"Nurturing" Plan for Educational Solution Framework in Saudi Arabia

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OVERVIEW: The education of the youths who will bear the burdens of the country's future is a critical issue for countries in the Middle East and North Africa, where populations are skyrocketing. Of these countries, Saudi Arabia, which is the biggest oil-producing country, is tackling the issue of educational reform as a national project. Hitachi is trying to expand the sales in Saudi Arabian market with a core lineup featuring ultra-short throw LCD projectors, which have done well in the UK and Russia, and the StarBoard IWB, which is also referred to as an "electronic blackboard" or "electronic board."

INTRODUCTION

IN the Middle Eastern and North African regions, where populations are skyrocketing, schools and classrooms are being built and expanded at a fever pitch, and the provision of quality education to youths has become an urgent issue.

In particular, in Middle Eastern oil-producing countries that rely on oil resources, non-oil industries that can employ the rapidly increasing numbers of youths must be created and developed, and there is a great need for occupational training in areas such as technical and vocational education.

Technology and products matching these needs include the LCD (liquid crystal display) projectors of Hitachi, Ltd., and the IWBs (interactive whiteboards) of Hitachi Software Engineering Co., Ltd. LCD projectors and IWBs are often delivered as a set; the combination of the ultra-short throw projector and the StarBoard IWB was selected as the Best Interactive Education Product in the March 2008 edition of the

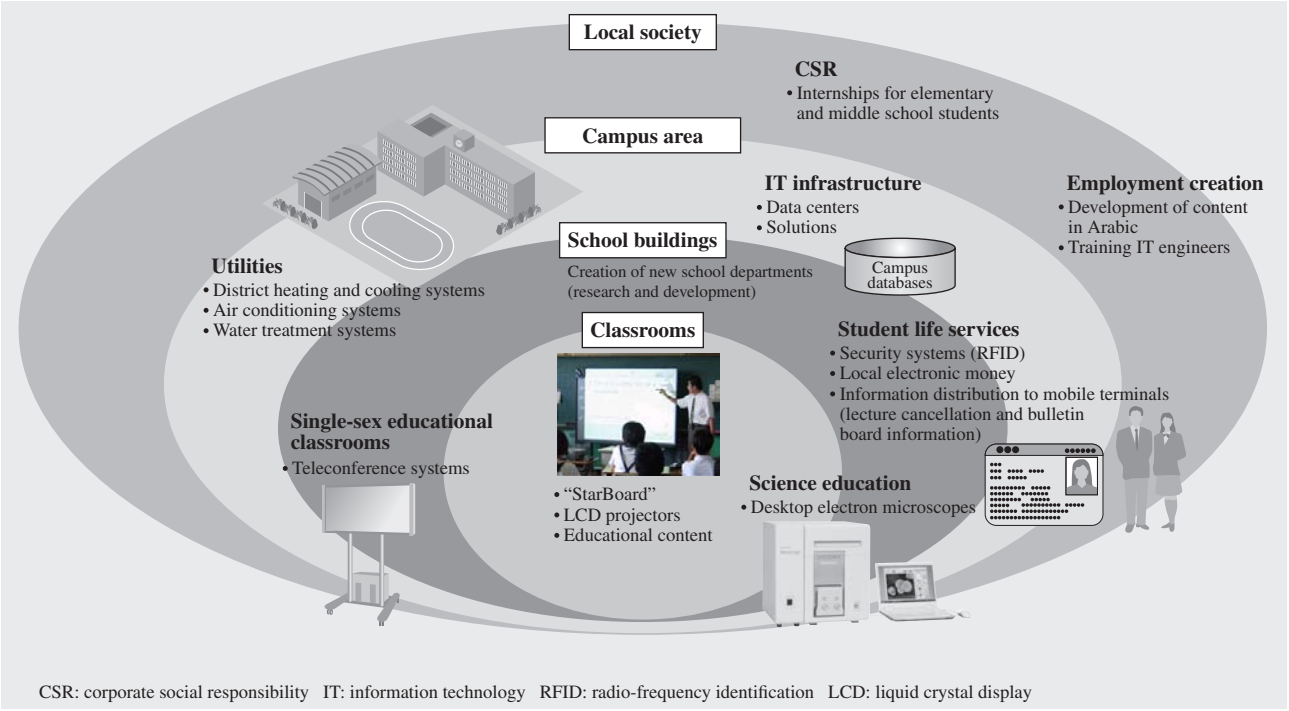

Fig. 1—Conceptual Diagram of Hitachi's Educational Solutions.
Hitachi offers educational solutions aimed at multi-tiered approaches for where education is actually provided, from classrooms to local society.

specialized UK magazine "AV News."

This article provides examples of the adoption of the ultra-short throw projector and the StarBoard IWB, and discusses the possibilities opened up by Hitachi's educational solutions, which contribute widely to general education (see Fig. 1).

STARBOARD IN OIL-PRODUCING COUNTRIES

Adoption in Russia in Recent Years

Russia's government has been taking the initiative in the adoption of IWBs since 2003. The high praise heaped upon IWBs during the lesson observations of President Putin at the time is said to have given the products a major push, resulting in a sudden launch of the Russian domestic IWB market.

Russia's IWB market size and adoption rate are shown in Fig. 2. Although the average growth rate in unit sales has been approximately 50% between 2006 and 2010, the adoption rate in school classrooms is still low, at approximately 10%. Since the Russian government's ICT (information and communication technology) education budget is expected to be maintained, major continued growth is forecast for this market. HitachiSoft is also considering expanding sales further in combination with Russia's StarBoard content.

Collaboration with Cambridge University Press

Since IWBs are mainly used in the classroom, it is important to develop electronic educational content with a great deal of value for use in lessons. HitachiSoft has been collaborating with Cambridge University Press in the UK to develop content. Cambridge University Press boasts a history of longer than 400 years since its founding, and has access to a tremendous amount of educational content that it has cultivated over this time. When expanding StarBoard business operations in the markets of developing countries, HitachiSoft bundles the Cambridge University Press content with StarBoard so that its superiority over the competitors is ensured (see Fig. 3).

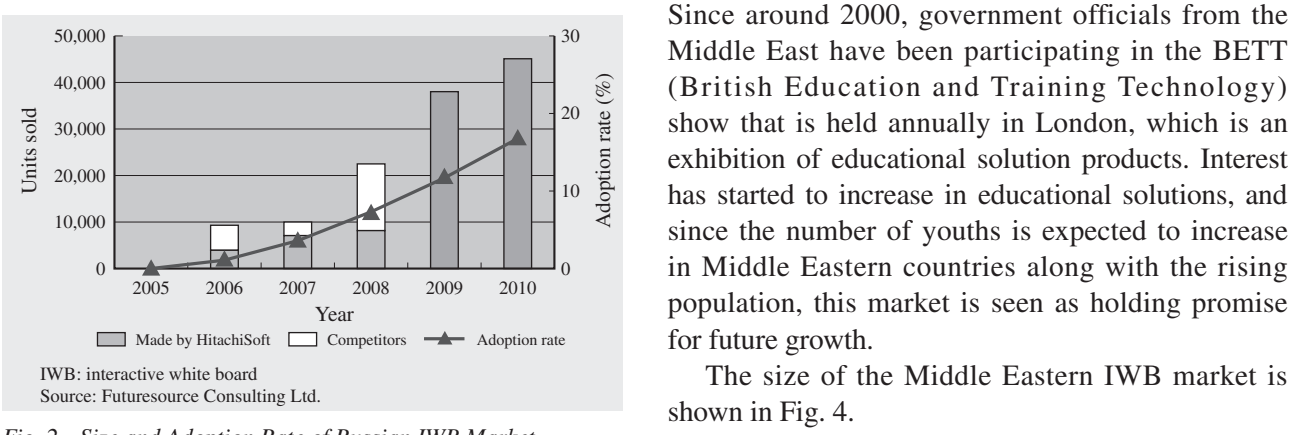

Fig. 2—Size and Adoption Rate of Russian IWB Market. The total number of IWBs sold for educational and corporate use is shown here, with the number of IWB units sold domestically in Russia on the left vertical axis, and the rate of adoption in school classrooms on the right vertical axis. Although HitachiSoft achieved the top market share in 2007, the competition was fierce in 2008. Figures for 2009 and on are the estimated numbers of units sold in the entire IWB market.

Fig. 3—Example of StarBoard Application. The use of StarBoard in British elementary school lessons.

General Outlook in Middle East

Various countries have been emulating the successful example of the UK in adopting IWBs in the field of education, leading to market expansion. Since around 2000, government officials from the Middle East have been participating in the BETT (British Education and Training Technology) show that is held annually in London, which is an exhibition of educational solution products. Interest has started to increase in educational solutions, and since the number of youths is expected to increase in Middle Eastern countries along with the rising population, this market is seen as holding promise for future growth.

The size of the Middle Eastern IWB market is shown in Fig. 4.

Between 2007 and 2010, the Middle Eastern IWB market is expected to grow at an average annual rate of approximately 70%, or around 80% in the Kingdom of Saudi Arabia alone. The Saudi Arabian government has allocated a major share of the budget to educational and occupational training, and StarBoard products are expected to be adopted in

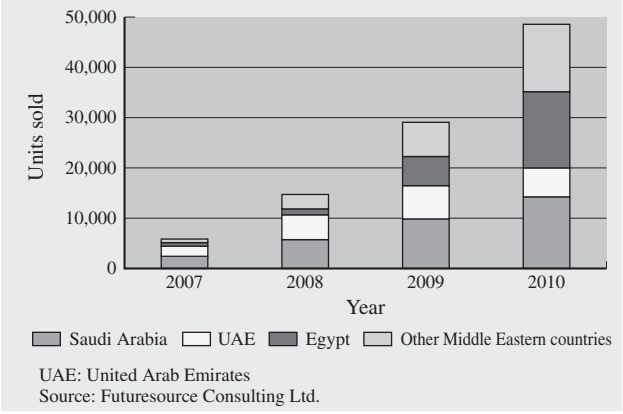

Fig. 4—Size of Middle Eastern IWB Market.
The total number of units sold in the Middle Eastern IWB market is shown here. Figures for 2009 and on are the estimated numbers of units sold in the entire IWB market.

Fig. 5—Example of StarBoard FX-DUO Application.
This figure shows an example of how an ultra-short throw LCD projector is used in combination with the StarBoard FX-DUO.

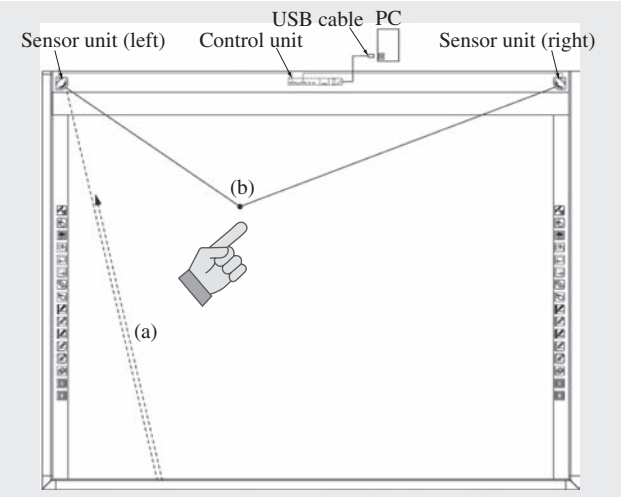

Fig. 6—StarBoard FX-DUO Operating Principles.
The user is provided with a diverse range of input methods.

large volumes.

Examples of how Hitachi has participated in government-level educational projects that have been launched in Saudi Arabia against this background are described below.

(1) Tatweer School Project

This project is being run by the Saudi Arabian Ministry of Education with the goal of adopting ICT devices for use in all classrooms at public elementary, middle, and high schools. Based on the number of schools, this means that the number of IWBs to be adopted is estimated at several hundreds of thousands of units. The 50 schools specified as model schools have already adopted 1,000 StarBoard units.

(2) SEHAI (Saudi Electronics and Home Appliance Institute) Project

This personnel development project is aimed at fostering domestic home appliance repair technicians in Saudi Arabia. StarBoard's teleconference feature is being promoted in this project because it gives the maintenance personnel of appliance manufacturers the ability to give lessons from Japan. Since documentation and images regarding repair can be shared and written over StarBoard, communication proceeds smoothly in both directions, and StarBoard is already being adopted on a trial basis.

STARBOARD

StarBoard Technology

The FX-DUO, which is the main StarBoard product, projects images from a PC (personal computer) screen to a board when connected to an LCD projector and a PC. In addition, it enables input via the board by using a finger, electronic pen, or other such means, as an interactive function for controlling the PC's operations.

An example of how to use the StarBoard FX-DUO is shown in Fig. 5.

The main features of the FX-DUO are shown below:

(1) A finger, pointer, or electronic pen may be used for input.

(2) Multiple simultaneous inputs and gesture input are both possible.

(3) StarBoard's software supports 21 languages, including Arabic.

(4) When used in conjunction with a Web camera, StarBoard can be used as a teleconferencing system that enables the sharing of conference material.

The FX-DUO operating principles are shown in Fig. 6. Infrared light is emitted at a wide angle from image sensors located on the left and right side

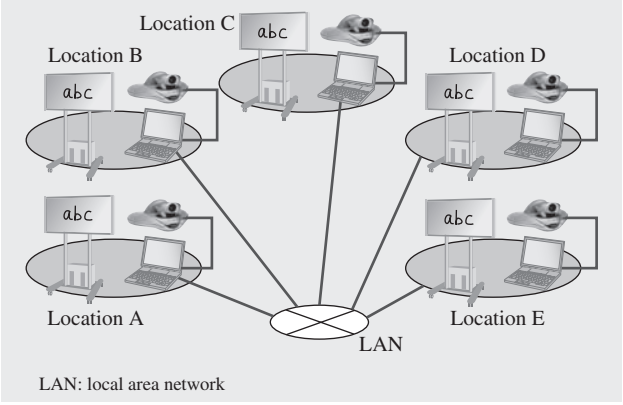

Fig. 7—Example of Teleconference Using StarBoard.
It is possible to hide written content that the user does not want to display at other locations, and to read documentation at one's own pace.

of the board. This infrared light is reflected by the retroreflective tape located around the board, returns to the sensor units [see Fig. 6 (a)], and is mapped by the image sensors. When the screen is touched [see Fig. 6 (b)], this reflected light is not returned, and the image sensors inside the sensor units detect this interruption of light, resulting in the mapping of a shadow image. The left and right image sensors can determine the coordinate position of where a touch occurred by using triangulation. This principle allows the user to input with a finger or pointer, or to input multiple points (use gesture input) and add input regions for the entire palm.

An example of how to use StarBoard during teleconferencing is shown in Fig. 7. A Web camera and StarBoard are installed at each location and connected using teleconferencing software. For instance, it is possible to display an electronic file opened at Location A on another location's StarBoard, or to display content manually written to a file (such as the "abc" screen shown at each location in Fig. 7). This makes it possible to conduct a conference while sharing documentation, which in turn alleviates the need to move between locations, thereby reducing business trip expenses and paper usage during conferences.

Future Product Development Based on Market Needs

As Middle Eastern and Saudi Arabian markets rapidly expand, the current model used at StarBoard sites (FX-DUO) is affected by a dust issue. Dust too small to be seen by the naked eye often floats through the air inside Saudi Arabian buildings, and this can conceivably affect the operation of the FX-DUO. Ways to resolve issues such as these are being considered for the next model.

MIDDLE EASTERN PROJECTOR MARKET

Positioning and Future Potential of Middle Eastern Market

The Middle Eastern projector market is also seen as an important market with promise for the future. This market was growing at a rapid rate of approximately 130% or greater year-on-year up until 2008. Due to the current economic crisis, however, although the 2009 projector market is projected to reach 102% year-on-year with 280,000 units sold (according to research by Futuresource Consulting Ltd.), negative market growth is also projected for many countries. Nevertheless, this is one of the important regions, and positive growth can be expected as a whole.

The market size and growth rate of African countries, which are also expected to show growth in the future much the same as Middle Eastern countries, are shown in Fig. 8. The average growth rate is 110%, with the three countries Saudi Arabia, South Africa, and UAE (United Arab Emirates) comprising 55% of the whole. In particular, the market size and growth rate of Saudi Arabia both exceed average values, and it is the most promising market in the Middle East or Africa.

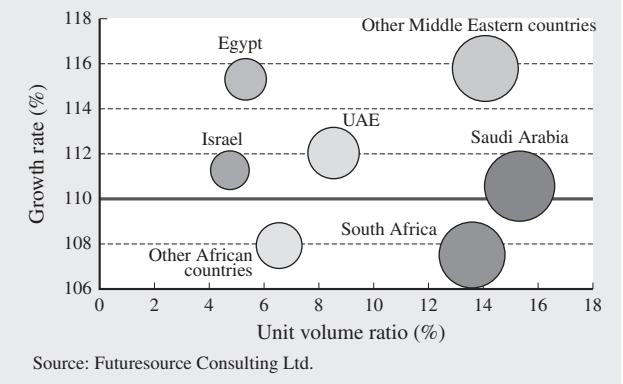

Fig. 8—Analysis of Projector Markets in Middle Eastern and African Countries.
The horizontal axis shows the unit volume ratio for each Middle Eastern and African country, the vertical axis shows each country's growth rate (average growth rate year-on-year between 2008 and 2011), and the size of the circles shows the monetary market size of each country. The growth rate for the entire Middle Eastern region is 110%. Saudi Arabia, South Africa, and the UAE are the three main countries.

Projector Market by Application and Purchasing Patterns

The projector market is broadly divided into three applications, namely corporate, educational, and home (see Fig. 9). The ratio taken up by educational projectors has been growing since 2007, and this trend is expected to continue into the future.

This trend is presumed to be caused by changes in the purchasing patterns of projectors. In European Union (EU) countries such as the UK and the Republic of Poland, from several hundred to several thousand projectors are purchased at a time under the leadership of central governments, after which they are provided to schools and other educational institutions. This kind of central government-led purchasing pattern was not as mainstream in the Middle Eastern region, however, where the prevailing trend has been for entire educational systems including projectors to be procured for each municipality, educational institution, or school.

There is an increasing interest in systematic education on the part of Middle Eastern countries at present, and many large-quantity orders have been received through central governments, starting in 2007. Furthermore, requests have been received since the second half of 2008 for "short throw" specification proposals.

Hitachi's Position in Middle Eastern Market

The Middle Eastern region is broadly characterized by both ordinary sales and periodic large-quantity tenders. Hitachi also won tenders for several thousand units in volume almost every year, and is steadily increasing its share in the Middle Eastern region (see Fig. 10).

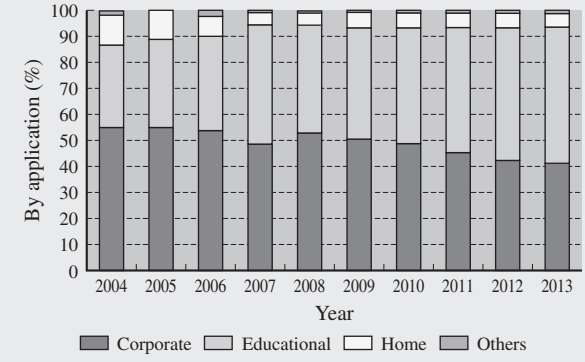

Fig. 9—Past and Predicted Projector Markets by Application.
Although corporate applications used to be the mainstream, the educational market has been on an upward trend ever since 2007.

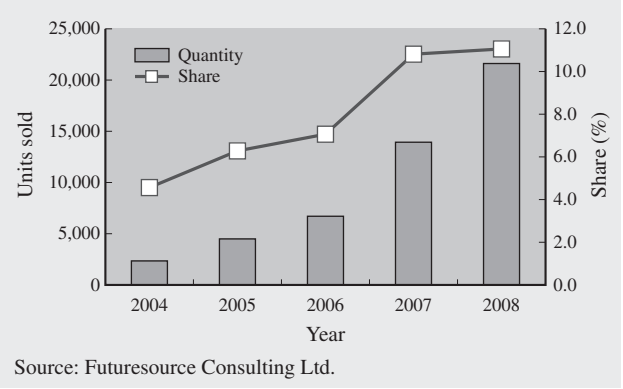

Fig. 10—Hitachi's Projector Sales and Market Share in Middle Eastern Region.
Figures exclude SVGA (800 × 600 dot resolution) products and home markets.

Fig. 11—External Appearance of ED-A100 Ultra-short Throw Projector.
The elegantly slanted curve design of the main unit and mirror part gives the ED-A100 a casual feel.

CP-A100, ED-A100, AND ED-A110 ULTRA-SHORT THROW PROJECTORS

Features of Ultra-short Throw Projectors

Since November 2007, Hitachi, Ltd. has been selling three models of ultra-short throw projectors that enable projection to large screens from the proximity of the screen in the European market, namely CP-A100, ED-A100 (see Fig. 11), and ED-A110. A100 series uses Hitachi's proprietary free-shaped surface optics system, which is based on optical design and manufacturing technology that has been accumulated over many years, and which has enabled Hitachi to achieve ultra-short throw capabilities that have never been available before (one third or shorter when compared with previous models).

The main features of Hitachi's ultra-short projectors are described below.

(1) Enables projection to large screens from the proximity of the screen (saves space).

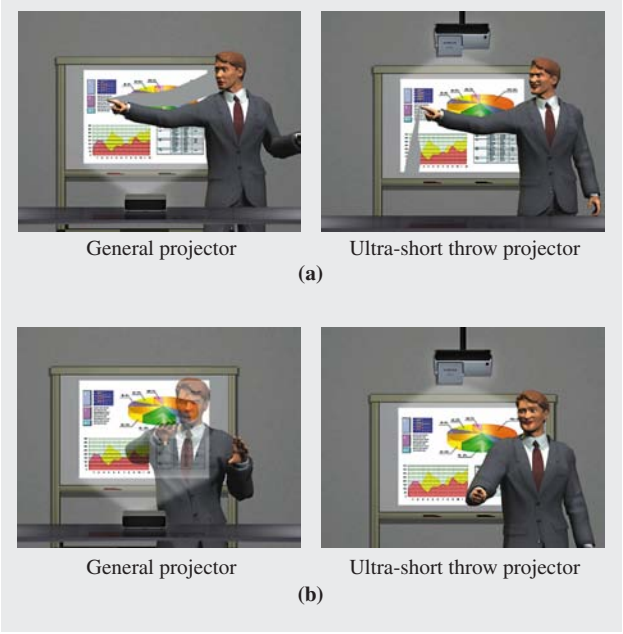

Fig. 12—Features of Ultra-short Throw Projectors.
These models greatly reduce the problem that afflicted previous projectors, whereby the presenter's image (shadow) would appear on the screen (a). In addition, they feature an elimination of glare due to projector light entering the presenter's eyes when he faces forward (b).

(2) Since the light from an ultra-short throw projector hits the screen at a diagonal angle, the image (shadow) of the presenter himself is greatly reduced [see Fig. 12 (a)].
(3) Since the ultra-short throw projector is closer to the screen than the presenter, even when the presenter faces forward, there is no glare, and the projector is easy on the eyes [see Fig. 12 (b)].
(4) CP-A100, ED-A100, and ED-A110 can be used to project a 48-inch image to a table when installed in a vertical orientation with the tabletop use kit.

Since they have achieved a previously impossible ultra-short throw, in addition to the education market, the series also shows promise for applications in a variety of other fields, such as amusement and digital signage. It is possible to directly draw both letters and diagrams on a projected image by using IWBs, which are extremely well matched with ultra-short throw projectors because the image (shadow) of the presenter himself is rarely a problem.

Free-shaped Surface Optics Technology for Achieving Ultra-short Throw Projectors

In general, when projection distance is shortened, this would lead to issues such as an increase in aberration caused by the projection lens, a worsening in focus and convergence performance, screen distortion, reduced image quality, and a larger projection lens. In order to resolve these issues, Hitachi, Ltd. developed a proprietary free-shaped surface optics system to achieve ultra-short throw functionality.

A free-shaped surface involves more than five times the design parameters of a traditional aspheric surface, and can be used to express a complicated shape, which makes it extremely effective at correcting for aberration. As shown in Figs. 13 and 14, it uses a mirror and lenses (two elements) together to correct for a wide range of aberration at a high dimension, while enabling the use of a smaller projection lens.

Although free-shaped surfaces offer a variety of different benefits, they are also extremely unforgiving when it comes to the margins of error involved in

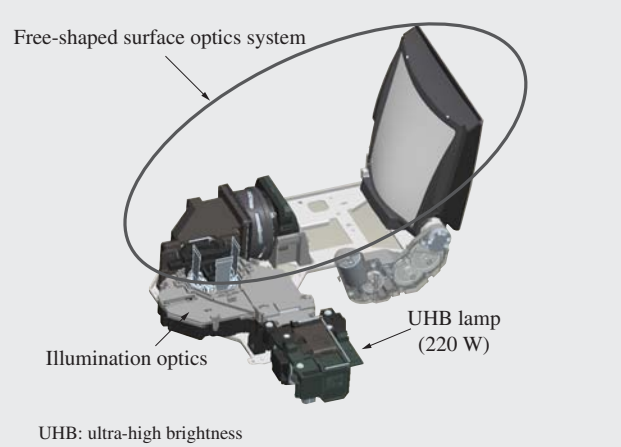

Fig. 13—Configuration of Ultra-short Throw Projector's Optical Engine.
A free-shaped surface optics system, highly efficient illumination optics, and UHB lamps have enabled the achievement of 60-inch images at a projection distance of 47.4 cm, with a brightness level of 2,500 lm.

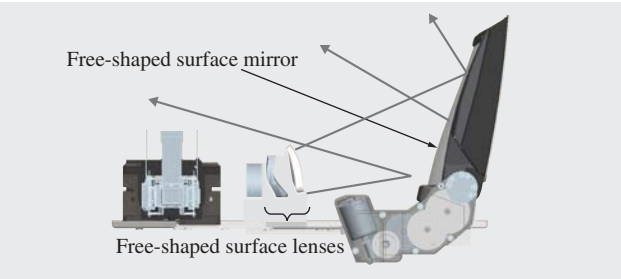

Fig. 14—Configuration of Ultra-short Throw Projector's Free-shaped Surface Optics System.
The combined use of both a free-shaped surface mirror and free-shaped surface lenses allows an ultra-short throw that is one third or shorter than that of normal projectors.

manufacturing formation tolerance. For this reason, Hitachi, Ltd. has commercialized free-shaped surface lenses and mirrors that satisfy the demands of formation error tolerance by developing ultrahigh-precision forming processes through the optimization of both die assembly (cooling, birefringence, warpage deformation analysis, and so on) and molding conditions.

Future Product Development to Meet Market Needs

The ultra-short throw projectors manufactured by Hitachi, Ltd. have dramatically improved convenience for users.

In the future, Hitachi will continue working to increase the ultra-short throw projector adoption rate by reducing both size and price, while actively utilizing materials based on a consideration of environmental concerns.

SAUDI ARABIA'S EDUCATIONAL SOLUTION CONCEPTS

Saudi Arabia is one of the most important educational markets in the Middle Eastern and North African regions, for the following two reasons:
(1) As an Islamic monarchy with two major holy sites (Mecca and Medina), Saudi Arabia has a major influence on the general educational systems of other Islamic states.
(2) As part of the national policy of improving education, a budget amounting to approximately one fourth of all appropriations for 2009 (approximately 3 trillion yen) was allocated to personnel development, including educational and occupational training.

The state of education in Saudi Arabia differs a great deal from education in Japan, however. Although the system is the same 6-3-3-4 system as in Japan, with compulsory education including six years of elementary school and three years of middle school (for a total of nine years), due to the strict religious social order that permeates Saudi Arabia, single-sex education is thoroughly enforced, and even faculty are completely segregated by gender. In addition, lessons focus on the humanities at both the elementary and middle school levels, including religious and moral lessons involving recitation of verses from the Islamic holy book, or Koran, as well as geography, history, and other such subjects.

There are special opportunities for the technology and products of Hitachi to contribute to this unique Saudi Arabian educational system. For instance, teleconferencing systems can be utilized in an environment where male and female students are kept isolated, and are seen as one possible breakthrough in the issue whereby faculty cannot be trained fast enough to keep up with increasing numbers of students. StarBoard is another solution that can supplement the lack of faculty by enriching educational content. Convenient tabletop electron microscopes, measurement devices, and other such equipment can be an effective means of eliciting the interest and curiosity of elementary and middle school students regarding science.

IT (information technology) can also be applied to educational services in order to achieve finely detailed instruction for university students. Starting with the use of RFID (radio-frequency identification) for student ID-based educational information distribution systems, various services can be provided through a fiberoptic network system and school servers in an IT infrastructure that supports book management systems and various other services.

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO) statistics, although approximately 60% of Saudi Arabia's university students are studying education or the humanities, only approximately 18% are studying medical and scientific fields. The government is planning increases in departments and subjects in areas such as medicine, computer science, nanotechnology, and business administration, and there is plenty of room for cooperating in the development of university education, such as in the establishment of university courses and joint efforts between industry and academia based on Japan's track record.

This trend is not limited to IT, but also includes business opportunities related to the infrastructure necessary for new schools, such as district heating and cooling systems, water treatment systems, in-house power generation systems, and water-supply pumps. In addition, proposals related to the creation of communities in university cities and other areas are also conceivable.

Our task for the future is to give shape to proposals for solutions based on the current conditions of Saudi Arabian society, as described above. To this end, Hitachi, Ltd. established its Riyadh Branch Office on October 1, 2009.

CONCLUSIONS

This article discussed examples of the adoption

of a combination of the A100 series ultra-short throw projector and the StarBoard IWB, as well as possibilities for Hitachi's educational solutions to widely contribute to education as a whole.

The eyes of those working on educational reform, which is the most important undertaking of Saudi Arabia today, are firmly fixed on the future. Saudi Arabia is very serious about its plans to ensure the success of sustained development by using the wealth attained from oil to invest in the cultivation of the next generation of human resources, and expectations are running equally high for the contribution of international corporations to this educational reform.

It is our hope that this article covering topics such as the example of educational solutions in Saudi Arabia can be of some small help in discussions about how to respond to the issues faced by developing markets.

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