available. In addition, school systems have discovered that schools with "sick" internal physical environments are shunned by prospective teachers and parents alike (Stevenson, 2006). Widespread misconceptions reinforce the view that the quality of school buildings has no impact on academic performance. Consequently, a gap exists between the educators' view of improving quality and the process of planning schools.

It is also becoming more evident that students function best in different educational settings according to their abilities, consequently identical schools in terms of facilities do not equate with equal opportunity for students. School systems in the USA are offering parents and children more choices about the school a child attends. The one-size-fits-all approach is gradually disappearing, and may give way to smaller and more diverse learning environments that give parents and students more choices and options about what, where, and how they learn. Therefore, the focus is shifting away from district-wide planning providing equality of school facilities towards plans that meet the unique program needs of each school (Stevenson, 2002). And as parents have more choices about where to send their children, it follows that they demand schools that are personalized and that fit their needs.

Very different scenarios may affect what spaces will be included in future building designs (Butin, 2000). One view of the future suggests that standard academic classrooms will disappear. In their place, specialized labs and learning centers will become the norm (Lackney, 1999). Those with this vision maintain that separating learning into academics, arts, vocational, and the like is a false dichotomy (Chan, 1996). Instead, they view learning as holistic with, for example, art incorporated into language arts or maths taught with specific job skills or vocations in mind. In this scenario, classrooms must be multipurpose, allowing a blending of traditional instruction with meaningful and diverse hands-on, lab-type experiences that may include anything from pottery making to dramatic arts. This idea of personalized learning environments, which has generated immense interest in the design of classroom clusters, house plans, and school-within-school settings has magnified the role student commons can play in a school's overall design, serving as a hub for an academic wing or providing a space for alternative teaching strategies.

Another scenario sees the development of more shared school facilities. In this view, future schools will be created or redesigned so that instructional and support spaces can also be used by social and community organizations or even businesses. The idea of schools as community learning centers has been supported by research documenting the importance of active parental involvement, the growing importance of lifelong learning, and a recognition that communities have many assets to offer that are themselves important learning tools. This awareness presents an opportunity to reconsider what constitutes an appropriate learning environment and to identify those factors that can enhance student achievement. Sharing instructional and support facilities is expected to be beneficial to both the school and the community. In such settings, students have access to a wide array of community and business expertise that can bring the curriculum to life – and those who do not normally have access to school facilities find that the facilities better justify the money spent upon them. In any of the scenarios, school facilities would be different from what exists today. The key to successful planning is to provide the most flexible and adaptable spaces possible in our schools.

The previous trends suggest how school facilities may be different in the future. Though the possibility may be remote, another scenario exists – schools, as we know them, will disappear (Northwest Educational Technology Consortium 2002). If one thinks about the combination of the rapid development of technology and the increasing lack of confidence parents have in public education, the disappearance of the brick and mortar structure called school is possible. The child has access to lessons prepared by the most knowledgeable professionals

in the world and can interact electronically with teachers and students in other countries as part of language, geography, or political studies instruction. Parents who home-school increasingly use technology to access instructional materials. Students in remote areas of Canada and Australia, hundreds of miles from a school building, attend school by logging onto their computers. Technology literally allows a high school student in rural locations to take a course online from a teacher in another town.

The question, perhaps, is not whether it is possible that schools will cease to exist, but how virtual schools will grow and to what extent. No one knows, but it raises some interesting issues about how much to invest in physical structures, what kind of life expectancy they should have, and whether the future emphasis needs to be on schools as traditional learning environments or schools as production and broadcast centers. It also raises a question about the fundamental purpose of schooling. If technology consumes much of the instructional delivery of the future, who or what will assume responsibility for the socialization process that schools have traditionally been held accountable for?

Another new element to consider in school design is the reality that there are more active participants who want a voice in how new school facilities are designed. Community-based groups, municipal agencies, and universities are just a few of the groups in the past decade that have voiced their ideas. This activism has led to a greater need for authentic citizen engagement and growing acceptance of shared space and public-private partnerships. In the coming decades, educators and facility planners may increasingly be thinking about the needs of preschool children and senior citizens. In this new era of lifelong learning, educators and architects are going to have to expand their vision of who uses these facilities and be keenly aware of changing demographics. It may be necessary to move away from the traditional emphasis of creating facilities for seniors only and consider approaches that let the generations mingle in order to keep retirees active and current (Sullivan, 2002). Schools can achieve more innovative approaches to learning by creating learning environments in nontraditional settings such as museums and shopping malls, as well as encompass community needs.

The key to providing school facilities that meet current and future needs in a given community is to constantly scan the environment, communicate regularly with educators, the community, businesses, and policy makers, and stay aware of current educational, design, and environmental issues. Otherwise, reliance on "It's always worked in the past," or "That's how it has always been done" may well result in the waste of capital resources, dissatisfaction in the community, and reduced opportunities to optimize instruction and educational outcomes. A ba-

sic element of effective planning for the 21st century must be "thinking beyond today." Specific questions must be asked on an ongoing basis: "What is emerging in educational practice that may affect school design tomorrow? What is happening with the demographic composition of the community that may change how education must be delivered? Does quality research exist that indicates education can be delivered in a more efficient, effective manner?" (Bingler, Quinn, & Sullivan, 2003). If such questions are addressed, can we hope that the school facilities of tomorrow will adequately support the educational programs of the day? This book would like to be seen as a first step toward the much needed discussion of these questions.

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Preface

We hope that our descriptions in this book of innovative schools worldwide, embedded in a framework of architectural psychology, will be able to offer a professional foundation for the construction, renovation, or expansion of existing and future schools.

Interest in this topic has in recent years gained impetus as a result of various studies evaluating pupils' performance in international comparisons, notably the triennial worldwide PISA (Programme for International Student Assessment) studies coordinated by the Organisation for Economic Cooperation and Development (OECD) that assess 15-year-olds literacy in reading, maths, and science as well as problem-solving in general. These curriculum-independent studies with a rotating particular emphasis on one of the three core areas began in 2000, and each successive round has led politicians, educators, and parents – particularly in countries not at the top of the results list – to ask why pupils in one country do better than those in another. Whilst there is, of course, no simple single-factor solution, the importance of learning environments that support various user needs is being recognized. In our search for features of supportive environments, we found that, besides teachers, parents, and other children, the school buildings themselves significantly influence performance, well-being, social behavior, and therefore also, in the end, grades as well as the knowledge and skills that pupils acquire for their future lives.

The success of an earlier book of ours on school buildings and trends in educational architecture in Germany, Schulen der Zukunft (Schools of the Future), published in 2002, encouraged us to widen our scope and address the subject on an international level. After all, how an inspiring, stimulating school should be designed will be different in different countries, according to culture and climate. There are commonalities, however, and so our proposals should be understood as a set of criteria that should be examined for applicability, and adapted to the respective local situation.

Many factors have to be considered. Depending on a country's location relative to the equator, the north or south face of a building may serve to provide cooling shade or contribute to heating the structure. But what counts as the optimal temperature is very similar in hot and cold climates, and for mental work

is around 21–22° C (approximately 70° F). And depending on the climate of a specific region, one might use cool or warm colors to compensate for actual temperature deficits. Then again, there are cultural differences in the symbolic meaning attributed to colors, which will influence well-being. The need for privacy is also very different in various cultures.

User participation in the design and building processes is usually implemented according to the degree of acceptance of the organizational effort it requires, but in the view of experts it is vital for the long-term acceptance of buildings. Information technology enhances the communication of knowledge even across considerable distances, and its advance will therefore reach most schools in the future, if it has not done so already. Especially for children in need of special support, from one-parent or immigrant families, schools with a home-like atmosphere and many appropriation opportunities represent built models of a functioning home. Integration is also supported by universal design. Innovation in the regulations for school construction will have to be advanced in many countries with the help of a common design language.

The contributors to this book address all these aspects. Overall, we see our recommendations as based on an interactionist approach, which posits that performance can be promoted with school buildings, relative to the specific teaching methods, learning goals, and learning styles, the people – students and teachers – involved, the community, the general culture, and the climate. This means that there is no one single school design that will satisfy all requirements everywhere: While the recommendations we offer are clear expert-based suggestions, they remain varied and multifaceted.

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1 Introduction

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> *It is an unfortunate truth that dignity and freedom of thought often depend on the proportions of a room, a delightful view out of the window, a certain measure of light and color, so that someone who has spent his whole life in a kind of oblong boxes and one day enters a room with noble proportions might wonder how much he might have been missing, spiritually, just because of the character of his living quarters.*
>
> *Christian Morgenstern*
> *Steps, Psychological Issues (1906)*

1.1 Overview

Every day, we experience how spaces can influence human beings, whether we are visiting friends in their homes or entering a department store, a restaurant, or a museum. We get very different impressions, which in turn generate very different emotions and moods. Because spaces influence us, we like to design the spaces we inhabit in such a way that they make us feel comfortable and at home in them.

With public spaces such as schools, this is more difficult. The importance of the design of school spaces for successful education is often underestimated. A main finding of our studies is that students must feel comfortable in their school environment as a crucial precondition for successful learning (see Walden, 2007). It is the opinion of many experts that there are communication problems between architects and educators and the main users of schools, teachers and students. These buildings are planned by many for many users, which leads to many individual expectations falling through the cracks or never even being taken into consideration. In any case, one should be clear about the learning processes that are to be accommodated, which pedagogical concepts are to be used, and which learning goals are to be pursued with the students. If the spaces met these expectations, would we then be on the way towards "schools of the future"?

The present study shows the future trends in school design. Perhaps we will never see the "school of the future." This might be due to very different reasons: Sometimes the architecture is inappropriate, sometimes the teachers are not sufficiently engaged, or the student community just does not allow things to get moving. Also, architectural design and furnishings will always be perceived in a subjective manner: What makes some people comfortable and content might cause discomfort or even stress in others.

Certain shapes or colors may be disliked by many users, while others are appreciated. It is necessary to find out what these preferences are, and consider them in the design of future buildings. The simplest, most sensible and successful way to do this is to include users in the planning or remodeling projects from the beginning, in the form of user participation in the design, user design and decision making (as has been done, for instance, by the architects Henry Sanoff in the United States, and Peter Hübner in Germany). This achieves an interlocking process, resulting in a final fit which is formed, carried, and acknowledged by both sides: the young users and the spatial arrangement. This makes it possible to identify with spaces. Basic human needs are located in the spheres of emotion, communication, and intellectual as well as physical development. This means that the learning environment of a school has far-reaching associations of living space, place for experience and encounter, workshop, laboratory, oasis, and way station. It also means that architects must design and plan more than walls, ceilings, roofs, and hallways – a spatial composition that is esthetically pleasing, evokes functional curiosity, invites users to enter and stay, encourages work to be done, enhances the joy of learning and performance, offers firm support in the daily routines yet opens avenues for self-actualization that extend into future careers as well as private relationships.

Some readers may consider it somewhat presumptuous to talk of a "school of the future." However, our research efforts are indeed guided by the question of what such a school might be like. In view of the demographic forecasts that envision ever increasing numbers of elderly people who will have to be "supported" by fewer younger people, this question is no mere luxury. The younger generation will have to become more capable and productive to be able to meet such expectations. Besides, many older schools are deficient in their ability to support learning, productivity, well-being, and social interaction. We are convinced that better school buildings can provide better environments for successful education.

To achieve a sense of "feeling at home" in such a school environment – where, after all, teachers and students spend a considerable amount of their time – it should be a matter of course to have students, parents and teachers contribute

to the design of the school. An additional effect of such participation in improving the school is an increased sense of responsibility for this environment, of becoming creative, environmentally aware, and understanding, and a reduction in vandalism. Our project is rooted in the premise of architectural psychology, that performance and behavior of people depend on their interaction with their environment (Lewin, 1963).

1.1.1 Methodological Considerations Regarding Architectural Psychology Relationships

Regarding the many aspects which influence the experience and behavior of students, teachers, and parents in schools, Gifford (2002) asks the following question with respect to architecture: How do different building configurations influence learning? School buildings and school yards are very diverse. Some are very large, others quite tight; some look like monopoly hotels, like one-story geometric structures assembled from classroom blocks; some have lawns, while others have only tiny asphalt courtyards.

This leads to a search for 1) structuring units and their empirical relationships and 2) the conclusions that can be drawn from the results.

Regarding the first of these two points: Not only are the building forms varied, but so are the local conditions of each building, and its ecological integration. Furthermore, the people involved are very different. For pragmatic reasons, we therefore employ an interactionist approach in our investigations, which assumes that behavior is formed by both people and their environment. A structure with the elements response, situation, and person, which then permits making statements about concrete points in it, is offered by the facet theory (Borg, 1996). Conceptually, we follow the transactional approach, which assumes that that individual behavior is not only determined by the social and physical environment, but the individual in turn changes reality by his or her behavior. The transactional approach also embraces the uniqueness of problem solutions as they are described in interviews, for example (Werner & Altman, 2000, pp. 21 et sqq.). Kaminski (1988; Moore, Turtle, & Howell, 1985; see Dieckmann et al., 1998, pp. 48 et sqq.) describes a conceptual frame of reference for establishing relationships between basic environmental psychology components.

With respect to the second query arising from Gifford's questions: Researchers of older studies tended to claim that environment determines behavior. Thus, they tried to establish concrete effects of the environment on humans, based on mere correlations. Especially Linneweber (1996) pointed out the problems with this approach to deriving causal relationships, specifically with respect to environmental studies regarding school buildings.

It is legitimate to establish causal relationships when the effects can be unequivocally isolated and thus law-like relationships can be shown. But that is not the case here, an objection that can be raised for all applied social studies in general. We would like to emphasize that we, therefore, can only point out tendencies whose consequences are not equivalent to the conclusions from so-called "hard" experimental studies.

This debate mostly culminates in the conclusion that research aiming at determining results based on relationships between multiple aspects often turns out to be quite relevant for practical application (in spite of the above reservation) while experimental research may aim at establishing firmer (causal) relationships, but at the expense of being able to focus only on very small slices of reality, and therefore has very limited practical usefulness.

We cannot offer a solution to these general problems. But our discussions are guided by the view that architects rightfully expect concrete assistance from psychologists, since, after all, buildings have to be built, with or without unequivocally (experimentally) validated expert psychological advice. This dilemma leads to the search for units respectively structures and a determination of the research object by means of a combination of several different methodological approaches to the same question (see the discussion of "triangulation" in Hellbrück & Fischer, 1999, p. 115.) This is the approach we use in this study.

Our book is organized in three parts: A theoretical part with a history of school building in the Unites States (Lackney), Japan (Yanagisawa), and Germany (Schalz), basics of architectural psychology and architecture, such as psychological relationships and processes (Walden), the principle of community participation (Sanoff), the expectation for communication and information technology in schools (Yanagisawa), and a design language for learning communities (Lackney); an empirical part (Walden) containing a facet approach, interviews regarding selected schools of the future, and a format for the assessment of the quality of school buildings; and an appendix with descriptions of 24 international examples of innovative schools, in 11 countries on all five continents.

The introduction to the topic begins with a discussion of school building in earlier times (Chapter 2). A brief historical overview of school building in the USA, Japan, and Germany makes it clear that school building, just like architecture in general, is not only subject to the changing conditions of the time, but also a mirror of society. The criteria for the quality of school buildings have changed continuously.

1.1.2 Historical Perspectives

History of the Schoolhouse in the USA
In chapter 2.1, Jeffery A. Lackney outlines the history of the schoolhouse in the USA. Three definable periods of educational architecture in the United States – the Colonial period, the Industrial Revolution, and the Information Age – demonstrate how educational facilities from early one-room schoolhouses to modern-day, high-tech buildings have evolved over time in response to societal and political influences.

Historical Background of the Japanese School
Kaname Yanagisawa looks at school buildings in Japan in chapter 2.2. There were no public schools in Japan before the Meiji era other than private schools called "Hanko," which were feudal clan-owned schools for educating samurai, and "Terakoya," temple-owned schools for educating tradesmen and farmers. The modern public school system in Japan with separation of grades started in the Meiji era (1868–1912).

Central government school design guidelines were issued in 1881 and a model school plan in 1895. School features from this period are still found in many contemporary Japanese schools. While there were few changes in school design during the early 20th century, the central government organized a committee to build two model schools as symbols of Japan's postwar rehabilitation after the Second World War. Several innovative schools were built during the 1960s, demonstrating shifts from quantity to quality, and from standardization to variation.

Open plan schools were built during the 1970s, following the open plan movement in the UK and the USA. After 1984, the central government started to subsidize construction of open plan schools. Criticism of open plan schools and their lack of human scale and privacy led to innovations in school design such as a more home-like environment, the independent class house, and small enclosed spaces. These ideas have not become mainstream practice in Japan, but have had an influence even on some of the open plan schools.

The Historical Development of German School Buildings
In chapter 2.3, Simone Schalz provides an overview of the historical development of school buildings in Germany. Until the 16th century, schools in Europe were the exclusive domain of the church. At about this time, mandatory education was introduced in Germany. With the work of Johann Amos Comenius (1592–1670), the first steps towards modern pedagogy were taken. "Reform educators"