Content

Guideline

Inclusive Architectural Design Concepts and Strategies for Technical Vocational Education Training

Editors
R. A. Oppong, A. Plümmer, A. B. Marful, D. Y. A. Duah, J. A. Danquah

KNUST, CABE, Kumasi 2022

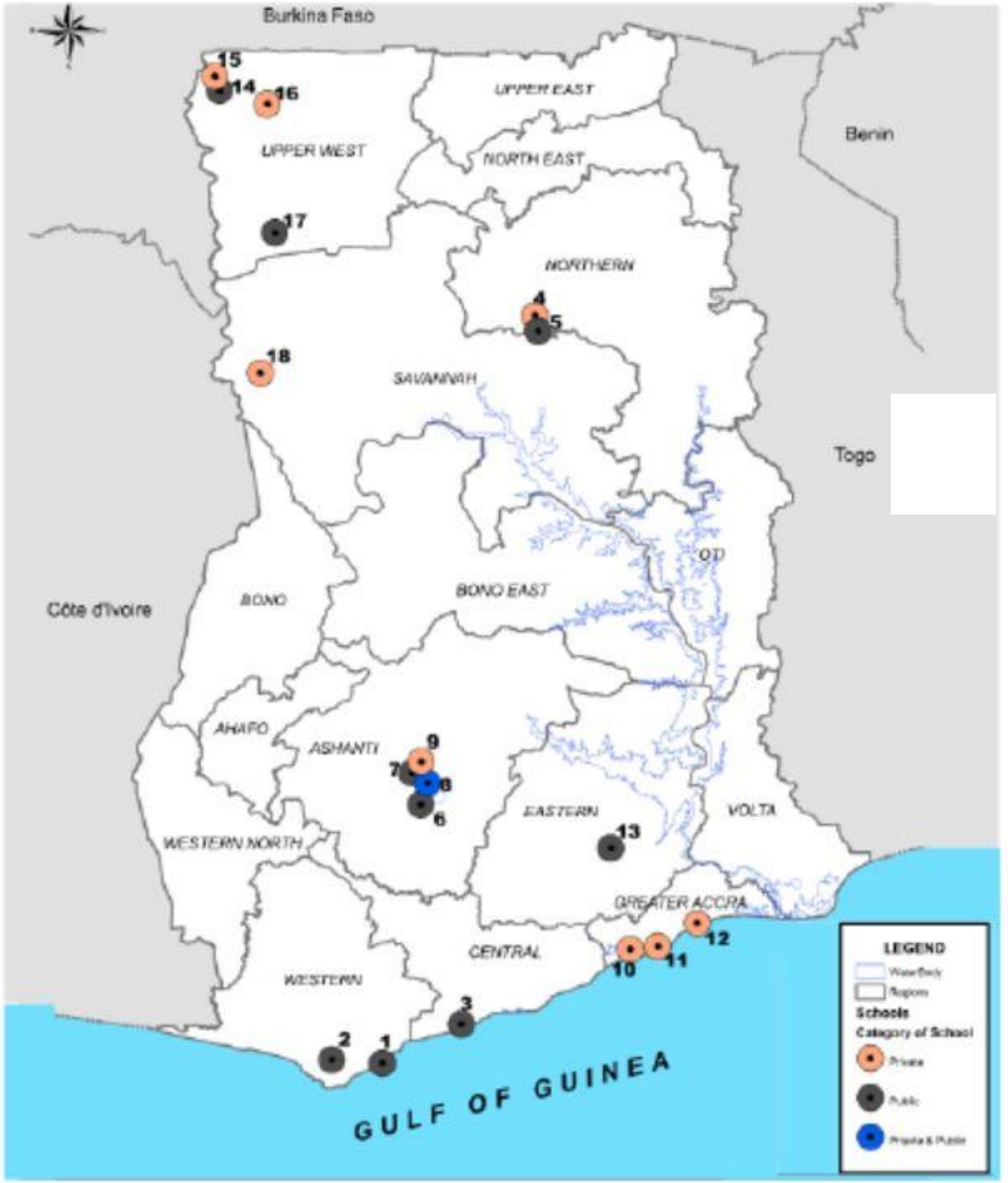
Background TVET

Surveying

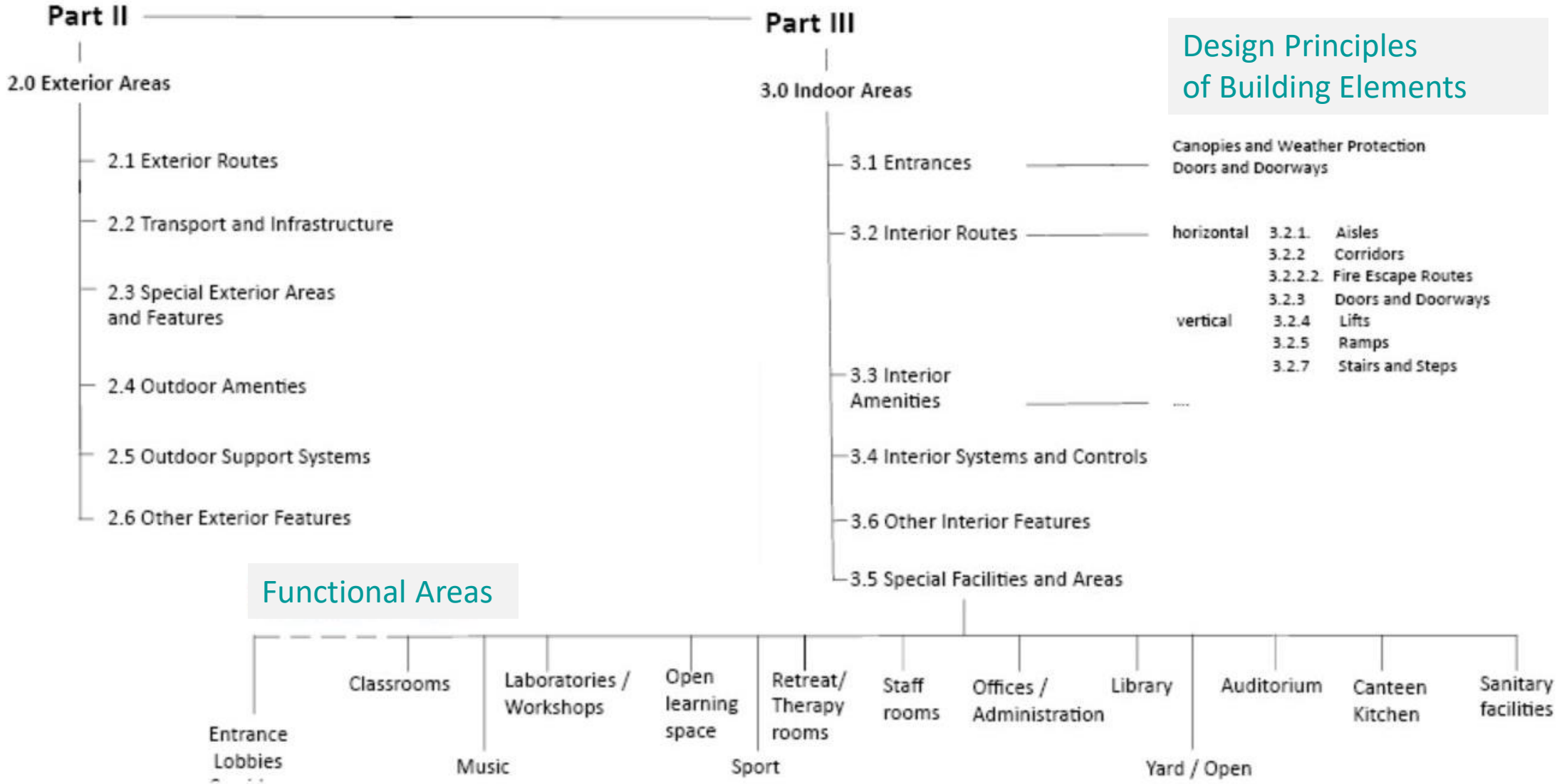
Photographing

Interviewing

Description of impairment	Frequency	Percentage
Asthmatic And Mobility Impaired	1	7.7
Cognitive	3	23.1
Cognitive And Mobility	1	1.7
Hearing And Speech	2	15.4
Height And Vision	1	7.7
Mobility	2	15.4
Speech	1	7.7
Vision And Mobility	2	15.4
Total	**13**	**100.0**



Ghana Accessibility Standard for Built Environment

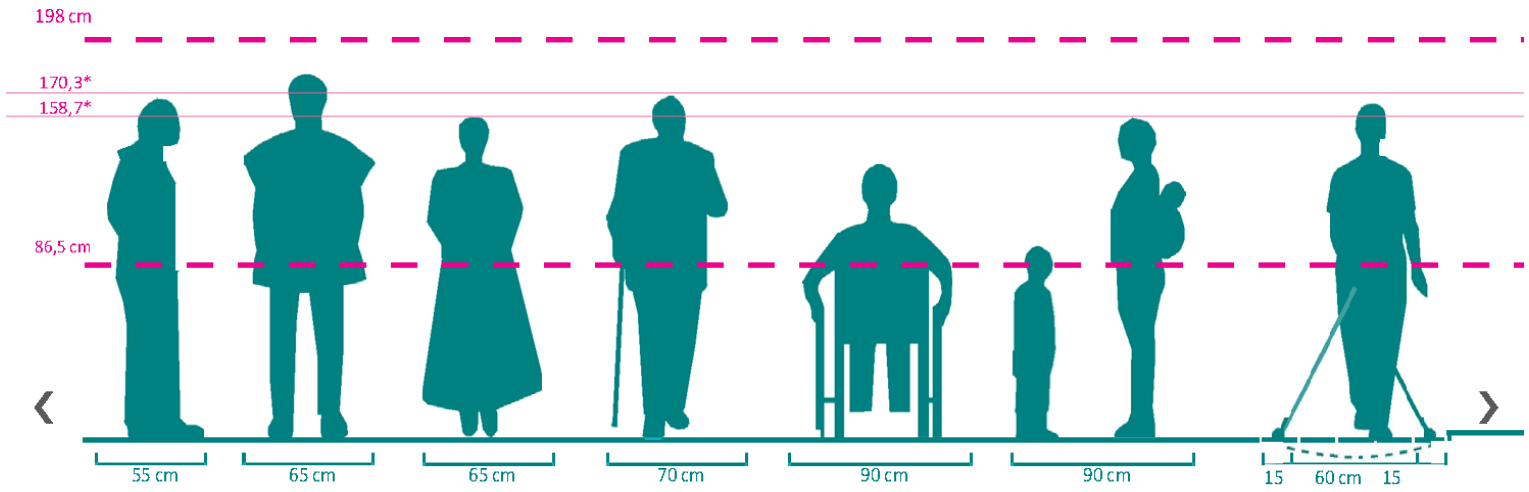


Design Principles of Building Elements

Functional Areas

Basic requirements

- **Anthropometrics**
- Reachability
- Maneuvering and Circulation areas
- Fields of vision
- Colours and Contrasts



A barrier-free school includes both the external and internal development of the site and the building. Here, the requirements for ergonomics and design principles must be taken into account.

Thus, the basic dimensions needed by persons must be considered. These standard dimensions should form the basis for the design of facilities for a barrier-free school. The essence of using a standard anthropometrical distance is to ensure that notwithstading a person's stature, he/she can easily navigate the spaces of the school.

The distances above are the approapriate and efficient widths for these different actvities.

Addtionally, the dimensions of mobility aids like wheelchairs, crutches,walking sticks and white canes must be considered as well. These dimensions form the basis of the Accessibility Code DGS -1119 for the width of doorways, corridors, walkways, etc., the most important dimensions can be found in the grey boxes below.

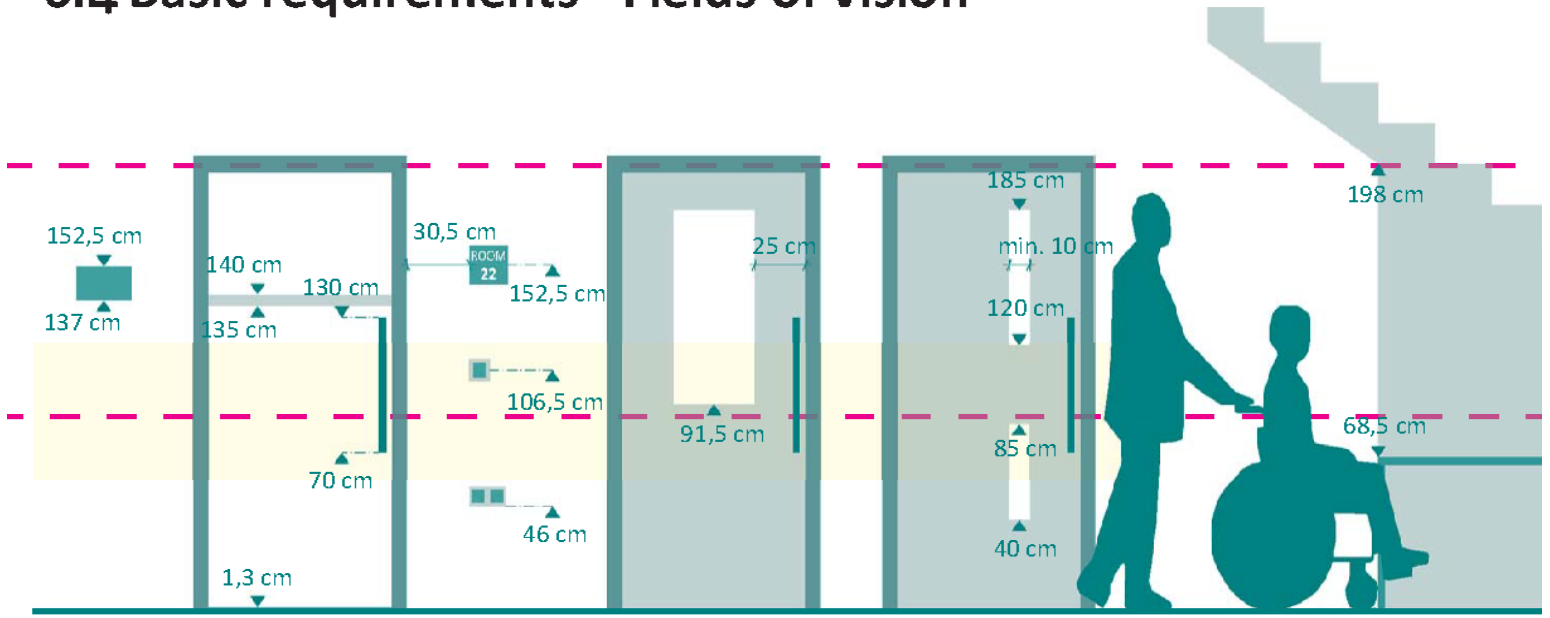
Accessibility Code DGS 1119	**Width and Area:**
→ Link: *Average Height By Country 2021	
→ Link: Raumpilot – Basic (German)	

3.2.1	91,5 cm min. width of main entrance and accessible doors
	81 cm min. width of at least one leaf of door pairs
3.2.3	86 cm min. opening, clear of obstruction

Basic requirements

- Anthropometrics
- Reachability
- Maneuvering and Circulation areas
- Fields of vision
- **Colours and Contrasts**

6.4 Basic requirements - Fields of vision



To ensure that people can identify and use handles and switches efficiently, they must be placed in the field of vision. On approach, entrance doors should provide a visibility area of at least 50 cm to 150 cm. This visibility area is generally acceptable for the placement of vision panels. This ensures that people can see and be seen approaching doors. Door handles should fall within this visibility range for ease of identification and operation. Heights of sockets and duplex receptacles needs to be within reach and vision of all persons especially persons using mobility aids like scooters and wheelchairs.

3.4.6	46-106,5 cm height of duplex receptacles 61-120 cm height of all controls, operating components for easy access by persons using mobility aids

Furthermore, the standard heights permitted in the field of vision of an upright man informs the heights and positions of critical components in the built environment. This visibility range informs much of the considerations for heights of furniture, door handles, headroom clearances etc. The recommended visibility range for effective identification, reach and function in most cases is between 86.5cm to 198cm. The principle should be that everyone should be able to perceive and use facilities through the same provisions, thus the need to design an inclusive system that meets everyone's needs.

3.4.16	137-152,5 cm height of directional, locational signage
3.1.7	1,3 cm max. of thresholds
3.2.7.	198 cm headroom clearance under stairs

Inclusive Architectural Design (IDA) – Concepts and Strategies

Access to TVETs implies that everyone can

Approachability | Findability | Accessibility | Usability | Security and Comfort

→ Mobility chain/Atlas - bfb building barrier-free

get there	by public transport, private car, bycle...
get informed	by a wayfinding-, orientation system, signs...
get in	by overcoming height differences self-determined...
get along	by easy usability of operating elements, functional areas and sufficient movement areas....
get out	in case of emergency

IDA
– Concepts and Strategies

Approachability
Findability / Orientation
Accessibility
Usability
Security and Comfort

IDA
– Principles

Inclusive Architectural Design Principles for TVETs

- Moblity
- Visuality
- **Audibility**
- Cognition

IAD Principles - Audibility

1 **Hearing well**
The design of rooms must be geared towards high speech intelligibility both phonetic and visual

2 **Good audibility**
Use design calculation and simulations of sound for good speech intelligibility and audibility.

3 **Appropriately designed spaces**
Spaces must be designed appropriately based on calculations and concepts aimed at reducing echoes and reverberation times to enable concentrated work and good speech and hearing comfort

4 **Spatial disposition**
Spaces should be laid out in such a way that facial expressions, gestures and body language are clearly visible to all – to aid lip reading and the use of sign language.

5 **Visual communication**
Create strong visual identities to enable easy wayfinding. Eliminating visual noise for good vision ensures effective visual communication.

6 **DeafSpace architectural design concepts**
Enhance and promote multisensorial orientation and function of spaces. → Link: Gallaudet University

7 **Use of technology**
Employ noise reduction and communication through technology, integrated into the architecture or as add-ons.

Photo: C. Ruhe

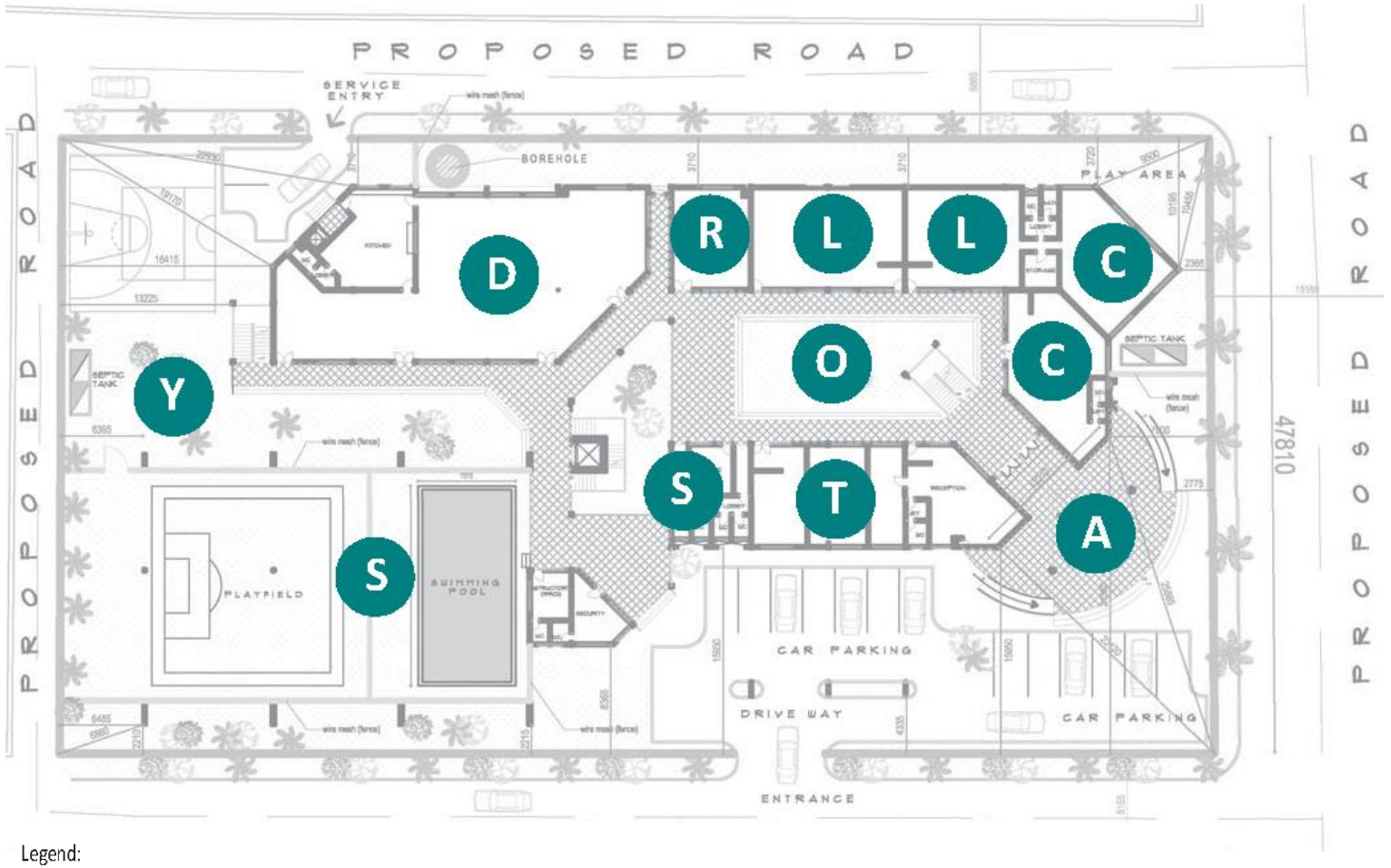
Photo: Schörghuber

See well = Hear good

Room Guide

Description of concrete measures for selected rooms in a TEVT

- **Function**
- **Equipment / Furnishing**
- **Light**
- **Acoustics**



Legend:

A_Atrium / Entrance	**O**_Open Learning Space	**T**_Teacher's Lounge
C_Class room	**R**_ Retreat room	**Y**_Yard / Campus
D_Dining area /Canteen	**S**_Sanitary room	
L_Lab / Workshop	**S**_Sports	

LAB / Workshop

- Function
- Equipment / Furnishing
- Light
- Acoustics

Light

The lighting needs for laboratories/workshops must be planned carefully due to the high hazards in these spaces. It should be well illuminated and have task lights at all work surfaces/benches. Learners will have to be able to see the supervisor well at all times, and must also be able to see their work piece. Make sure that the design of task lighting, with at least 500 lux, does not obstruct learners' vision or work.

The overall goal of lighting for workshops is to create a neutral, safe and glare-free lighting environment, so that colours, shapes and tools can be easily distinguished. An individually adjustable task light can help to perform assigned tasks well and safely. Ideally, a laboratory should have a uniform colour temperature of light, as contrasting temperatures can be confusing and dangerous to work with.

- Provide both working and ambient light with at least 500 lux.
- Ensure that all tools, the instructor and other participants are clearly visible.
- Provide synoptic and sound alarms for emergency warning.
- Provide tactile tools for learners with visual impairments.

Acoustics

The basic function of such spaces for practical work can vary from trade to trade. Whatever the nature of the education activity, the right acoustic environment is crucial for success.

As workshops and laboratories involve the use of all kinds of machinery and tools, all spaces depending on their use might require additional protective gear for good acoustics. For example, ear muffs in an auto mechanic workshop are mandatory in the TVET system.

The use of tools and machines per se creates increased background noise, which negatively affects the overall acoustic health of the facilitators and learners. Therefore it is important to choose the right acoustic solution and to create an effective lighting situation.

In addition to reducing background noise, it will be helpful to observe the following:

- Reduce background noise.
- Provide a good illumination level.
- Ensure high visibility of tools, machines, facilitator and other learners always.
- Regard listed key points: Light.
- Try to make the usage of tools as quiet as possible

The Way forward

Juxtapositions
- Existing vs. Proposed Situations
of Inclusive Environments

Suggested measures

Rendering: Nora Kramer

- ramp and stair in combination
- the handrail is neccessary (here it is only indicated)
- using colour and signage for orientation

Checklist / Rating System

Checklist and rating system for assessing and surveying inclusive educational buildings.

BARRIER FREE DEVELOPMENT KEY PERFORMANCE INDICATORS (BD-KPI)
Community / Project Scorecard

I. EXTERIOR AREAS

Yes	?	No			
0	0	0	**APPROACHABILITY- GET THERE (12%)**		**36** Points Possible
0	0	0	**Access, Infrastructure, Outdoor Facilities**		**28 Points Possible**
Y			**Prereq 1**	**Minimum width of sidewalks 150 cm** (167.5 cm preferrable)	Required
			Credit 1	Threshold-free, main access stepless, level difference bridged with ramp (150 cm)	2
			Credit 2	Max. width and length of ramp (101.5-110 cm / 900 cm)	2
			Credit 3	Inclination of ramps (1:15 better 1:18)	2
			Credit 4	Depth plattform required in front of the ramp (167cm x167cm)	2
			Credit 5	Min. depth of intermediate level landing (1.67 m) in depth by the width of the ramp	2
			Credit 6	Handrails with wheel deflectors on both sides on stair or ramp	3
			Credit 7	Firm and level surface of the access areas, flooring: hard, non-slip', no gravel	1
			Credit 8	Usability in a seated and standing position	2
			Credit 9	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
			Credit 10	High-contrast design among surfaces such as floor,doors and openings, walls and ceiling	2
			Credit 11	Use lighting fixtures for orientation and guidance	2
			Credit 12	Tactilely detectable floor structures	2
			Credit 13	Usability of sports and play equipment in the outdoor facilities must regard all usergroups	2
			Credit 14	Effective way finding system at acceptable heights and no glare	2
			Credit 15	Well demarcated access route with guardrails at end such as kerbs	1
0	0	0	**Barrier Free Parking Lot**		**8** Points Possible
Y			**Prereq 1**	**Protected or designated route from the parling space to an accessible entrances**	Required
Y			**Prereq 2**	**Physical separation between motorised traffic and pedestrian zones**	Required
			Credit 1	1:25 ratio of accessible parking spaces to normal parking spaces (New)	2
			Credit 2	Ratio of accessible parking spaces (366 x 538.5 cm) to normal parking spaces (1:25)	2
			Credit 3	Location: maximum recommended distance to building entrance (3000 cm)	2
			Credit 4	Flooring: level, hard, unavoidable slope max. 1:20, and with accessible parking signage	2

Thank you very much

In cooperation with

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH