Guideline

Inclusive Architectural Design Concepts and Strategies for Technical Vocational Education Training

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Inclusive Architectural Design Concepts and Strategies for

Technical Vocational Education Training

Preface

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There are over one billion people living with disabilities around the globe. This equates to around 15 per cent of the world's population, with some 80 per cent of them living in developing countries and emerging economies. Therefore, inclusion plays a critical role in maintaining equity, which allows persons with disabilities to produce and reach equal outcomes along with their abled competitors.

The government of the Federal Republic of Germany committed itself to disability inclusive development cooperation after ratifying the United Nation Convention of the Rights of Persons with Disabilities (UNCRPD) in 2009. The contribution takes a human rights-based and intersectional approach of development cooperation which ensures the rights of persons with disabilities are respected, protected, promoted and guaranteed as a key prerequisite for sustainable development. The 2030 Agenda serves as the compass for German politics as it pledges to 'leave no one behind'. However, it cannot be realised without considering the inclusion of persons with disabilities. Therefore, it is important to capture and address the diverse living conditions, intersectional ties and specific needs of certain population groups and give them a fair chance to participate in society.

The GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH) Global Project Inclusion of persons with disability is commissioned by the

German Federal Ministry for Economic Cooperation and Development (BMZ). It aims at championing the rights of persons with disabilities by supporting international, regional and national efforts through German development cooperation. A partnership has been established with the Kwame Nkrumah University of Sciences and Technology (KNUST), Kumasi, Ghana and the Frankfurt University of Applied Sciences (Frankfurt UAS), Germany to promote equal participation for individuals with disabilities in an inclusive education and remove obstacles to such participation within society. Within German development policy, the inclusion of individuals with disabilities is considered a major element of a development process that is moving towards a society in which every individual has an equal opportunity to develop his or her full potential. If the Federal Republic of Germany is able to shine a spotlight on the situation of persons with disabilities in their partner countries by actively supporting these individuals and addressing them as a target group in our programmes, it unlocks opportunities for them to participate in societal, economic and political life.

This book with guidelines scrutinizes the feasibility, importance and impact of inclusive architectural design concepts and strategies for Technical Vocational Education Training (TVET) in Ghana. It further questioned the applicability, relevance and efficiency of the curriculum, institution infrastructure and support systems. The book emphasized that attaining vocational training and education is key for the liberation of all persons from the confines of poverty. The guidelines give a safe space for learning, by highlighting the concepts that promote accessible and barrier-free TVET in Ghana, regardless of a student's identity and ability.

In sum, great strides and dedication has been taken to compile this book and research this topic. Evidently, with any good initiative, there are challenges faced in the process. However, the authors managed to acquire data, analyze and present it. The findings suggest that students with disabilities experience difficulties accessing school infrastructure, stigmatization, and lack of institutional support. These challenges are proof that there is a lot to be done in the field of inclusive education. Nevertheless, this book paves the way for upcoming scholars to further research and look in-depth at inclusive training at TVET in Ghana. We would like to thank the authors and all contributors for this excellent piece of work!

Chapter overview:

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Foreword

R. A. Oppong

01

This book is a product emanating from a well-conceived primary research by some academics and students of the College of Art and Built Environment of Kwame Nkrumah University of Science and Technology (KNUST), Kumasi and Frankfurt University of Applied Sciences (FRA-UAS) with kind sponsorship from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The research addressed issues of inclusive architectural design concepts and strategies for accessible employment promotion and training institutions in Ghana to meet the need of specific architectural design principles for making built environments free of any barriers for the use of all persons irrespective of their disability.

In addition, this book led by architectural academics and experts, significantly contributes to the actualization of the core values of KNUST by creating diverse and equal opportunities for All on the backdrop that universal design principles have been quite generic. As a leading University, KNUST recognises the importance of the Sustainable Development Goals (SDGs) to technical and vocational education training (TVET); and therefore, provides quality leadership in innovation and technology as well as culture of excellence to support the development of Ghana and beyond.

Arguably, whilst the universal design principles have been quite generic, the content of this book, in an inventive manner, tackles the seven principles of universal design developed by architects, product designers, engineers and environmental researchers to guide the design of environments, products and communications. The inputs of this book by enlightened stakeholders and thoughtful practitioners, such as architects, planners, teachers, parents and students etc. address concrete Inclusive Architectural Design (IAD) principles to guide and stimulate how built environments can be made barrier-free and dynamically inclusive.

This book is undoubtedly relevant for all stakeholders to understand the issues of inclusive architectural design concepts, strategies, the different needs and perspectives of mobility, accessibility, safety, seeing, hearing, cognition and types of disabilities in general. The way to enhance inclusivity in TVET education is understanding and meeting these needs of disability for sustainable living. This book provides a general overview of measures for inclusive design; and thus, it is an important book for everybody, especially in Ghana and to some extent, Sub-Saharan Africa.

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Inclusion

MMUSUYIDEE-or "that which removes ill luck or curses." This is the symbol for good fortune and sanctity.

Inclusive education means that all people can participate in quality education and fully develop their potential. Neither gender, social or economic conditions nor special learning needs should prevent a person from developing their potential. (Definition by UNESCO)

Photo from survey

Introduction

D. Y. A. Duah, A. B. Marful

02

[1] Kearney;Alison, (2016), "The right to education ..."

- → **Link: Sustainable Development Goals**
- → **Link: Sustainable Development Goals Ghana**
- → **UN Convention**
- → **[2] Global education monitoring report, 2020**

2.1 Disability-Inclusive Education

The significance of education in the entire development of people cannot be overstated. Education can empower people, break cycles of poverty and oppression, reduce inequality and discrimination, increase tolerance, respect and understanding between different groups of people and also reduce conflict[1].

The latest "Global education monitoring report," published by UNESCO in 2020, reminds us of the persistent and troubling inequalities in education and clarifies: "Inclusion in education is about ensuring that every learner feels valued, respected and can enjoy a clear sense of belonging. Yet many hurdles stand in the way of that ideal. Discrimination, stereotypes and alienation do exclude many." The report's central recommendation is that all education stakeholders should broaden their understanding of inclusive education to include all learners, regardless of identity, background or ability.

An "all means all" approach to inclusion means dropping all stigmatising labels. At the same time, the UNESCO report does not deny that the ideal of full inclusion can have its downsides. There are dilemmas and tensions associated with achieving the ideal of full inclusion.[2] Even so, it is necessary to change from current practise of exclusion to a system that meets the needs of all learners.

In addition to a broad array of pedagogical, systemic and organisational requirements, several studies have documented the influence of the physical, built environment on people's daily activities. It therefore goes without saying that a school's environment can make an immense contribution to effective teaching and learning in educational institutions. The prerequisite, however, is a conscious decision to implement inclusion and to allow the participation of all those involved in the school system.

The concepts in this particular manual are intended to assist in the promotion of accessible and barrier-free TVET in Ghana. By making TVET institutions spatially and structurally accessible and barrier-free, Ghana can address the widening gap in high-skill development and truly "leave no one behind."

To provide a holistic and fully inclusive space, that is conducive to effective teaching and learning. Accessible facilities should not only be seen as a solution for the inclusion of people with disabilities, but as a general prerequisite for training, education and personal development.

Although the lessons and case studies refer to Ghanaian culture, prerequisites and standards, the findings from them may be applied to other regions of (sub-Saharan) Africa in general.

2.2 Necessary Settings

An inclusive built environment focusses on its spatial, technical and social requirements. These fundamental settings enable inclusion and access to disability-inclusive education, as may be seen in the graphic to the right.

→ cf.: Schulze, Astrid (2016) Auf dem Weg zur inklusiven Schule. Schule für alle gestalten, Aktion Mensch e.V., 04

Background

D. Y. A. Duah, A. B. Marful, J. A. Danquah, M. Amoah, I. Baffoe-Ashun, I. Bekoe, C. Akuffo

03

Key Themes:

- **Formal Education System in Ghana**
- **TVET in Ghana**
- **Survey and Findings**

3.1 Formal Education System – Ghana

In line with the International Standard Classification of Education (ISCED), the Ghanaian education system is organised into five main stages.

Formal education in Ghana begins with primary education in the country's "free compulsory universal basic education" programme. This is followed by Junior High School, situated on the ISCED 2 stage, from which pupils proceed to either

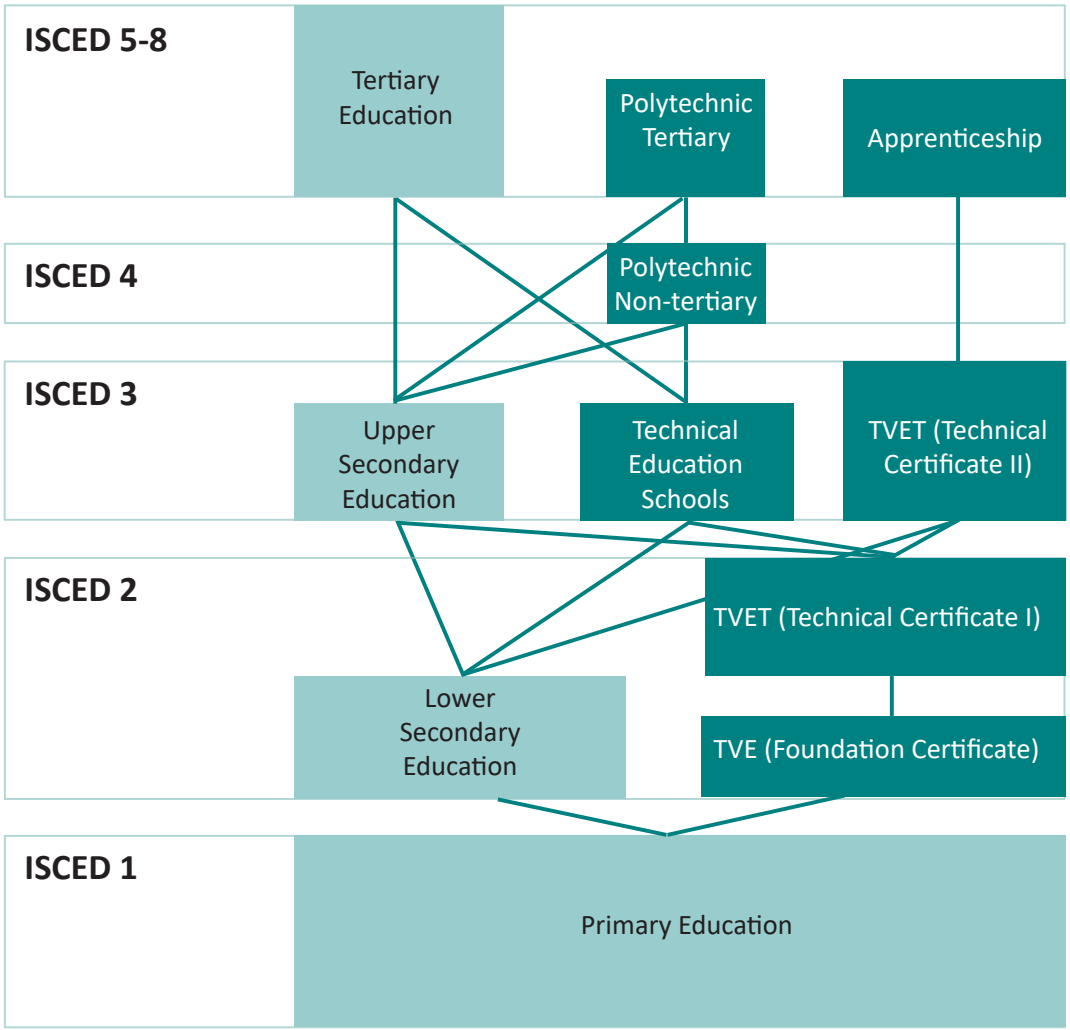
1) Upper secondary education or
2) Technical education or
3) Technical and Vocational Education Training (TVET),

which are all at the ISCED 3 level (upper secondary education). There are some institutions of post-secondary (ISCD 4) or tertiary (ISCED 5–8) education.

In a typical TVET track, there are the Foundation certificate, Certificate I and II, then an apprenticeship (the tertiary level) conducded by Workplace Learning Experience. (WLE)

→ cf. UNESCO-TVET+Country+Profiles/

Compulsory education: 11 years



3.2 TVET in Ghana

Any educational institution that provides technical and vocational education and training is referred to as a TVET institution. The idea is to use training and skills development programmes that relate to diverse occupational fields, production, services and livelihood to provide employment related knowledge and skills to students to allow them to transition from secondary education to work (UNESCO 2015). The aim of TVET is to help youth and adults to develop skillsets that are necessary for employment, decent work and entrepreneurship and these address economic, social and environmental demands, thus is sustainable. TVET promotes equitable, inclusive and sustainable economic growth (UNESCO, 2021a).

In Ghana, technical vocational institutions were set up to equip people with expertise in technical and professional skills necessary for the socioeconomic and industrial development of the nation. An important aspect of the programme is to train students for self employment. In a competency-based training (CBT) sector like TVET, instructional learning transcends the classroom environment to laboratories, workshops, practical rooms and sometimes open learning spaces.

The TVET system in Ghana is governed by the Ministry of Education and supported by other ministries including the Ministries of Employment and Labour Relations, Youth and Sport, Health and Environment, and Local Government and Rural Development. The Ghana Education Service (GES), which is an agency under the Ministry of Education is responsible for implementing all pre-tertiary education policies developed by the Ministry.

Two important actors in TVET governance in Ghana are the Council for Technical and Vocational Education and Training (COTVET) and National Vocational Training Institute (NVTI). COTVET is responsible for the coordination and supervision of the TVET system and is supported by five standing technical committees: the National TVET Qualifications Committee; the Industrial Training Advisory Committee (ITAC); the Training Quality Assurance Committee (TQAC); the National Apprenticeship Committee and the Skills Development Fund Committee.The NVTI which comes under the Ministry of Employment and Labor Relations, runs thirty-four vocational institutes across the country and trains the youth in twenty-eight skill areas (UNESCO 2021b).

One of the biggest challenges that TVET has faced over the years in Ghana is what has been an image crisis over a perception of the public that such education is reserved for students who do not do well academically. In addition, there are challenges such as obsolete machinery, a fragmented TVET landscape, an outdated curriculum, a lack of standardization, duplication of roles amongst agencies and poor investment (MoE 2021).

Additionally, funding has been a huge bottleneck. Funding is from three main sources: allocations from the budget, contributions from development partners and tuition fees. While budgetary allocations to education (budget and development partners) represented around 20 per cent of total government expenditure in 2017, less than 4% of these funds went to the TVET subsector and it was mainly to pay the wages of TVET staff. Chronic underfinancing of the TVET continues to pose a challenge to TVET education in Ghana and this is evident in the schools (UNESCO 2021b).

Another area of neglect is the TVET environment which must provide the best possible space for effective teaching and learning. Thus, the TVET campus must have a holistic approach to accessible and inclusively designed structures and environments for all students to thrive irrespective of their abilities and background. Such a conducive environment must consider the approach, access and use of the spaces and its users.

In terms of qualification, the National Technical and Vocational Education and Training Qualifications Framework (NTVETQF), which is administered by COTVET, provides a comprehensive eight-level national qualifications framework for TVET (Table 1). Levels 1 and 2 cover informal apprenticeships.

Table1: The Ghana National TVET Qualifications Framework

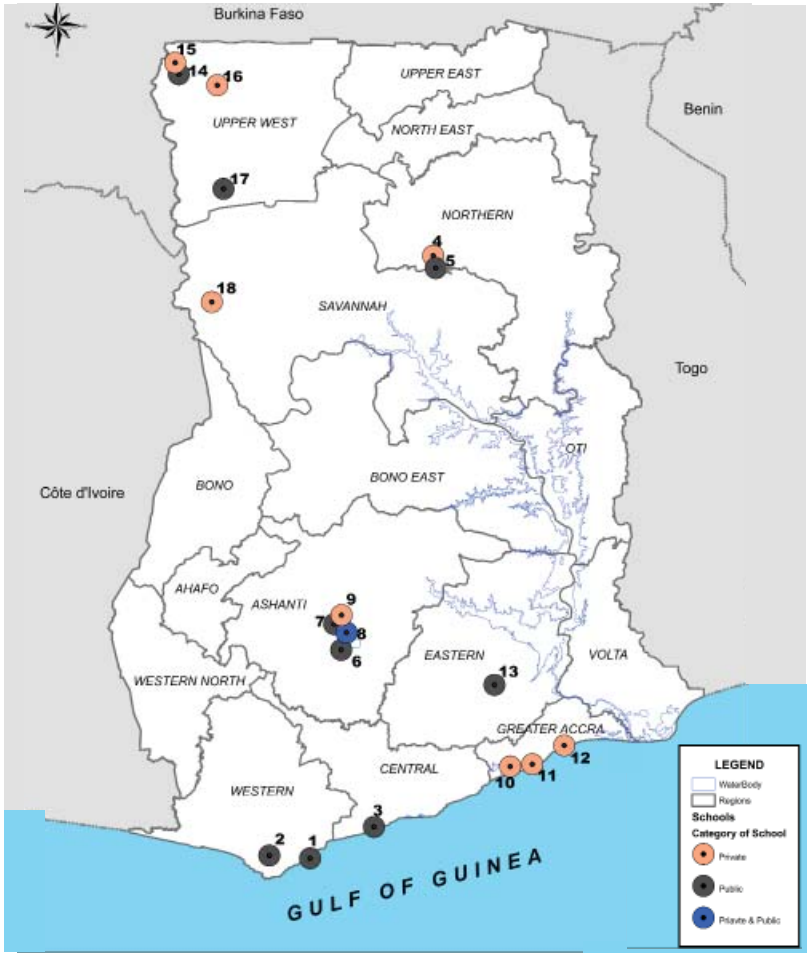
Level	Qualification	Qualification TVET
8	Doctor of Technology	
7	Master of Technology	
6	Bachelor of Technology	
5	Higher National Diploma	TVET
4	Certificate II	TVET
3	Certificate I	TVET
2	Proficiency II	TVET
1	Proficiency I	TVET

Source: Ministry of Education 2021

The future of TVET looks bright with the commitment of the government of Ghana to establish at least two fully equipped TVET centres in each region with state-of-the-art machines and training tools for all levels to serve as the headquarters of technical and vocational training. In addition, existing centres shall be upgraded to provide young people with employable skills that will make them employable, ensure skills and TVET drive development across the country, and enhance the Ghanaian workforce to make them globally competitive.

Infrastructure upgrades and investment in the TVET sector are long overdue. With the renewed impetus from the government of Ghana and collaboration from all partners, it is expected that this programme will achieve its desired results. These results will, however, be meaningless unless it ensures that the environment for TVET learning is accessible and has inclusively designed structures and environments for all students to thrive irrespective of their abilities and background.

3.3 Survey and Findings



A survey was conducted among randomly selected TVET institutions across the country to understand the current state of inclusiveness of such institutions in Ghana. The survey successfully covered 18 schools (see distribution on map) out of the selected 28 schools granted access by the Ministry of Education. This survey collected data on the statistics of students and staff with various impairments, the courses of study of such students, the perception of these persons on barrier free issues on their campus as well as barrier free physical audit of facilities within the campuses.

The survey revealed that students with impairment constitute 1.1% of the total enrollment, whereas staff with impairment also constitute 1.4% of the total staff employed.

The findings indicated the presence of staff with impairment who had mobility and sensory challenges whereas students identified with impairment fell under the following descriptions in table 2 below.

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**

→ More Information chapter 13

A further investigation using the Washington groups' set of questions on randomly selected students indicated that an average of one in every 8 students had expressed one or multiple difficulties in performing daily school activities. This gives credence to the challenge of properly identifying students with impairment in the various schools for effective policy implementation.

Again, students with impairments interviewed expressed satisfaction about their perception on barrier free school environments. Whilst approachability and accessibility to facilities scored 3 out of 5, usability had average score of 2 (with a ranking range from 1 to 5 where 1 is least satisfied and 5 highly satisfied).

A barrier free audit checklist used in assessing the campuses had the following findings:

- All facilities and institutions were found to exhibit one form of barrier to multiple barriers making it difficult for students and staff with impairment to perform their daily functions.
- Barriers include lack of accessible entrance and drop off zones, uneven, unstructured and poorly maintained access and pedestrian walkways, lack of orientation and direction to basic facilities, prevalence of old dilapidated structures causing serious safety concerns and inaccessible recreation facilities. Instructors and teachers also lacked the requisite knowledge to identify and offer support for PwD's.
- Students with impairment disclosed the prevalence of stigmatisation from other students, parents and staff towards their inclusion in the mainstream schools of study.
- New structures on campuses still lacked barrier free features. If available, ramps were poorly constructed.
- Many of the heads of institutions have been trained with the basic concepts of inclusive education but decried the lack of institutional support from the ministry of education to implement its barrier free education policy.
- The Summary of the audit (Link see below) shows the average performance of various indicators of barrier free conditions on the campuses with a ranking from 1-5 with 1 as lowest and 5 as highest.

The audit further revealed that all schools visited, failed to meet a satisfactory score of 3 and above indicating high prevalence of barriers on the campuses. Main entrance to facilities, internal ramps, accommodation, and steps and stair halls obtained an average score of between 2.3 and 2.6, whilst signage, corridors and teaching spaces had averages between 2.08 and 2.20 out of the 5 marks.

Moreover the few barrier free interventions made were heavily (90%) tilted towards mobility impaired students, with neglect of other forms of impairment on the campuses.

These findings highlight the inadequacy of inclusiveness in TVET schools in Ghana. Thus, there is an urgent need for proactive actions to be taken to address this. This manual provides one such step to address the need for inclusiveness in schools.

Legal Framework

M. Amoah, A. I. Baffoe-Ashun

04

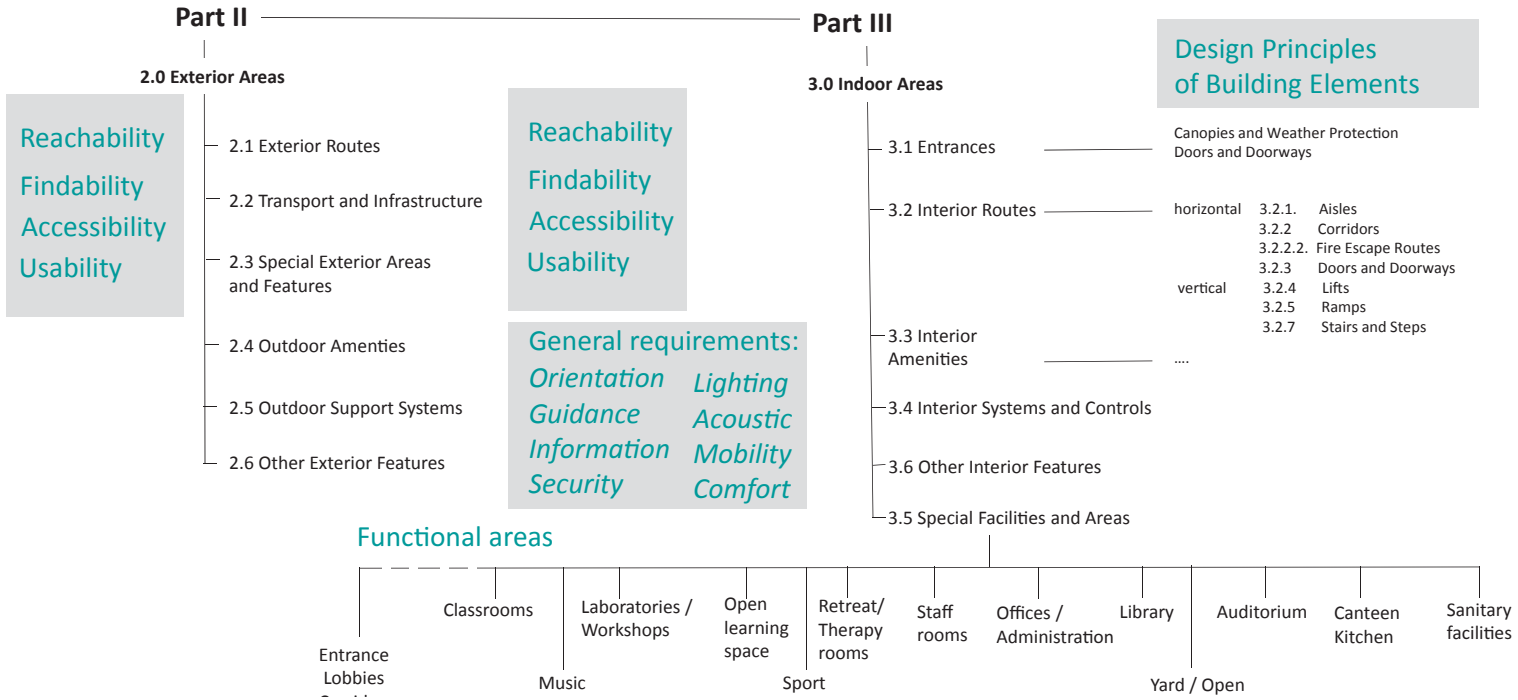
Key Themes:

- **Structure of the Accessibility Standard**
- **Legislation and Inclusive Education in Ghana**
- **Key Gaps identified**
- **TVET Relevant Laws, Standards and Guidelines**

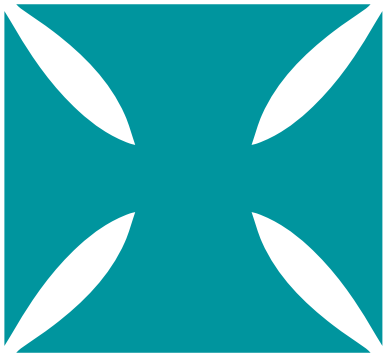
This chapter shows the relevant laws and policies in Ghana for the built environment aimed at creating accessible environments:
The Ghana Accessibility Standard for Built Environment, passed in 2016, is an important legal document that seeks to make our public built environment free from barriers.There are a number of laws and policies that guide the planning, design, construction and maintenance of the built environment in Ghana. A combination of these helps to guide the creation of accessible built environments in Ghana.

As shown in the Figure below, Part II deals with Exterior Areas and Part III, Indoor Areas. In addition, specific functional areas have been indicated as shown.
The overarching principles for accessible built environments using the accessibility code are reachability, findability,
accessibility, and usability for both exterior and indoor areas. Finally, the general requirements include orientation, guidance, information, security, lighting, acoustic, mobility, and comfort.

Ghana Accessibility Standard for Built Environment



4.1 Legislations and Inclusive Education in Ghana



4.1.1 The Global Perspective

At the core of the global strive towards human development is the essence of inclusivity in all dimensions of human development. The right to access all levels of education for persons with disabilities has been at the crust of a host of international charters and instruments. Notable amongst them are:

- The United Nations Convention on the Rights of the Child (1989) with the Article 23 specifically for the Children with Disabilities,
- Declaration on Education for All in 1990, Standard Rules on Equalization of Opportunities for Persons with Disabilities in 1993,
- The Salamanca Framework on Action for Special Needs in 1994, Dakar Declaration on, Education for All in 2000,
- The United Nations Convention on Rights of Persons with Disability, 2006 with the more recent one being the 2030 Agenda on Sustainable Development which affirms the right of persons with disability to access all forms of learning opportunities. Specifically, Goal 4 of the current Sustainable Development Goals explicitly support the promotion of inclusivity and quality education for all PWDs (UN, 2019).

These instruments represent a global commitment to champion the course of universal accessibility to quality inclusive education and inclusive designs. In most developing nations, PWDs are less able to access quality education as a result of a host of barriers which may be psychological, cultural, economic, and/or physical in nature.

4.1.2 The Ghana Perspective

Ghana's commitment to inclusive design and education for PWD's is evident in the host of international Disability Acts and frameworks that the nation has ratified. Internally, the efforts of the nation are legally backed by a legal frameworks promulgated internally to help promote access to quality inclusive education. This legal framework includes:

1. The 1992 Constitution of Ghana

The 1992 Constitution of Ghana is the supreme law of the land which guides all the actions and activities of all actors in all sectors of the national economy. It provides the legal backing for all institutions that oversee the day to day administration of the nation.

Specifically, Section 25 of the constitution grants universal right to educational opportunities and facilities from the basic to secondary, technical and

vocational, as well as higher education to be equally accessible to all classes of people in the state on the basis of capacity, by every appropriate means, and in particular, by progressive introduction of free education.

Aside the granting of a universal right to education for all in Ghana, Section 29 (1) to (6) specifically addresses the Rights of the people living with disabilities.

2. The Children's Act, 1998(Act 560)

Section 3 of the Children's Act makes it an offense to discriminate against children with disability in any form or manner. The Act makes inclusivity the key for children with disabilities in all Facet of Live and also makes provision for other specialized care for the training and education for such children.

3. The Disability Act, Act 715, 2006

The National Disability Act, Act 715 is among the legal provisions that support the rights and development of PWDs in Ghana. The Act supports the establishment of a National Council on Persons with Disability and to raise and advocate in issues regarding the PWDs. Subsequently, section 6 of Act 715 provides for the need to make public spaces accessible for PWDs.

4. Education Act, Act 778

This Act also support the promotion every child's right to education in Ghana. The Act mandates the design of schools to be universal in nature so as to accommodate children with special requirements and needs. This suggest that the design of schools should not be such as to subtly discriminate children with disabilities.

5. United Nations Convention on the Rights of Persons with Disabilities – (UNCRPD – Ghana, 2012)

Ghana as a signatory to the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) with the deposition of the instrument of ratification executed on the 22nd August, 2012. Article 9 of the Convention ensures accessibility for PWDs whiles Article 24 touches on the need for accessible education for this category of persons as well.

Subsequently, the nation has adopted the guidelines of the Ghana Society for the Physically Disabled in the design of the built environment.

These guidelines define the actions that policy makers, implementers as well as service providers must undertake to provide quality and non-discriminative services in a barrier-free environment.

6. The Inclusive Education Policy 2013

The Inclusive Education policy (2013) is a nationwide legally binding policy which presents a detailed strategy of inclusivity for all in terms of education. It is a build-up of the 1992 Constitution of Ghana. The philosophy behind the inclusive educational strategy is that educational institutions must recognize and respond to the needs of their student using different styles and methods of learning to promote quality education through appropriate curricula, organizational arrangements, teaching strategies, resource use in partnership with communities.

As part of the goals, the inclusive education policy supports access for all Persons with Disability by promoting increased access to education for children with disabilities. This is to be achieved through the following means, namely:

(1) increasing links between special education institutions and mainstream schools;

(2) providing appropriate infrastructure;

(3) improving detection and support for children with disabilities in regular schools; and

(4) creating awareness and building the capacity of service providers to support inclusive education.

Provisions have also been made to improve the quality of education for children with disabilities, teacher education through the provision of special educational needs, as well as teaching and learning material including assistive devices, which will enable children with disabilities to access learning opportunities.

7. The Ghana Accessibility Code, 2016

The Government of Ghana in 2016 launched the Ghana Standards on Accessibility Design Document to provide design specifications on how buildings, roads and other structures should be designed so as to make them accessible to all, especially persons with disabilities (PWDs).

The Ghana Accessibility Code targets the following groups of persons as affected by barriers: small children, wheelchair users, people with limited walking/movement abilities, people with visual impairment or low vision, people with hearing impairment, elderly persons, people with temporary disabilities, and people carrying heavy or cumbersome luggage.

Although Ghana has adopted the above mentioned legal frameworks to help promote access to inclusive education in the county, many of these frameworks offer broad guidelines for inclusive education with little or no focus on the varying levels of the Ghanaian educational system. It is with this regard that this project seeks to develop Inclusive Architecture Design (IAD) principles/guidelines that can form the basis for framing specific legal guidelines for the development of inclusive TVET schools in Ghana.

Addressing the future implementors of architectural infrastructure with the relevant requirements intended to promote the implementation of these policies

4.1.3 Key Gaps identified

- Most of the design strategies and specifications depicted in the existing legal frameworks on Universal Design in Ghana is heavy on persons with mobility impairment, such as wheel chair users, as compared with the other forms of disabilities.
- Specifications with respect to the design of interior spaces to facilitate the adequate use of light (natural and artificial) by the persons with disability are missing in the Ghana Accessibility Code, 2016.
- Universal design considerations for making Classrooms accessible for PWDs, especially children, have not been specified in the existing Ghana Accessibility Code 2016. It is suggested that the same standards to be used in the design of public halls and worship centres are to be applied for classrooms designs, which is not always the case in terms of issues pertaining to seating arrangements, lighting and acoustics.
- Graphic illustrations and diagrams that depict universal design considerations in most of the existing legal frameworks for Ghana are limited and would require improvement and expansion to meet international examples.

4.2 TVET Relevant Laws, Standards and Guidelines

→ **Link: Ghana's Building Code 2018**

→ **Link: National Building Regulation 1996 (LI 1630)**

→ **Link: Local Government ACT 462**

General Building Norms

In Ghana , the building standards and accessibility code applies to the erection, alteration or extension of a building as either residential, commercial and social and permitted by the building codes and accessibility standard.

Permission to build is granted after sufficient land title and plans have been submitted to and verified by the Metro / Municipal or District Assembly (MMDA). The choice of the material for construction is not discretionary but purpose specific subject to the approval of the MMDA.

It is a norm that a qualified building inspector visits the site periodically to ensure that the structure is being built to specification and on the completion of the structure, an assessment should be carried out to indicate its stability and consistency with all building regulations. It is compulsory for structure that are dilapidated to be maintained to protect lives and properties.

Generally, structures are not to be allowed on reclaimed lands, lands liable to flooding, drain, culvert, water course, high tension cable or sewers and all buildings are to be protected against dampness. Suffice to note it that, these norms are challenged in terms of implementation as evidence abounds to the fact that almost all the standards and norms have been flouted especially in the urban areas due to over population and scarcity of land,lack of planning and enforcement of rules.

Norms and standards for Schools

There is no definite Law, Norms. standards on different subject fields of the Technical and Vocational Education and Training alone in Ghana.

However, the National Building Code captures some law and regulations for all educational facilities. Generally, it is required that a detailed plan of an educational structure including specification and measurement on services and fire safety is submitted to the Assembly for verification and approval a month before the award of contract or commencement of the work.

The construction of the structure is expected to be monitored by a qualified building inspector and a thorough assessment of the structure is also to be done before the commencement of use. Routine and parodic Maintenance is also a requirement.

However, these norms and standards are not allways adhered to. This non adherence have been attributable to low awareness creation on the need for permit before a structure is put up. This grant the opportunity for people to build without permit and the those who acquire the permit sometimes build out of scope.

Generally, compliance to the regulation and monitoring by the building inspectorate have been low to the favour of the ethically disadvantaged people who abuse and disregard the codes, norms and standards.

4.3 Working Aid

Accessibility Standard DGS 1119 Requirement Catalogue:

Here you will find a tabular compilation of selected requirements from the Accessibility Standard in a Built Environment DGS 1119_2016, which is intended as a working aid. Important dimensions are listed in the first column and keyword comments in the second column, thus facilitating an initial assessment of which measures may be useful for your own project. The selection was made on a topic-specific basis and mainly takes into account points that are crucial for TVETs in Ghana.

This overview is not binding, makes no claim to completeness and in no way replaces the usual specifications of the
Accessibility Standard DGS 119-2016

Requirements Catalogue of the Accessibility Standard DGS 1119_2016, Part II and III

→ **Forthcoming**

Norms / Standards on Accessibility

Any person at different points in time may face barriers. It is now an acceptable norm in Ghana that, barrier free access to a public structures goes far beyond just a ramp and an elevator. In line with the above, educational structures are to be planned, designed and constructed with wheelchair users, people with limited walking/movement abilities, people with visual impairment or low vision, people with hearing impairment, elderly persons, people with temporary disabilities and children as a priority.

Accessibility is no longer a luxury but a basic necessity for all users. The use of standards, audit teams made up of professional architects, facility managers, curricula accreditation officers, engineers, representative from PWD's and CSOs are required to assess the universality of public educational structures in Ghana. The owners of private educational structures are also to comply with accessibility standards in conformity to the universal accessibility specifications as enshrined the Accessibility Code of Ghana.

There are specifics measurements to ensure accessibility of exterior, interior, circulatory, functional and other areas of educational facilities enshrined in the Ghana Accessibility Code although the use of higher levels of discretion is allowed due to the varied nature of educational fields in Ghana.

Conclusion

The situation of accessibility is Ghana currently in terms of the formulations of Laws, regulations, standards and norms is a fair improvement of the situation a decade ago. However, the systems to ensure implementation of the laws and regulations have not been holistically developed. This hampers the effectiveness of universal access for all. The absence of specific regulations to guide accessibility in different field of the educational and vocational training institutions limit the impacts of the norms and standards on accessibility especially for the Person living with Disability.

In the wake of acceptance of the many international treaties on the rights of Disability to access a decent livelihood, it is incumbent on the Government, CSO and other development partners to aid the development of specific standards on Disability and access to TVET institutions in Ghana.

Variety of User Groups and TVET

A. Plummer, D.Y.A. Duah, J. A. Danquah, C. Akuffo, A. Adu-Gyamfi

05

Key Themes:

- **Different Users**
- **Diversity**
- **Inclusion**
- **Key factors of Disability**
  The International Classification of Functioning, Disability and Health
- **Exposition focused on Types of Disabilities**

5.1 Different users

In the TVET environment there might be a variety of user groups, but principally, the main user groups for the efficient working of TVET Training Centres include (but are not limited to) the following:

- Learners/Students
- Staff – Teaching (Facilitators) and Non-Teaching
- Authorities/Officials
- Visitors/Parents/Guardians

The environment will also have to cater for the children and relatives of resident staff on campus if accommodation is provided for staff.

In this scenario, the peculiar needs of all these user groups will have to be factored into the overall inclusive agenda of the school. Here the idea is to design a system of a future-oriented kind of TVET that could be more open and connected with the neighbourhood, so that everyone has access to a place forming an integral part of their daily lives. It should not only be a place to get pedagogical input but to get motivated to learn by the environment itself.

As a public facility, a school has to provide easy, barrier-free access for all its users. Structural accessibility means: making buildings and other structural installations and facilities accessible and usable in the generally customary manner for all people, with and without disabilities.

In future, such accessible schools could also be used for public and non-public events initiated together with people from the neighbourhood or from surrounding areas. This would create “Learning Hubs” as an integrated public place of community life, offering space for identification and ideally promoting a sense of community.

5.2 Diversity

Put in simple terms, diversity is the variety of differences in humans, including (but not limited to) differences in bodily functions/physical ability or attributes, race, cultural background, ethnicity, gender, age, social class, nationality, political beliefs, etc. Bearing in mind that all humans are not the same, these diverse versions of humanity must be attended to in the design of environments to accommodate a wide variety of people. This understanding of diversity sets the tone for an all-inclusive environment. In the TVET community, just like any educational institution, the range of people seeking to acquire skills will vary greatly due to individual differences of the various kinds mentioned above. Hence the need for an all-inclusive barrier-free TVET community, which does not hinder learners from acquiring skills solely based on their abilities or disabilities.

5.3 Inclusion

Inclusion, as opposed to diversity, is the involvement, empowerment and recognition of all people notwithstanding their abilities.

Inclusion promotes and sustains a sense of belonging, as individuals are not grouped based on their abilities, race, age, social class or gender but rather as a diverse collective in any given setting. Not feeling marginalized in a narrow group, learners can pride themselves on being part of a larger community, which has a positive psychological impact on individual development. However, an all-inclusive TVET system positions itself not just as a hub for individual skills development but also as a point of pride for the entire host community. An integrated system of education/training allows learners to learn critical life lessons from peers with different abilities, such as the respect, responsibility and empathy necessary for the growth of any nation.

5.4 Key factors of Disabilities

5.4.1 Classification Model

Various models have been employed across the world to define and classify the types of disabilities. This handbook adopted the International Classification of Functioning, Disability and Health (ICF) model in its definition of the various forms of disabilities.

This framework is the model used in analysing the health situations of people, their disability or disorder and how they function.

The World Confederation of Physical Therapy (WCPT) has adopted this ICF framework since 2003.

5.4.2 Components of the ICF

ICF has three basic components and these indicate the significance of the working and influence of factors affecting a person's health (internal and external) namely:

- Body functions and structures
- Activities and Participation
- Environmental factors

Body Functions and Structures

Body functions – how the body functions physiologically.

Body structures – refers to the anatomical parts of the body with examples as organs, limbs with their constituents.

Impairments – this has to do with difficulties in the way the bodyworks and structures such as significant loss.

→ Link: **International Classification of Functioning, Disability and Health**

Activities and Participation

Activity – refers to the performance of an act by persons.

Activity limitation – challenges a person may encounter in undertaking an activity.

Participation – involvement in a life situation.

Restrictions on Participation – challenges people may encounter while participating in the situations of life.

Environmental Factors

This refers to social, attitudes and physical settings for everyday living and activities of people. Such factors can either facilitate or hinder how people function.

Personal Factors

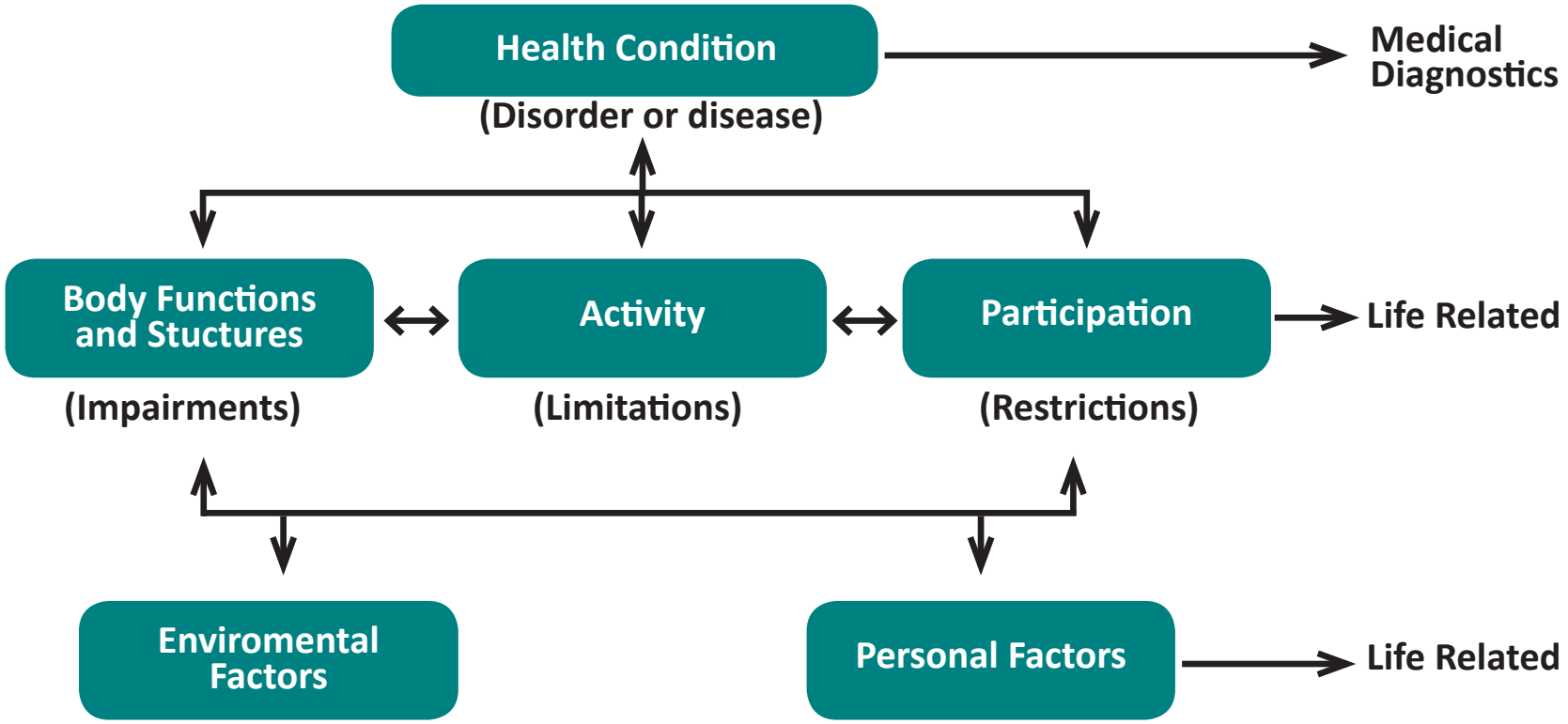
This refers to issues that relate specifically to the individual preferences or taste of persons within a space. Such features might not be generally known but can also impede the functions of persons (phobias and traits).

Relation to our project

This manual uses the broad classification(ICF) of abilities and factors to make appropriate recommendations that can be applicable to the wider population. It recognises the social and cultural dimensions of Ghana and the nuances that exist in the school systems in relation to persons with different abilities.

Such a background ensures that the provisions of the manual are suited for the particular architectural climate of the country with effective use and implementation.

5.4.3 ICF – International Classification of Functioning, Disability and Health



→ Link: **Definition of Impairments** → Link
→ Link: **Different types of Disability** → Link → Link

5.5 Exposition focused on types of Disabilities

While the focus of this chapter is on four major types of impairment, it should be noted that other groups of users will also benefit from the all-inclusive standard we aim for.

Mobility /motor functions

A mobility impairment includes people with different types of physical disabilities.

This form of impairment affects a person's musculoskeletal system, motor function and/or coordination and can affect physical strength, walking speed and/or dexterity. The extent of the limitation of movement of the extremities differs from person to person and can affect part or all of the body.

The impairment can be the result of an accident that may lead to paralysis, injury or loss of limbs or muscles or neurological damage.

There are many causes of mobility impairment. Physical impairments can be hereditary, congenital or acquired. Functional failures of the supporting, holding and movement apparatus can be counteracted with technical aids (wheelchairs or walking aids) if necessary.

For barrier-free construction, the individual requirements of persons with restricted motor skills or mobility must be taken into account.

In particular, this relates to the following aspects:

- safe and easy accessibility,
- additional space required for the necessary technical aids and/ or an accompanying person if necessary
- ergometric adaptations of operating elements, furnishings, etc.
- geometric specifications of operational elements need to be taken into consideration.
- another area of action aims at easy-to-use devices requiring acceptable levels of physical strength and stamina.

→ More information chapter 8.2

Seeing

According to the International Classification of Diseases 11 (2018), visual impairments and blindness are divided into two groups, namely distance- and near-vision impairments. Visual impairments can occur as either a partial or a complete loss of vision.

People in this category are completely blind or have a visual impairment. Many Visually visually impaired people still are mostly visually oriented but also use other senses such as hearing and touch to compensate for their lack of vision. Blind and severely visually impaired people usually orient themselves using the senses of hearing, touch, smell and balance.

Basically, visual impairment or blindness can be congenital or acquired. The types of visual impairment are very individual and may affect the extent of the field of vision or, visual acuity, depending on which part of the eye is impaired: lens, cornea, retina or the , optic nerve.

The following design considerations must be taken into account in order to promote visual accessibility:

- excellent visual conditions
- unobstructed, clear accessibility and usability
- optimal illumination and lighting and continuous lines of sight
- effective acoustic design measures
- multisensory design according to the two-senses principle

→ More information chapter 8.3

Hearing

The WHO defines those affected by hearing impairments (also called hearing loss or, in severe cases, deafness) as “a person who is not able to hear as well as someone with good hearing – hearing thresholds of 25dB or better in both ears.”

A person with a hearing impairment can be affected in either one or both ears, which can result in them not being able to follow a conversation, hearing sounds with difficulty or only in a fragmented way. Hearing-impaired individuals are usually socialised in an acoustically oriented, hearing environment, and are themselves acoustically oriented. The degree and severity of hearing loss is different in each case and ranges from mild through moderate impairments to profound hearing loss.

People who are deaf or profoundly hard of hearing generally use their vision to obtain information in public places, and communicate by sign language whenever possible. Vibration and synoptics also provide them with information.

In terms of the design needs of persons with hearing impairments, consider the following:

- ideal acoustic design measurements ensuring speech intelligibility and audibility, with technical support if necessary
- multisensory design according to the two-senses principle
- good lighting, illumination and continuous visual connections

→ More information chapter 8.4

Cognition

This user group includes individuals with mental or intellectual disabilities, or with neurodevelopmental disorders, such as learning disabilities – these also occur in children with normal or even above-average intelligence – or autism.

Cognitive impairments are characterised by the fact that they are based on disturbances of the processes in the brain and can affect an individual’s intellectual performance, behaviour, perceptual processing, visual-spatial abilities, language and/or motor coordination, among others. Irrespective of the primary diagnosis, further impairments such as depression, anxiety, addictive disorders and psychosomatic impairments such as severe dizziness, migraine or partial performance disorders may emerge in the course of life. Here, also, manifestations and degrees of severity are diverse and often episodic, but can also be chronic.

The field of these disabilities is, for the most part, invisible. Socially, they are associated with stigmatisation and are therefore often hidden. However, these impairments are far more widespread than has previously been acknowledged.

Users from this group will benefit from accessibility measures provided for the other impairments; beyond that, they will appreciate the following:

- consistently well-functioning educational environments
- additional spaces for retreat and cognitive decompression
- multi-sensory provision of all information

→ More information chapter 8.5

Spatial requirements – Basics

A. Plummer, J. A. Danquah, F. Ibold, C. Akuffo

06

Key Themes:

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

UNDERSTANDING DISABILITY

Persons with disabilities include those who have physical, mental, intellectual or sensory impairments, which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others[1].

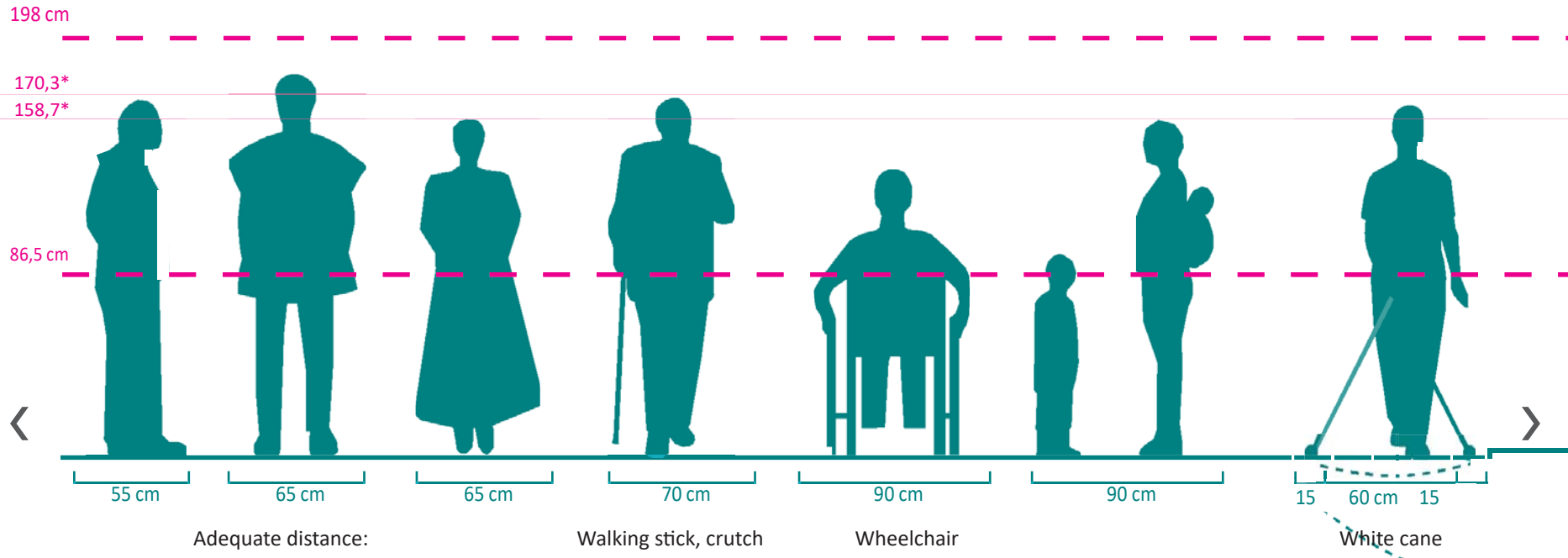
[1]UN Convention on the Rights of Persons with Disabilities

This chapter is dedicated to the basics and requirements at the beginning of a design scheme or a renovation. The essence is to expose the core dimensional and design principles critical for achieving a truly barrier free design suitable for all persons.

Since persons (with/without disabilities) who use the TVET system may require different accommodations to function and participate effectively in their society, it is imperative to consider the various dimensional requirements.

Photo: GIZ

6.1 Basic requirements - Anthropometrics



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.

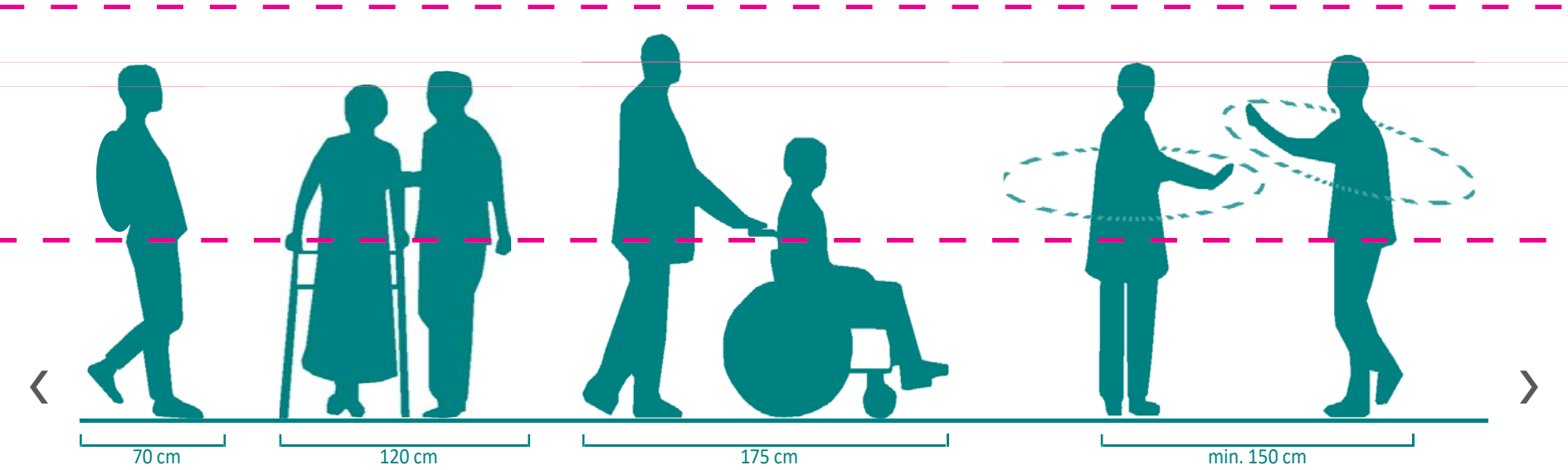
Thus, the basic dimensions needed by persons must be considered. These standard dimensions should form the basis for the design of facilities for a barrier-free school. The essence of using a standard anthropometrical distance is to ensure that notwithstading a person's stature, he/she can easily navigate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



Walker + Accompanying person | Wheelchair + Accompanying person | Visual communication - Sign language

Making walkways a minimum of 180cm ensures that friends can walk side -by-side even if one is using a wheelchair. With limited access to motorised wheelchairs, it is very prudent to consider persons helping mobility impaired persons in wheelchairs.

In a cultural setting like that of Ghana, access routes need to factor in the spatial needs of accompanying persons with mobility impairements.

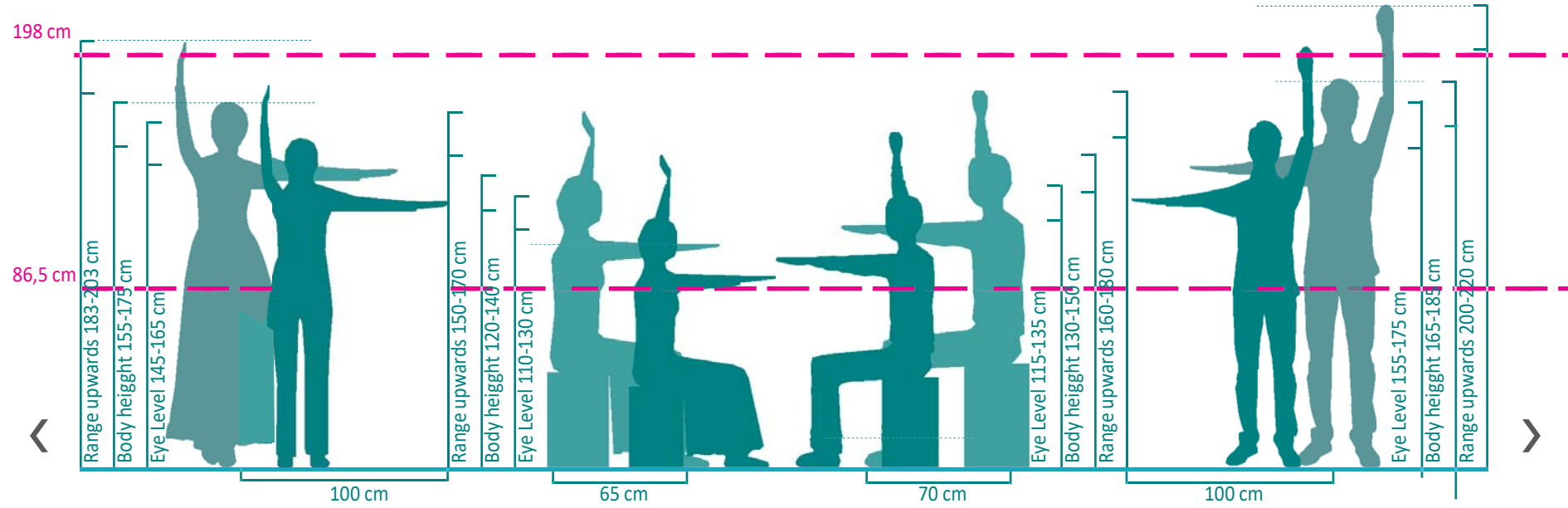
Additionally, the spatial requirements for effective visual communicaton must be factored into the design of accessible routes and walkways. This provison is even more critical for students who will like to stay in groups and chat along accessible routes. Wider access accommodations can trun an accessible route to an extension of the classroom for students.

Providing accommodations that allow all learners, facilitators and visitors to function normally without a feeling of being different or "special" should be the focus of design in relation to adequate basic distances for spaces. In the wake of the current Covid-19 pandemic, spacious accommodations are becoming non-negotiable.

3.2.1	120 cm space to allow access by people using crutches
3.2.2.2.	120 cm min. unobstructed width for an escape route
3.3.5	76 cm min. width of accessible sections of counters

3.2.5.	90 - 110 cm required width between handrails
3.3.6	120 cm min. distance to facilities without knee space
	140 cm min. distance to facilities with knee space

6.2 Basic requirements - Reachability



Body height _ Female standing | Sitting | Body height _ Male sitting | Standing

Different body size, girth, mobility, limitation and different activities require different space requirements, heights, widths, movement and meeting areas.

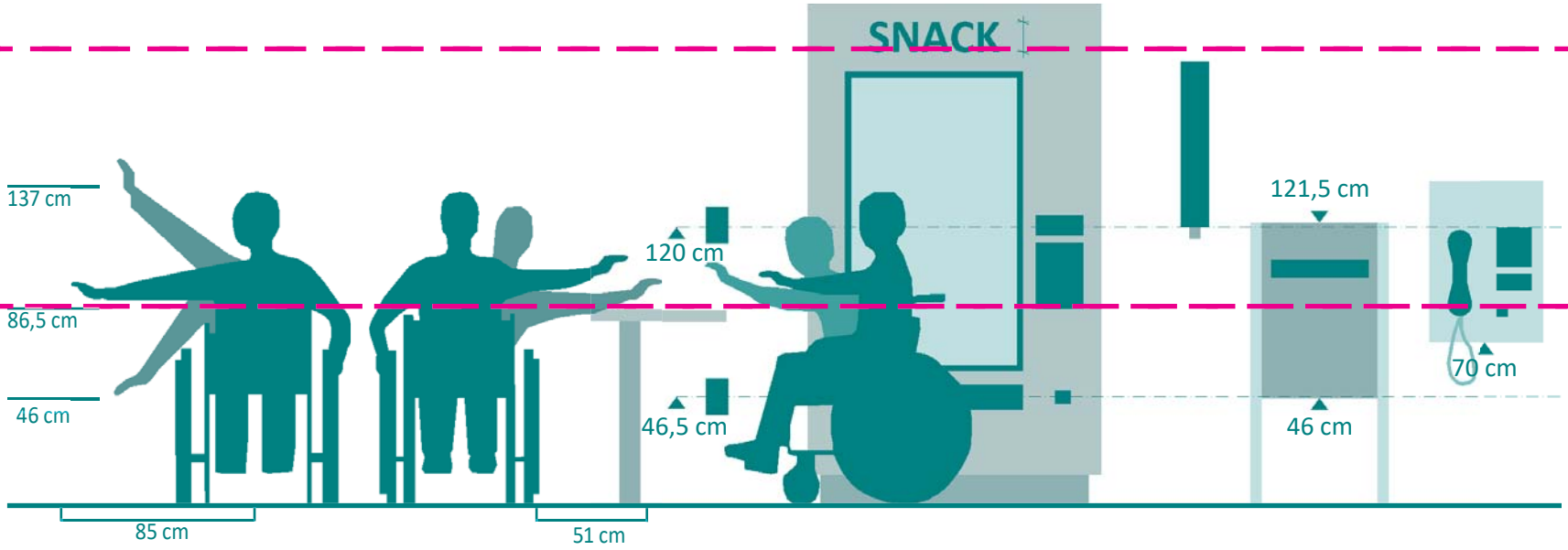
However, it is impossible to make specific accommodation for these individual differences. Hence the need for standards. Thus, it is imperative to look at the standards of reachability in the design of furniture, fittings and fixtures.

The figure above shows the different reach ranges for young males and females, seated and standing.

The essence of considering accessibility for different users is to make the exact universal provisions to meet the needs of the majority of users. Such areas are crucial for the design of furniture in libraries, learning areas, workshops/labs , kitchens, etc. in an educational institution. Book stacks, aisles, storage areas, work tables are just a few things that need to take into account the reach of users.

Conscious planning keeps these considerations and the different requirements in mind and provides an adaptable, flexible and universal design for all learning and teaching environments.

Accessibility Code DGS 1119	**Hight, Distance:**
3.1.2.6	86,5 - 122 cm grip height
3.1.3	100 - 110 cm height of push buttons or card access control
3.1.9.4	45 - 47,5 cm seat height



Body height _ Female + Male sitting

Visual communication - Sign language

The ranges differ depending on the approachability. If the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 122 cm. The minimum low forward reach is 46 cm. A comfortable reach range from the front is 65 for low shelf and 100 cm for high shelf for frequent use.

If the clear floor space reach allows parallel approach by a person in a wheelchair, the maximum high side reach allowed shall be 137 cm and the low side reach shall be no less than 46 mm above the finished floor.

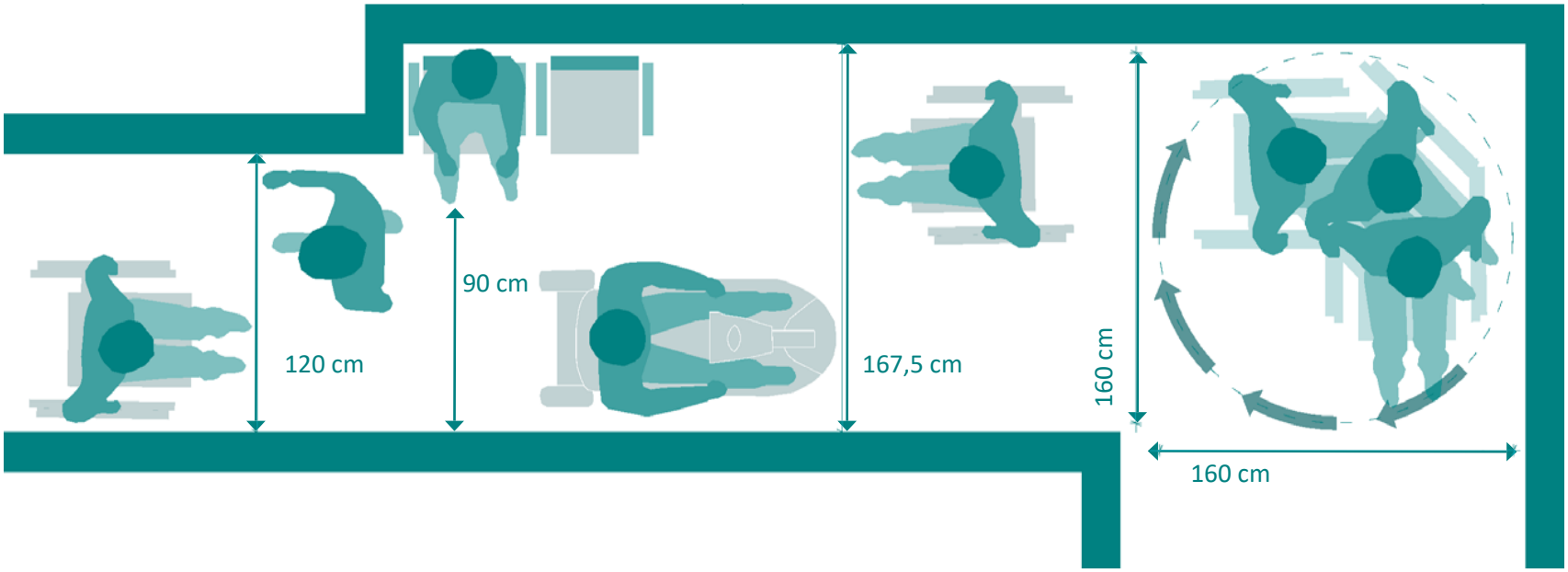
3.3.5	86,5 cm max. height of at least one section of a counters
3.3.5.1	106,5 cm max. height of a.l. one speaking port at a counter
3.4.6	85 - 110 cm min. high for signs and contrasting letters

If the side reach is over an obstruction 51 cm deep, the reach shall be no less than 122 cm.

All controls and operating mechanisims should be within the acceptable reach 86,5-106,5 cm and use by all persons with varying abilities. Here, the different heights specifications given by the Accessibility Code refer sometimes to the top edge / bottom edge, sometimes to the axis of a control element or lettering field, compare the figure above.

	61-120 cm height of all controls for easy access
	46 -106,5 cm min. height of all duplex receptacles
3.5.8	25 x 70 cm clear knee space below displays

6.3 Basic requirements - Maneuvering - + Circulation areas



The concept of the internal circulation of a building has a decisive influence on the usability and the guarantee of functional processes. Sufficiently dimensioned horizontal access enables the flexible barrier-free use of a building. The dimensioning of the circulation areas is subject to various specifications, depending on the use of the building. Structural fire protection plays an important role here.

To be barrier-free, corridors must be at least 167,5 cm wide.

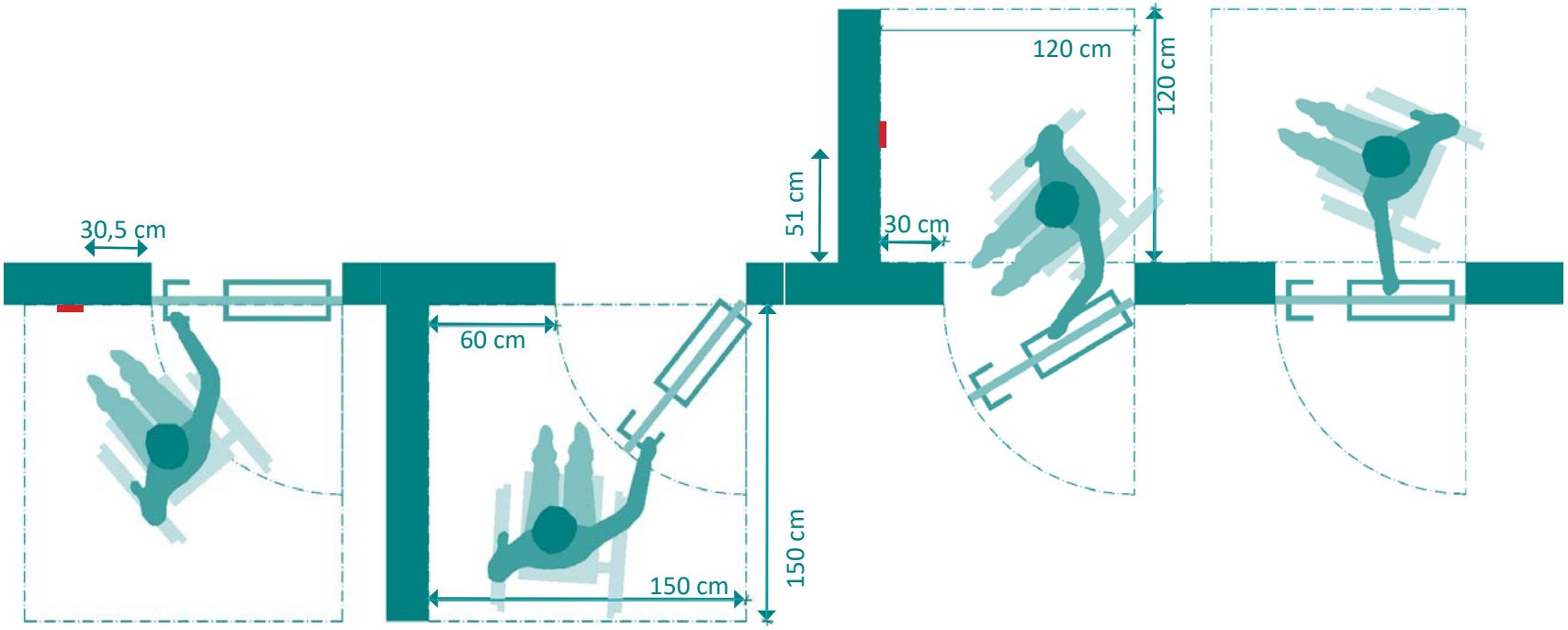
Passages must have a clear width of at least 91,5 cm. After a maximum corridor length of 6m, areas of at least 160 × 160 cm must be provided for people with wheelchairs or walking aids to meet or effectively negotiate a turn. For a corridor length of up to 6m, a width of 120cm is possible.

Moving Areas:

Prominent mobility disability basically deals with ambulatory limitations that affect a person's mobility or dexterity. Thus, those with mobility disability can be grouped into: non-ambulatory and semi-ambulatory. Due to the limited dexterity and flexibility in the use of wheelchairs, in the needs of the wheelchair user for greater accessibility,

3.1.9.2	90 cm in front of a row of seats
3.1.8	110 cm min. width for ease of turning of mobility aid users
3.5.3	106,5 cm min. width for clear aisle between study areas

3.2.2	120 cm min. surface width of corridor (escape route)
	167,5 cm min. width for two wheelchairs to pass
	160 x 160 cm in diameter of turning space



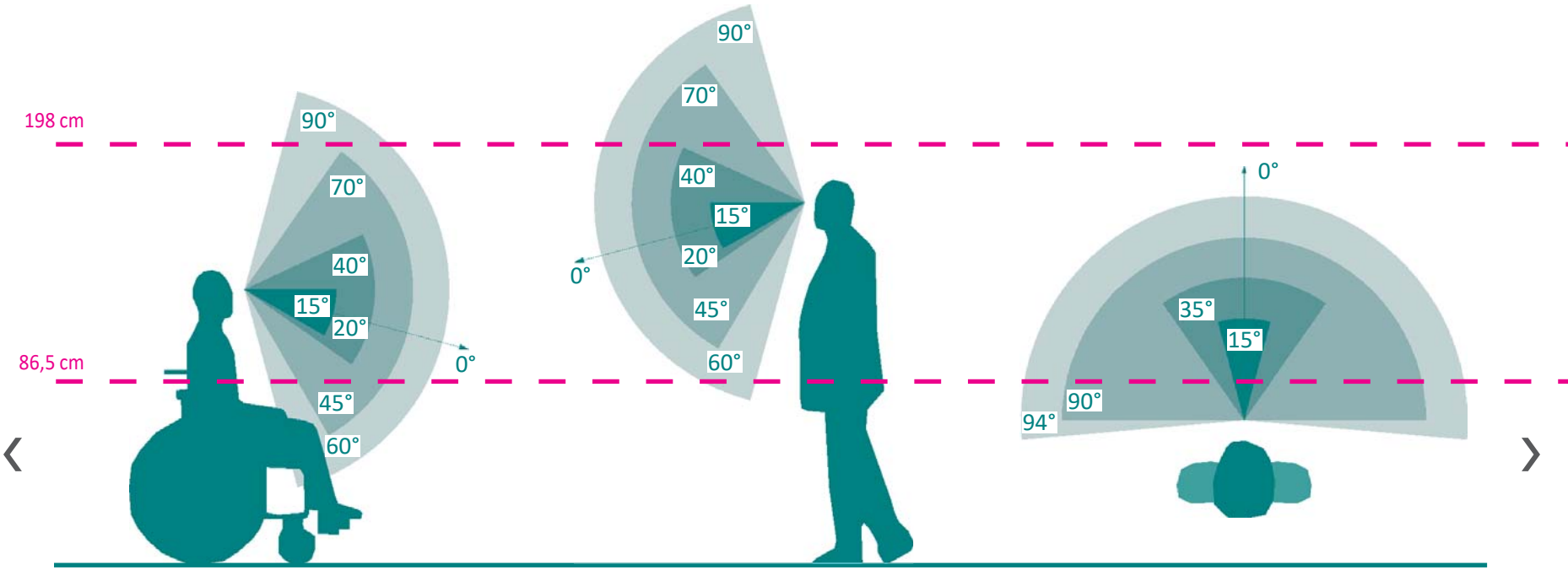
most circulation and manoureverability requirements must factor in approachability. The approach to a door needs adequate space:
a: 150cm x 150cm - outward swings and
b: 120cm x 120cm - inward swings for operation and entry or exit.

Also, to allow for a wheelchair user to get reasonably close enough to a door handle to pull or push a door open needs 60cm and 30cm clearance respectively on the leading edge. In a case where these dimensions are not possible, the use of automated doors should be considered. Also an individual should not be required to use a force in excess of 30 newtons for 0-30° and 22.5 newtons for 30-60°, to open or close a door (See BS 8300: 2001).
All door furniture (user-friendly handles) should be operable with one hand using a closed fist where fitted with a latch. To facilitate ease of access, the design of automated doors must factor in the travel distance and sensor location for various users. Doors with self closing mechanisms must be rarely used as they are not user friendly to most people, especially wheelchair users.

3.2.3	91,5 cm min. width for doors or arched openings 86 cm min. width for clear of obstruction 150 cm min. clear depth of door outward swings

3.18	120 cm min. clear depth of door inward swings 60 cm min. space, where doors swing towards persons 30 cm min. space, where doors swings away from persons

6.4 Basic requirements - Fields of vision



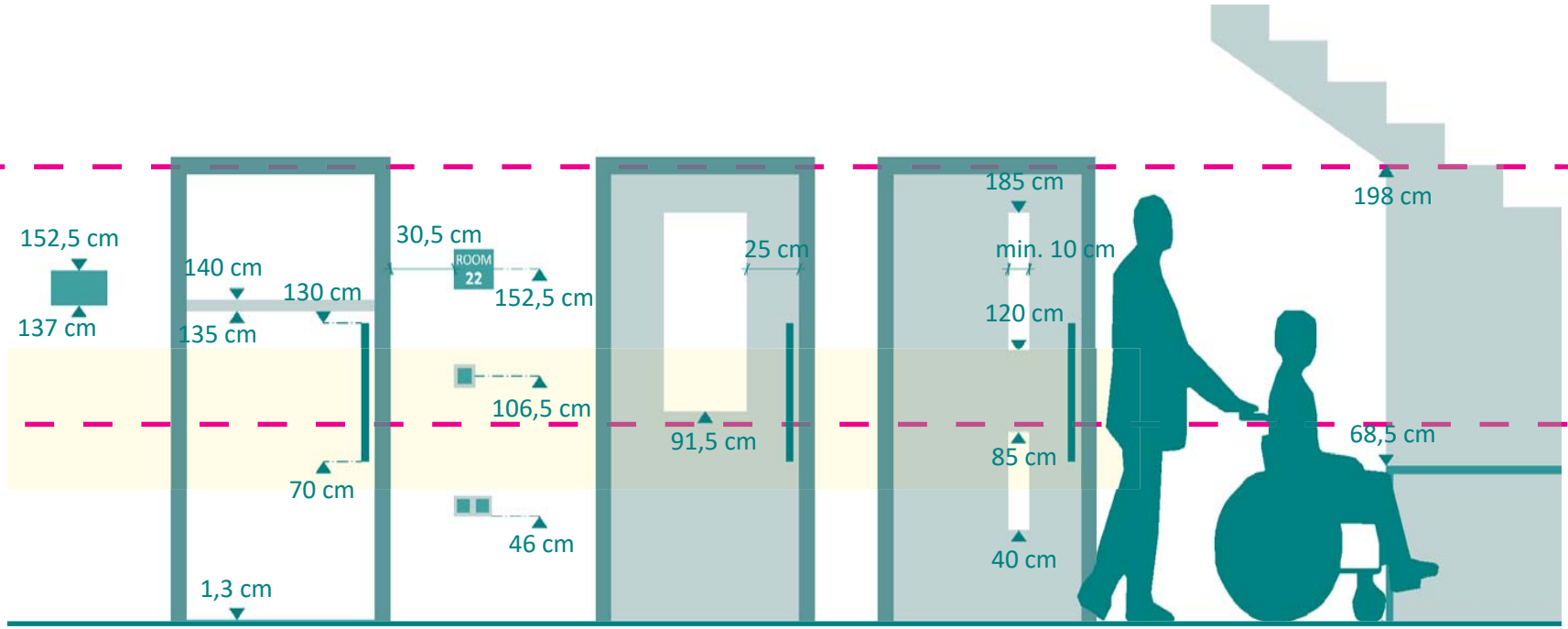
The visual field of a person is very critical for wayfinding and function within a built environment. It is important for all person as it shapes what is perceived in a space. The intelligibility of any visual information will depend on the cone of vision it is placed in. The height and visual acuity of persons often determine the fields of vision for different people. The illustration above shows the different fields of vision for the normal sighted person. All signages should be designed based upon these dimensions. This field proves critical even for person with limited vision for tactile informational signs as well.

Viewpoint (0°)

- Field of sharpest vision (15°)
- Field of stereoscopic vision (20° - 40°) (35°)
- Field of normal vision (45° - 70°) (90°)
- Maximum field of view (60° - 90°) (95°)

Accessibility Code DGS 1119

3.1.3	85,5 - 122 cm height of handles, pulls, latches, locks on doors
3.4.6	120 cm max. height of switches / fire alarm pull stations
	60 cm min. location of devices from internal corner



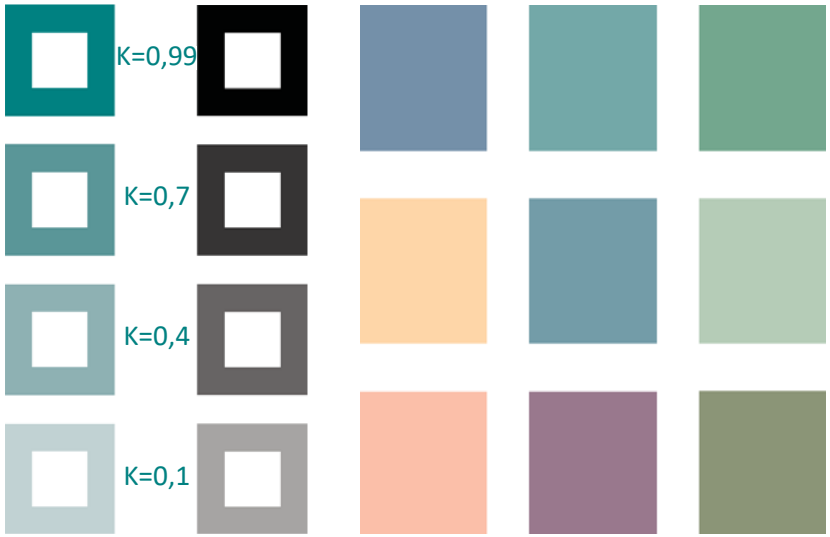
To ensure that people can identify and use handles and switches efficiently, they must be placed in the field of vision. On approach, entrance doors should provide a visibility area of at least 50 cm to 150 cm. This visibility area is generally acceptable for the placement of vision panels. This ensures 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.

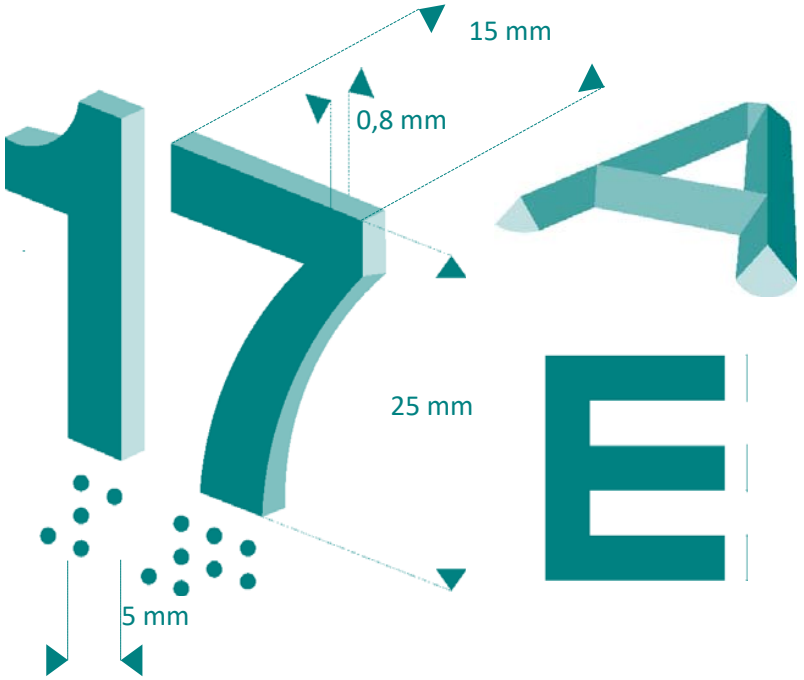
3.4.6	46-106,5 cm height of duplex receptacles 61-120 cm height of all controls, operating components for easy access by persons using mobility aids

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

6.5 Basic requirements - Colours and Contrasts





Luminance contrast (K) is created by the side-by-side presence of light and dark surfaces. The stronger the difference / the contrast, the better the visibility. Contrasts with a value of K > 0.4 are used primarily for orientation and guidance, whereas a contrast with a value of K > 0.7 is used for safety and warning functions and readable for visually impaired people. For black and white representations, K > 0.8 should be aimed for.

These contrasts can be checked online with the contrast checker:

> Link: https://webaim.org/resources/contrastchecker/

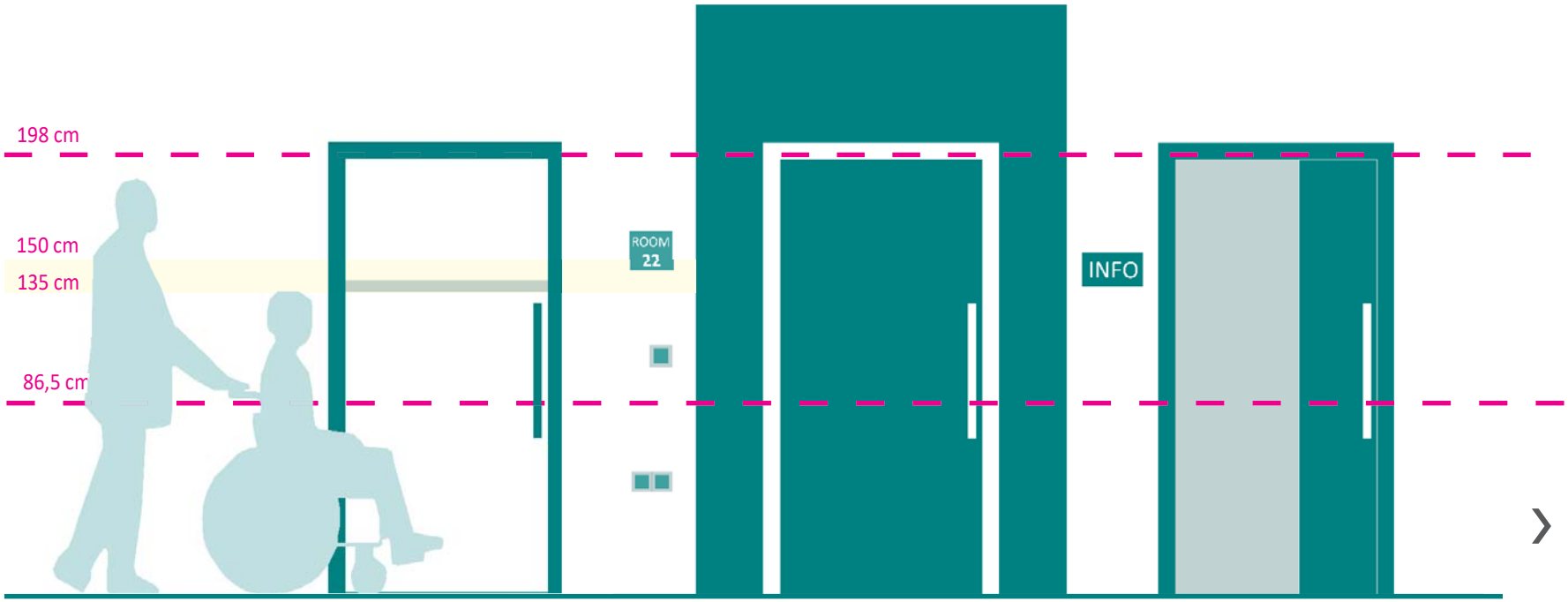
Colours and Contrasts have a great influence on behaviour - there are calming colours, stimulating colours, warm and cold colours.

In general, colours that create a warm and not too exciting atmosphere should be chosen for educational buildings and workplaces. (cf. Beaver 2010: 4).

For the recognisability of written information, the font size should be adjusted to the reading distance in addition to a high-contrast design. Simple and clear fonts such as Verdana and Calibri are suited for texts and pictograms that serve as orientation.

Character proportion for lettering and numbers on signs:	
3:5 and 1:1	width (A)-to-height (B) ratio
1:5 and 1:10	stroke-width-to-height ratio

	5~10 cm Identification or information signs
	2,5~5 cm Sign directories
3.4.16	25 cm min. height for lettering of room numbers or name



The ability to find and recognise doors and their function must also be guaranteed for blind and visually impaired people. For this purpose, doors (door leaves or door frames) must be visually highlighted from the wall in contrast.

The highlighting of the doors should be unambiguous and subordinate to the information and guidance system in the entire building. Door leaves and door frames can be designed to be both colour-contrasting and clearly tactile. To mark all-glass doors and glass surfaces, visually contrasting marking strips should be applied across the entire width at a height of 135 to 150 cm so that they are effective even in changing backgrounds and lighting conditions. The recommended height of each safety marking is 5 cm.

Partial glazing of the door should have a distance of 25 cm from the door opening, be at mimimum 7,5 cm wide and reach at least 90 cm above the floor with the bottom edge.

Visual relationships between the rooms serve to locate them and increase the feeling of safety. Other factors for the recognisability of visual information are lighting intensity and light reflection

3.1.2	Uses colour differentiation to aid location of entrances
3.1.5	min. 5cm wide should be an opaque highly contrasting stripe in 135-150 cm height

3.1.5	Glazed panels should extend low enough: 90 cm maxi. height from grade to lower edge
3.2.2.1	The frame should contrast visually with the wall surfaces

Inclusive Architectural Design – Concepts and Strategies

A. Plummer, D. Y. A. Duah, J. A. Danquah, I. Bekoe, I. Baffoe-Ashun, M. Amoah, C. Akuffo

07

Key Theme:

- **Categories of Inclusive Architectural Design for accessible and inclusive TVETs**

Approachability - Get there
Findability - Get informed
Accessibility - Get in
Usability - Get along
Security and Comfort - Get out

In this chapter, some important architectural design concepts and strategies for the setting up of accessible TVETS are explained and examples are included. The goal is to create appropriate environments for everyone, including people with differing abilities and without any particular difficulties.

The environment has to be:	-	implying that everyone can:
• approachable	-	to get there
• findable	-	to get informed
• accessible	-	to get in
• usable	-	to get along
• safe	-	to get out

The aim should be to develop a seamless accessibility concept for the users of the TVET that takes into account all important situations and transitions.

In order to consider people with sensory and cognitive impairments, it is important to offer information for the different senses.

The "two-senses principle" refers to the simultaneous transmission of information through a minimum of two senses.
It can be a combination of the following:

- Touching and seeing,
- Seeing and hearing or
- Hearing and touching.

This is always relevant because when one of the senses fails or is restricted, it can be replaced by the other sense.

Because of the important role that all the structural and design criteria plays in built environments, making a conscious decision to open the TEVT to all users is absolutely critical.

Designers must be prepared for values such as predictability, plannability, reliability, flexibility and the willingness to introduce unconventional solutions to shape everyday school life.

Access to TVET implies that everyone can

→ 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

7.1 Approachability

Get there

Approchability refers to the journey from the immediate surroundings to the particular destination of all users. The components include drop off zones, parking, pedestrian routes, gaps, grating, openings, and building entrances.

Provisions for easy approach include i.a.:

- good signage,
- mulitsensory communication via min. two senses (tactile/ audible/visual)
- consistent lighting
- designed visual contrast
- accessible external furniture,
- adequate maneuvering space

The highest priority is the stepless accessibility of the various rooms and infrastructural areas. Some of the accessibility issues (main considerations) are shown on this page.

Ramps

Accessible parking

Threshold free spaces

Directional maps and signage

Entrance for all

Zoning

7.2 Findability

Get informed

Access to information in any physical environment is very important for navigation.

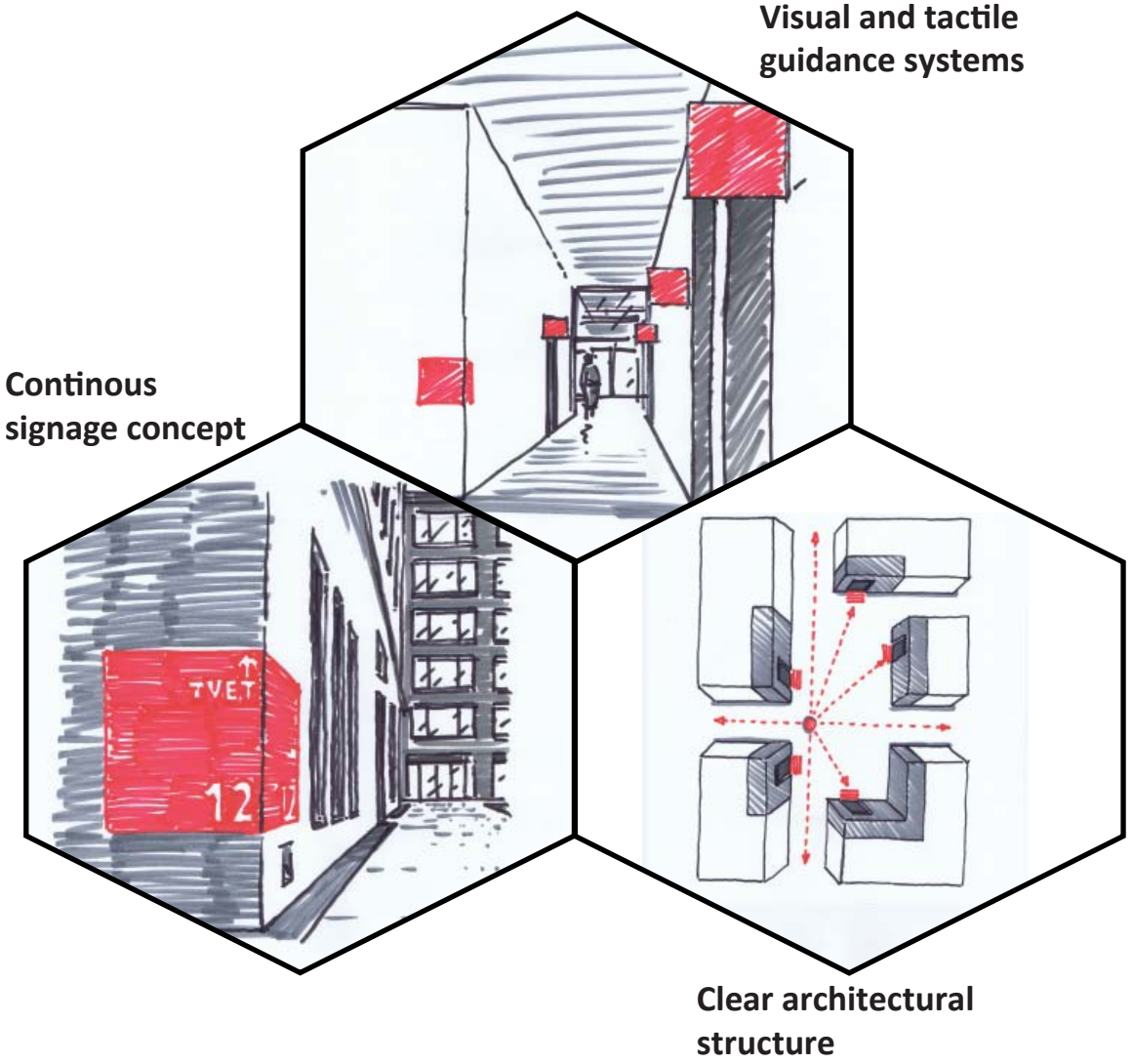
Especially in an educational institution route guidance, orientation aids and warning information should be equally understandable for all users according to the principle of universal design.

For blind people and people with severe visual and hearing impairments, the dependence on visual guidance and orientation systems is existential.

Here, a conscious design with contrast, colour coding, light signals, vibration, surface textures, zoning and material changes can be useful.

Well designed signage of paths, buildings, rooms and other infrastructure plays a major role and should be consistent and unambiguous outside and inside.

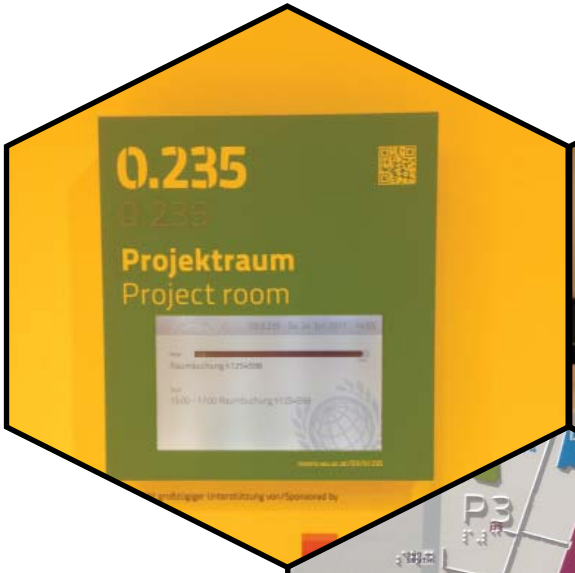
Today multisensory systems are available that are directly linked to users' mobile devices.



Contrast for easy findability

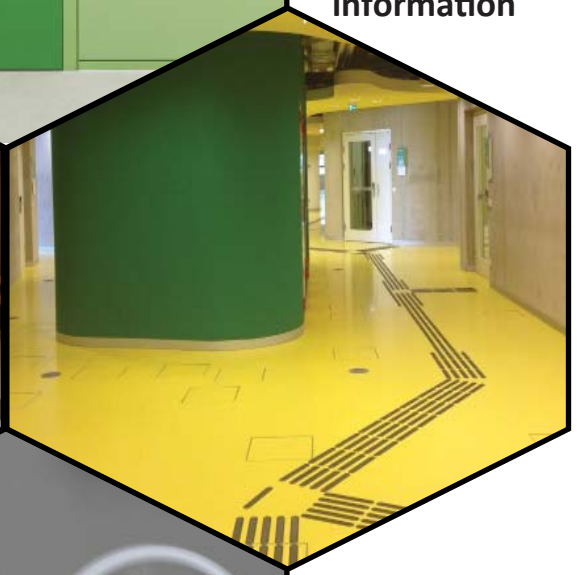
Photo: Schörghuber

Readable door signs



Routing

Colour for information



Different forms of writing

Infographics

7.3 Accessibility

Get in

Accessibility involves facilitating independent entry and access of the building and its services and facilities by all potential users of the building, while ensuring individual health, safety and well-being in the course of these activities.

The aim is to create barrier free mobility that is equally possible for all users. The highest priority is the stepless access of the various rooms and the infrastructural areas. Therefore we have to look at:

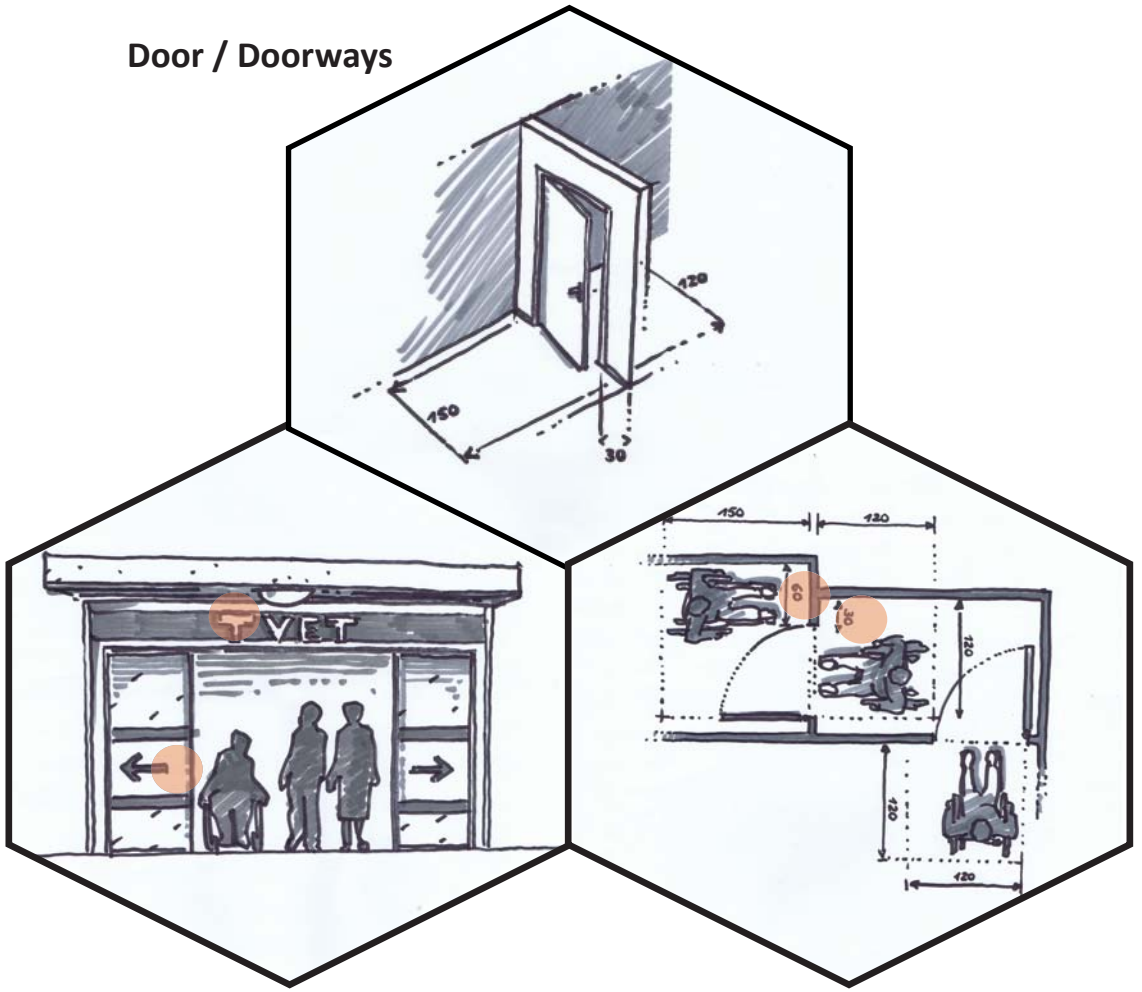
Access - horizontal

1. Main entrance
2. Doors and Doorways
3. Aisles, Passages Corridos, Circulation area
4. Transition Corridor / Rooms

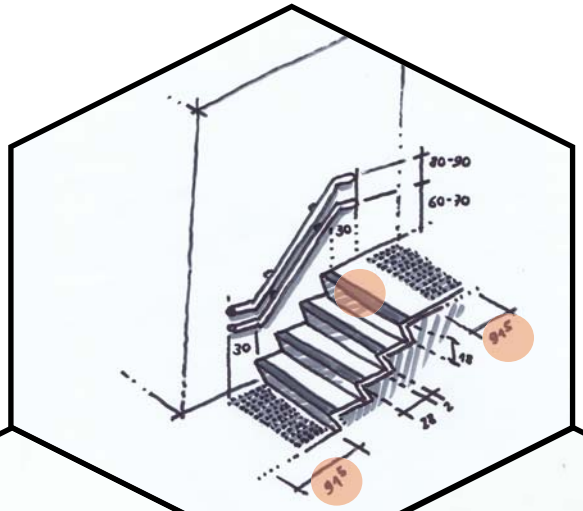
Access - vertical

5. Thresholds
6. Stairs
7. Ramp
8. Platform- or stair lifts
9. Elevator

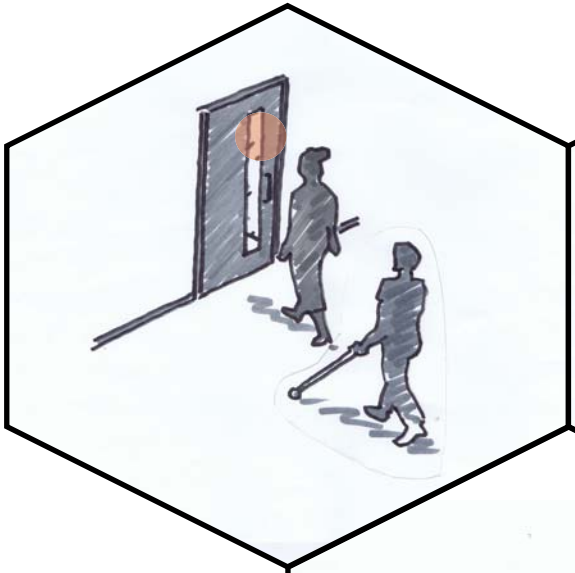
→ cf.: intern. Standard ISO 21542: 2021)



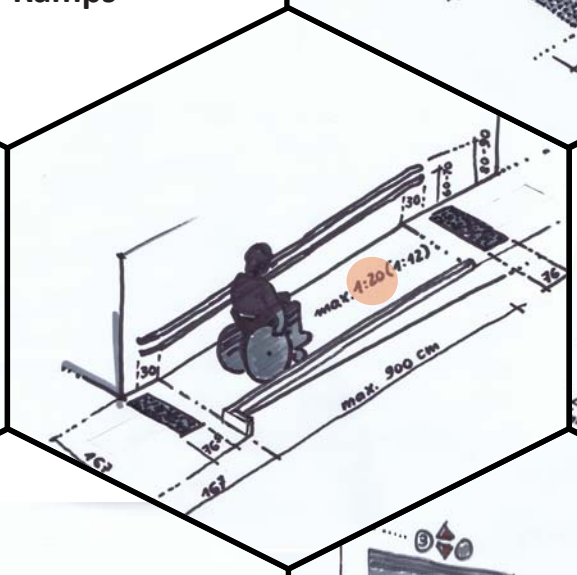
Stairs



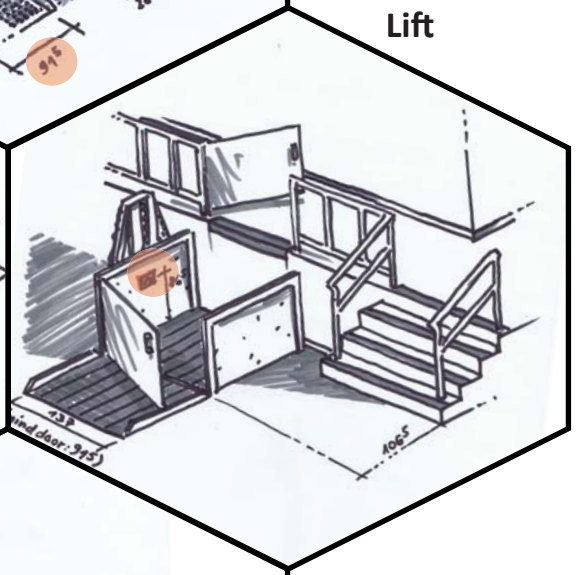
Visual entrance



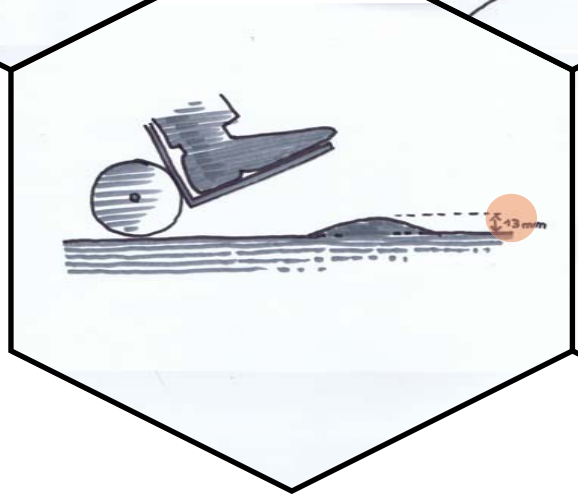
Ramps



Lift



Thresholds



Elevator

7.4 Usability

Get Along

Usability refers to designing building elements and products which can be used by everyone effectively and safely. This include general aspects in buildings that impact everyone and do not disproportionally impact people with disabilities.

Characteristic of the built environment which can be used by everybody is convenience and safety. Designing spaces for easy approach, reach, manipulation, and use by all, regardless of the user's body size, posture, or mobility.

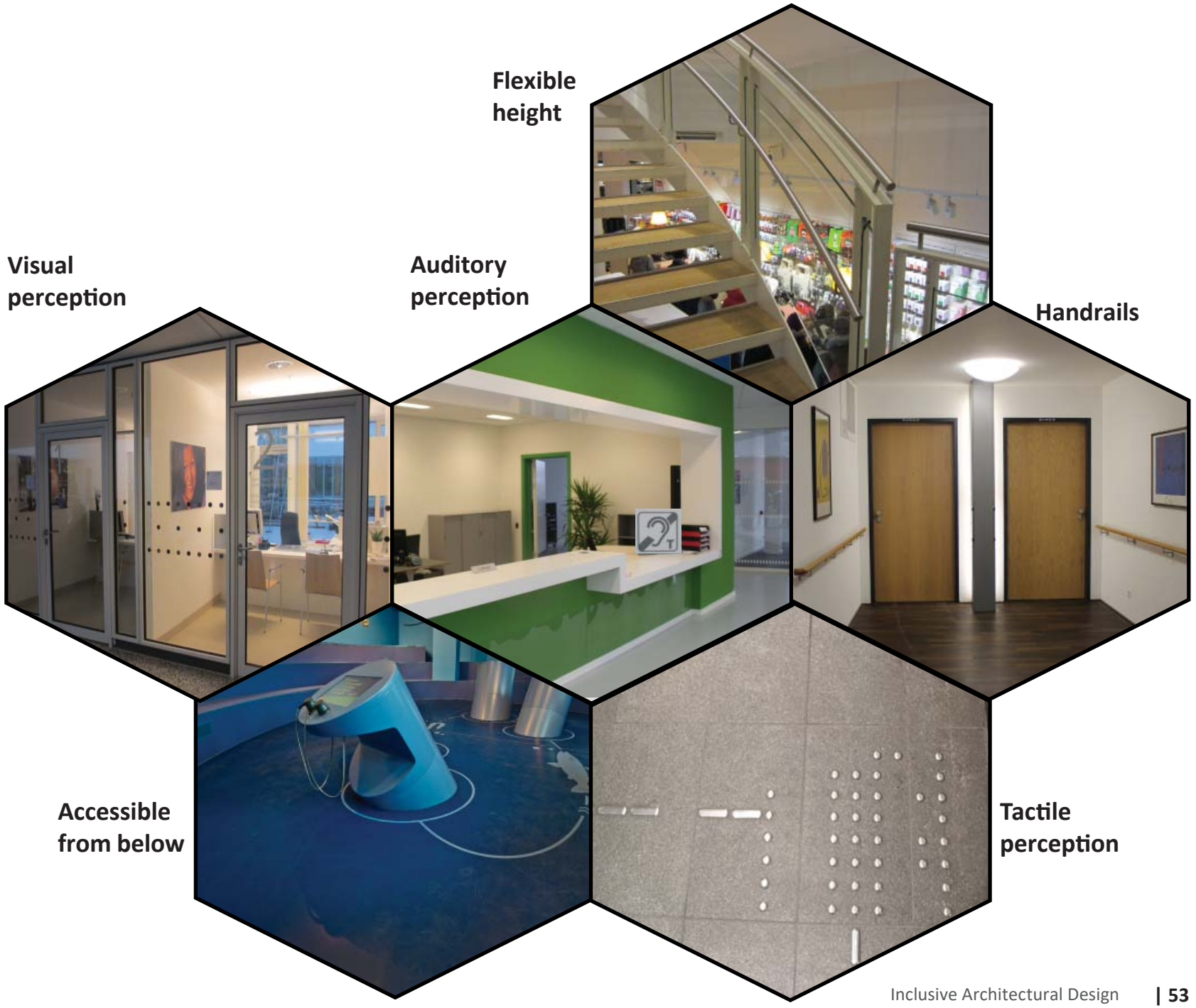
Reach - grasping, visibility, underrideability

- Control elements
- Easy language
- Contrast
- Compare chapter 6: Basic requirements: Anthropometrics (body dimension of reach and height)
- Spatial requirements: Movement areas and additional space for mobility, vision or hearing aids

No thresholds visual connection

All requirements in mind

Accessible stair


Flexible height
Visual perception
Auditory perception
Handrails
Accessible from below
Tactile perception

7.5 Security and Comfort for All

Get out

Visual relationship, clear orientation and good lighting

ensure safety outdoors and indoors. Areas of fear are to be avoided. Barrier-free accessibility as well as escape routes must be considered for people with mobility, hearing and visual impairments.

A holistic fire protection concept enables everyone to leave the building independently in an emergency. Escape routes, assembly points, route guidance systems, smoke detectors and emergency call buttons must be clearly visible, easily accessible and multisensorally provided. A warning signal or loudspeaker announcement should be acoustically distinguishable from disturbing noises and clearly understandable.

An emergency call system must be installed in disabled WCs and lifts. The call must be forwarded to an address that is always ready to answer.

Fire suppression systems

Text telephone with a digital display

Safe holding areas

Tactile escape plan

Safety Signs

Highly visible alarm indicators

Non-contact door opener

Emergency pull cord

Visible switches

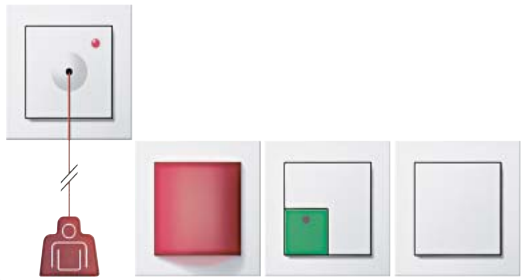


Photo: Gira

http://www.preventionist.co.uk/Content/contact-us.php

Accessible TVETs

A. Pluemmer, D. Y. A. Duah, J. A. Danquah, I. Baffoe-Ashun, C. Akuffo

08

Key Theme:

- **Classrooms and the educational support tools can respond to the wide range of specific educational needs of all users by regarding the new Inclusive Architectural Design Principles (IDA):**

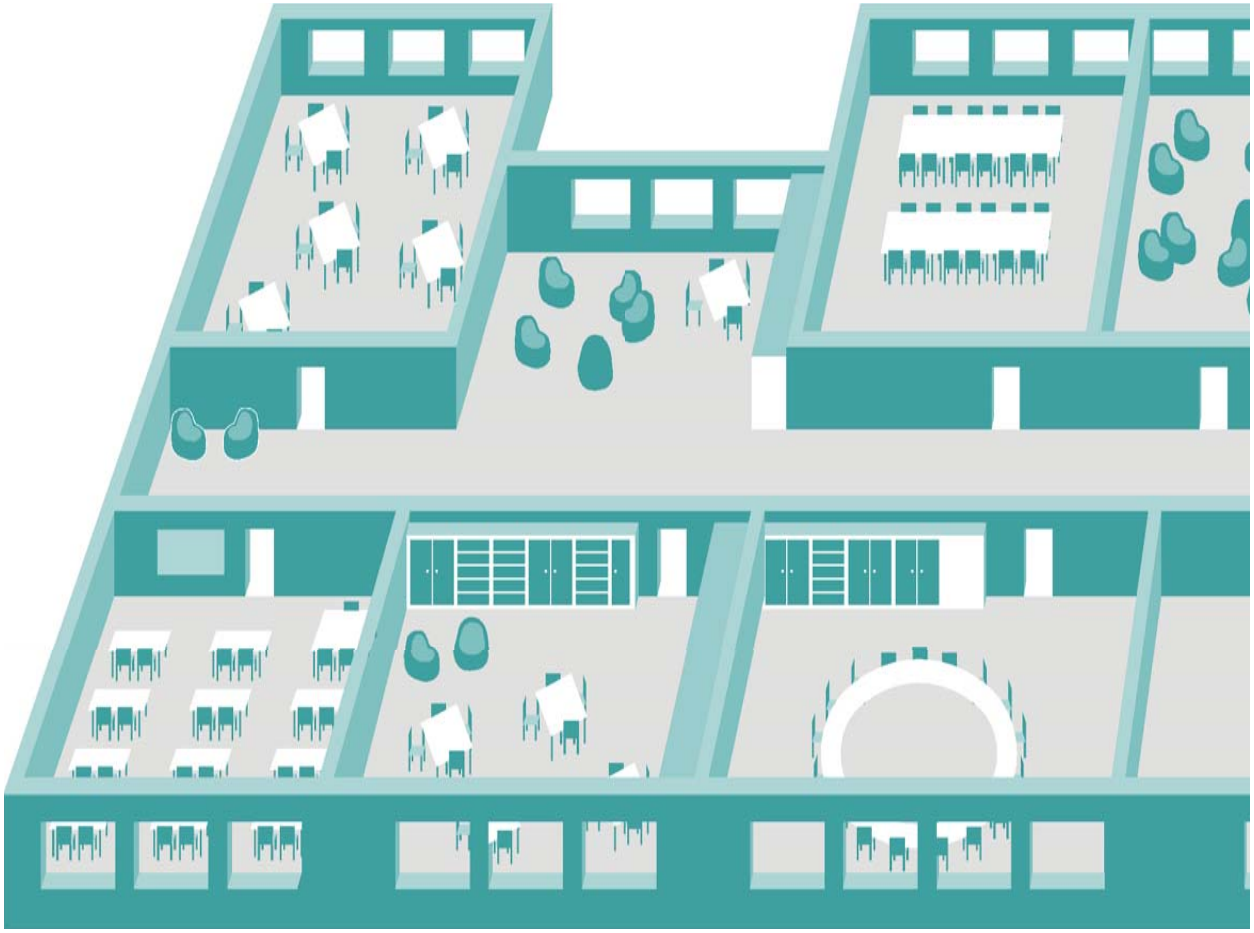
7 - IAD Principles - Mobility
7 - IAD Principles - Visuality
7 - IAD Principles - Audibility
7 - IAD Principles - Cognition

With the implementation of inclusion in educational institutions, a related change is taking place all over the world.

The traditional spatial concept of the school and the associated method of frontal teaching is being expanded to include new forms of teaching such as free work and project teaching.

Students with different abilities and support needs are taught together in one class. Here, new, variable room concepts are required that can always be adapted to current needs.

The picture shows some different ways of furnishing these classrooms. There are table groups of different sizes, arranged in rows or distributed around the room, circular table arrangements and armchairs as symbol for places where withdrawal and individual work but also relaxation are possible.



→ More information chapter 9

→ Link: Innovative-Learning-Environments
→ Link: Inclusive Education Strategies in New Zealand

8.1 Adaptability through Inclusive Architectural Design (IAD)

Adaptability relates to designing new buildings or making alterations to existing building spaces and elements such as windows, doors, toilets etc. in order to accommodate the needs of users of such spaces who have varying levels of or no disability. This allows all users of such spaces to adapt and feel comfortable using the spaces. The design of accessible employment promotion and training institutions is shaped by the overall pedagogical concept of the school, its orientation and its different users. Teaching students with and without disabilities together requires a conscious consideration of the diverse needs associated with certain types of limitations.

Everyone feels differently about the relationships, dimensions, movements in and purpose of a space. Nevertheless, there are some general considerationss that should be considered in order to design inclusive and multisensory spaces. These are spaces that can be grasped with all senses and are more comfortable for all users. In this regard „The Principles of Universal Design“ from Ronald Mace already asserts that the design of everything or anything should be accessible for the use of a larger spectrum of humanity in 1997. (see right side)

In this chapter, we focus on Inclusive Architectural Design (IAD) Principles that highlight on Adaptability for the four main impairments that were described in Chapter 5.

With these IAD Principles the building concept, the arrangement of classrooms and the educational support tools can respond to the wide range of specific educational needs of all users.

They offer among others, adaptable usable spaces with enough room for movement and retreat, good acoustics, good lighting and illumination, an effective ventilation concept, reliable holistic orientation and intuitive graspability. All of these must be combined within a consistent and appealing design.

Good inclusive architectural Design makes use of colors, type of materials and furnishings to enable the essential accessibility requirements (approachability, findability, accessibility, usability and security) to be used to create stimulating and inspiring places of learning where students, teachers and all other users feel comfortable. It meets the needs that tend to be fundamental to make their daily environment friendly to all people.

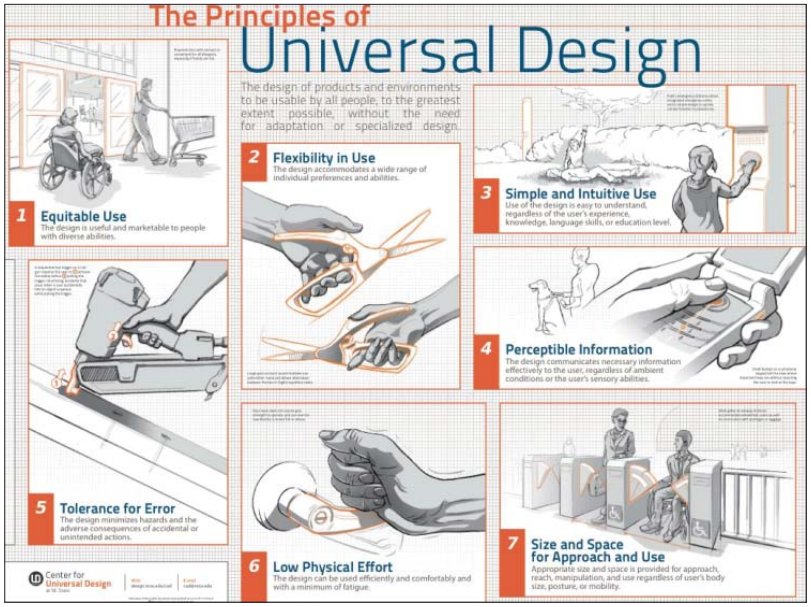
These are not always special solutions that need to be thought of and sometimes, simply the all-inclusive consciousness is enough.

→ Link: **Universal Design Principles - CUD - Ronald Mace**

→ Link: **Universal Design Principles - CEUD Centre for Excellence in Universal Design**

8.1.1 7 Principles: Universal Design

The Principles of Universal Design were created by Ron Mace and a group of design researchers and practitioners across the United States. It was published in 1997 by NC State University, The Center for Visual Design. The Principles of Universal Design is an invaluable resource you can use to plan and guide your design process intelligently.



1 Equitable Use

The design is useful to people with diverse abilities.

2 Flexibility in Use

The design accommodates a wide range of individual preferences and abilities.

3 Simple and Intuitive Use

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

4 Perceptible Information

The design communicates all information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

5 Tolerance for Error

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

6 Low Physical Effort

The design can be used efficiently and comfortably and with a minimum of fatigue.

7 Size and Space for Approach and Use

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

8.2 Adaptability on Mobility

Keynote:

Much attention should also be given to planning spaces and buildings with minimal levels of transitioning between them in order to reduce change in levels and avoiding the construction of long ramps.

IAD -Principles - Mobility

1. **Accessible transportation:**
provide accessible parking and accessible routes from main drop off and pick up zones.

2. **Accessible entrances:**
all buildings must have accessible entrances and where an alternative accessible entrance is from the main entrance, it must be clearly seen from the parking or drop off zones.

3. **Ease of movement in and around facilities:**
provide designs and spaces with minimal change in levels and avoid if possible. Where change in levels are seen, make adequate smooth transition between the levels by ramps or lifts

4. **Large doors and corridors:**
doors and corridors should be large enough to facilitate movements of mobility operated devices

5. **Flexibility of use in teaching and usable spaces:**
all spaces should be flexible enough to accommodate mobility impaired people in terms of furniture and furnishings

6. **Positioning of fixtures and fittings**
should be designed and positioned within reach and easily operated by mobility impaired persons

7. **Accessible washrooms:**
provide accessible washrooms at all facilities, and where multi levels are involved provide at least one each at ground and top floors.

Photos: J. Danqua

Implementation

Barrier free accessibility for all has its main roots from the long struggle on the recognition of the rights of persons with disability worldwide. Indeed, it thus explains the symbol of the wheelchair as the universal symbol for barrier free.

Implementation of the provisions and requirements for persons with special mobility needs are comprehensively treated in all barrier free or accessibility documents. These are found in international and national civil societies and corporate institutions. In the context of this manual, users will find most implementation guidelines from the following documents: 1. ISO 21542:2011-12, 2. Ghana Accessibility standard for the built environment dgs 1119, 3. Ghana Inclusive education policy (standards and guidelines ;implementation plan,2015), 4. Centre for accessible environment, RIBA, 5. Accessible Components for the Built Environment: Technical Guidelines embracing Universal Design.

In the planning and construction of educational institutions, critical consideration should be given to the location of vital facilities such as bus stops, parking, entrances and access routes, help desks and washrooms.

Also, consider the nature of building materials for firm grip and non-slip surfaces while planning shelter for communication routes, wide unobstructed passageways and doors for persons with mobility needs. Most importantly, this includes threshold-free access for self-determined accessibility to buildings as far as possible. If this is not possible, ramps or lifts can be used.

A height-adjustable, roll under, approachable and individually adaptable design of building components and furnishings best meets the different requirements.

8.3 Adaptability on Visuality

Keynote:

The information must also be visible and recognisable for visually impaired people.

IAD Principles - Visuality

1 **Good basic lighting**
Use of uniform, glare-free lighting by combining natural and artificial and main and secondary light sources to achieve an even, glare-free, diffuse light distribution

2 **Shading**
Blackout and shading options in the form of interior and exterior sunshades to prevent glare from sunlight.

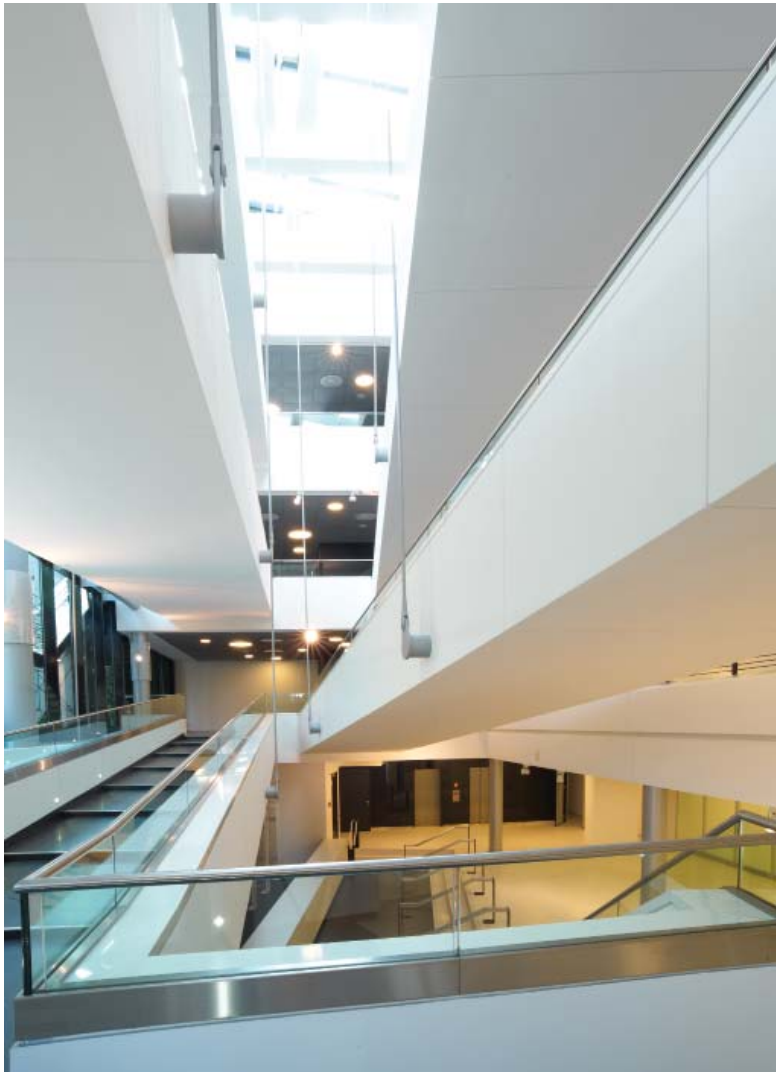
3 **Illuminance**
Sufficient vertical and horizontal light levels to fully illuminate the entire room

4 **Reflectance levels**
The ceiling should be light, the walls light-coloured, the area around the blackboard should not be too bright and the floor coloured more strongly to avoid reflections.

5 **Surface design**
Doors, furniture, work surfaces and operating elements should have a high-contrast design and matt and glare-free finish of all surfaces

6 **Individual improvement of vision**
It must be remembered that individual visual aids may need to be connected to sockets

7 **Orientation aids**
Linear arrangement of furniture in the room, high-contrast tactile guidiace systems give orientation and security.



Picture: v. Canal

Implementation

Good room lighting includes sufficient, uniform lighting for the entire room, achieved through a combination of a main and several secondary light sources. In addition to the basic lighting, several secondary light sources can create a higher lighting level in certain areas (workstation, blackboard, etc.) as required. Direct lighting, glare, should be avoided.

The horizontal and vertical lighting level should be planned to suit the room. Certain areas of a room require a higher light level. These are areas where certain visual tasks require greater concentration and clarity, such as the blackboard area in a classroom.

Blackout options are necessary in all rooms. They prevent glare from incoming sunlight and have a positive effect on vision for certain uses in the room, e.g. presentations. Blackouts can be internal, e.g. curtains, but also external, in the form of slats or blinds, which also have a thermal insulation function.
Clear and simple room structures, linear visual references and obstacle-free routes and movement spaces complement a good lighting concept.
A linear arrangement of furniture oriented to the walls of the room creates better orientation in the room. This can be further enhanced by a colourful and contrasting design of the furnishings and utensils.
However, the use of colour and contrast as informative colour coding must be chosen carefully and should be oriented towards the use and the planned dwell times in the room. The shorter the time spent in a room, the higher the contrasts can be. Not too many different colours, patterns and contrasts should be used in order not to disrupt clarity. A combination of the lighting concept with acoustic and tactile information systems makes a lot of sense and corresponds to the two-senses principle. In addition, when designing the furniture, care should be taken to ensure that all large surfaces are matt and glare-free; this applies especially to work surfaces and floor coverings.

8.4 Adaptability on Audibility

Keynote:

Hearing (just as seeing) is very critical for communication, participation, orientation and self-protection. The key to creating a holistic acoustically inclusive environment is to aid persons to hear well, see good and feel better.

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

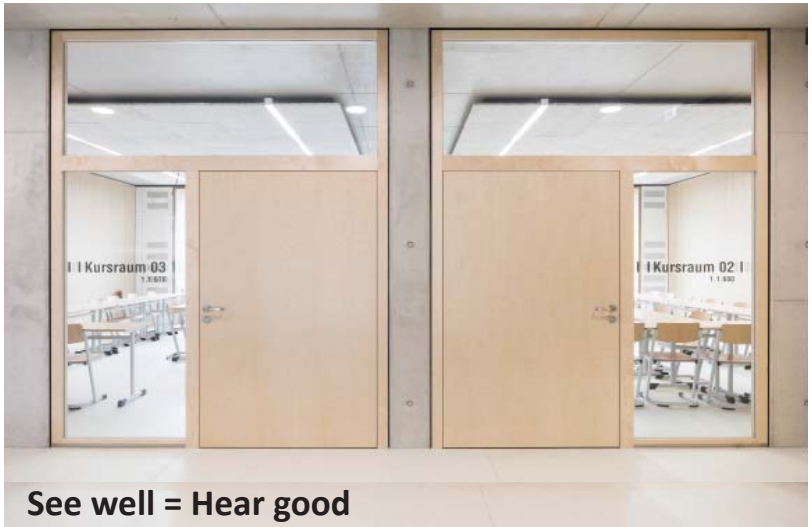


Photo: Schörghuber

See well = Hear good

Implementation

The design of a highly effective, acoustically inclusive environment needs careful planning and effort to get it right. The goal is to ensure speech intelligibility and auditory clarity.

Good acoustics serve all, those who hear well and those who depend more strongly on their hearing, e.g. visually impaired people. For the deaf or people with severe hearing impairments, good lighting and visibility are important for visual communication.

In a tropical country like Ghana, it is sometimes very difficult to create a quiet environment, as indoor environmental quality requires, first of all, ventilation, which will automatically admit noise (e.g., through open windows) into indoor spaces.

The implementation of a good acoustic concept in the TVET environment should take into account the context of local conditions and cultural inclinations. Room acoustics arise from the geometry of the room, sound propagation values and the characteristics of the listening environment, and aim to reduce reverberation time and echo, while avoiding background noise. The choice and properties of sound-absorbing interior materials (for ceilings, walls, curtains, floors) and open furniture can significantly improve the existing conditions in a classroom. Additionally, the architect can direct the design of spaces towards visual communication. The arrangement of furniture, the use of colour contrasts, clear designs and understandable infographics all serve to reduce “visual noise.” Improved lighting conditions, such as even and glare-free lighting, enable communication through body language and gestures.

The adaptability of spaces for an acoustically barrier-free setting can be achieved through the use of technology (IT), changing from textual to visual signs, round/oval arrangements of furniture for effective visual communication, visual and vibration alarm systems, and well-lit and easy-to-find spaces. All of these should be essential components of interior design especially in a learning environment.

8.5 Adaptability on Cognition

Keynote:

In order to create an inclusive, therapeutic-pedagogical education environment, several architectural-spatial interventions are required. In addition, the use of IT components provides a further level of accessibility.

cf. Kessel (2015, 2018, 2016, 2020) In her planning principles primarily developed for autistic people, the author Tamara Kessel points out that a resulting autism-friendly built environment is characterised by clarity and good structuring, which contribute to added value and comfort for all people - with and without disabilities

IAD Principles – Cognition

1 **Sensory concept**
Develop an intuitively graspable, functional spatial and sensory concept for the entire building complex.

2 **Provide expansive spaces**
Aim for an integration of “learner-friendly” functional areas into the spatial concept with expanded learning opportunities that are relevant to everyday life, promote independence and are family-friendly. Also provide areas for movement, language promotion and, if necessary, therapeutic offerings to help prevent stress and distractions.

3 **Intermediate zones**
Within the “route” transitional areas, it is advisable to create intermediate zones, which provide for a relaxing and stress-free learning environment.

4 **Sensory room quality**
Already in developing your spatial concept, the spatial-functional and sensory qualities should be considered.

5 **Intuitive, clear design**
This is aided by planning simply, reducing the number and obtrusiveness of details in the building and its furnishings.

6 **Security**
Always ensure security, control and supervision.

7 **Technological innovations**
Additionally it proves helpful to use IT components in the overall architectural-infrastructural concept.

Photo: ppsolution, Emma School

Photo: M. Duckek, CAPAROL, Moselleum, v.Canel

Implementation

The Ghanaian Accessibility Standard 2016 does not do justice to the complexity and diversity of neurological and mental illnesses. There is a lack of clear instructions and planning principles that lead to barrier-free solutions for people with neurological and mental illnesses and the resulting perceptual disorders.

This above mentioned general exclusion seems to be a consequence of the intangible and subtle challenges of cognitive impairment types, which cannot be plausibly standardized in constructional parameters and guidelines compared to other disabilities.

Unfortunately, the participation of autistic and cognitively impaired people and their relatives in identifying and establishing the urgently needed criteria for “self-determined participation” is also not given. It is well known that for most of those affected, dealing with reactions to their entire environment forms the primary problem.

Through purposeful design and structuring, architects can manipulate sensory input and spatial-functional arrangement to create appropriate conditions for concentration, behaviour, learning ability, communication, independence, and well-being for people with a wide range of cognitive abilities. In this context, individual aspects such as lighting, acoustics, room sequence/orientation, sensory-functional spatial division, route formation, workplace design, the inclusion of sensory gardens and other aspects, can be investigated.

Also, the use of intelligent systems (use of IT) in architecture and design as an integrated interface of the built environment for the modification and generalisation of learning, working and social behaviour and the promotion of independence can be included. Another building block for the implementation of accessibility for people with neurological and mental disorders will be formed.

Special Facilities and Functional Areas

A. Pluemmer, D. Y. A. Duah, I. Bekoe, I. Baffoe-Ashun, M. Amoah, C. Akuffo

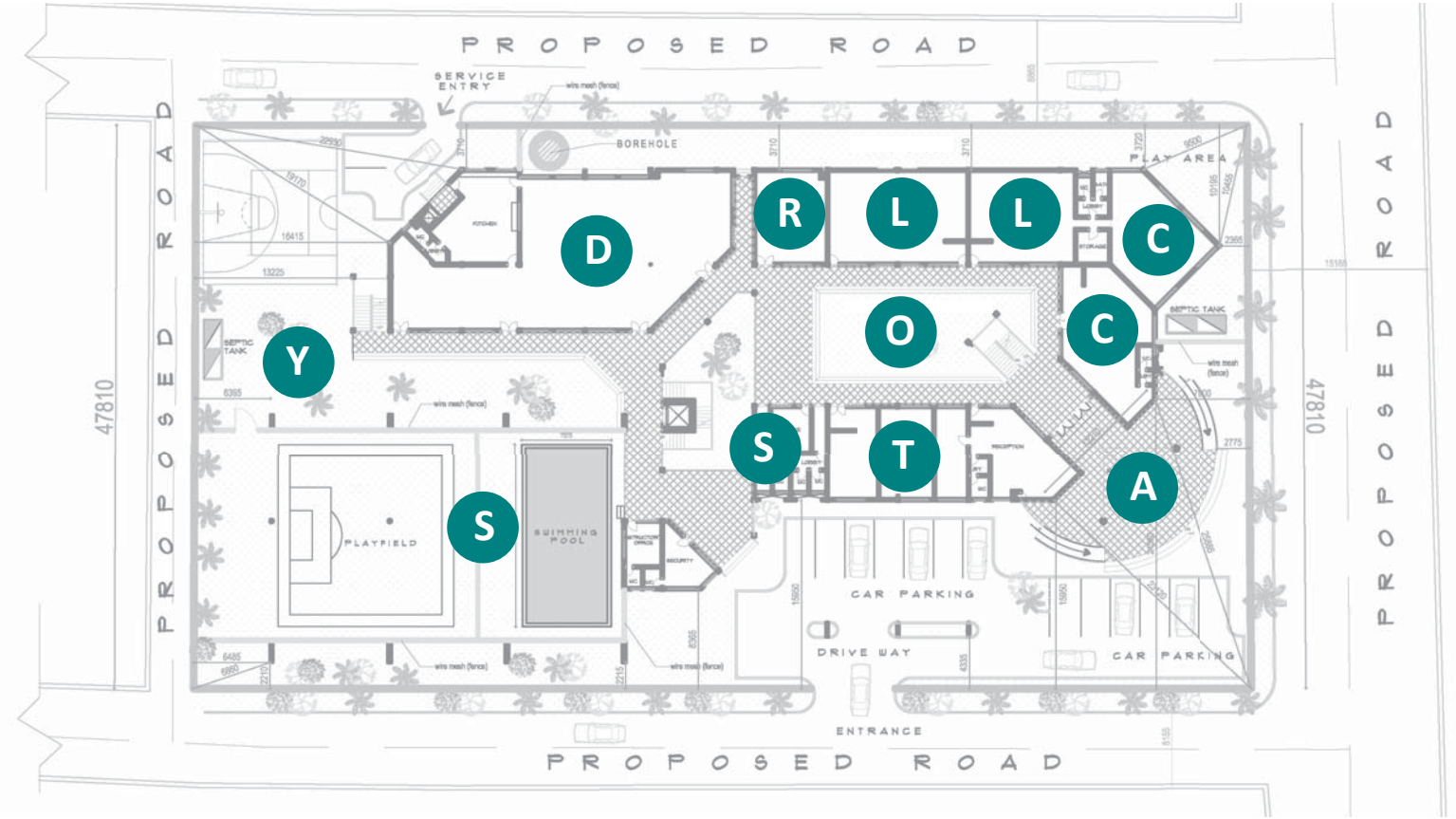
09

Key Theme:

- **Description of concrete Measures for selected rooms in a Technical Vocational Education Training (TVET)**

  - Function
  - Equipment / Furnishing
  - Light
  - Acoustics

9.1 Room Guide



This chapter describes some examples of rooms in a Technical Vocational Education Training (TVET) that should be considered when providing inclusive education. It is important to be clear about the function of the area and its different users in order to adjust the equipment, lighting and acoustics accordingly.

Legend:

A_Atrium / Entrance
C_Class room
D_Dining area /Canteen
L_Lab / Workshop
O_Open Learning Space
R_ Retreat room
S_Sanitary room
S_Sports
T_Teacher´s Lounge
Y_Yard / Campus

9.2 Atrium / Entrance

A

Function

Building entrances provide an opportunity to identify the main point of access into buildings, which also affects the functionality of buildings. Entrances provide a focal point of entry for staff, residents/users and visitors and should be easy to find and made accessible to all persons with disability.

The position of an entrance of a building should be accessible without thresholds and may be highlighted with architectural features such as a canopy or a door recess. A clearly visible and accessible entrance is likely to create a positive impression for all building users and make them feel welcome. The recommended clear area for a landing or turning space immediately outside an entrance is 2,40m x 2,40m. The design at this transition between inside and outside should be continuous to ensure good orientation

Photo: A. Plümmer Handicap HUS

Equipment / Furnishing

Entrance ushers´ users into a building and adopt a positive universal design approach.

The entrance area should be easy to find and use for pupils and carers with visual impairments, impaired hearing, walking disabilities, wheelchair users and people of short stature All equipment elements must not restrict the usable width of the traffic and manoeuvering areas and must be tactilely detectable as an obstacle for long stick user.

Entrances mats should be levelled with the floor and/or located in mat sinkages so as not to create a tripping hazard. Arrangement of furniture, counters and information should be support all users with visual and tactile signages, acoustic features, arranged orderly. The placement of call bell and public telephones should be firmly fix to the wall within acceptable height or reachability.

- Ensure the entrance indicates the uses of a building and exhibit a positive universal design approach
- Entrances should be accessible whilst also maintaining security, environmental performance

Photo: A. Plümmer. TU Wien

Arrangement / Equipment

The entrance area guides users into a building and takes a positive universal design approach that is accessible to pupils and carers with and without impairments. This includes non-slip floor coverings, entrance mats that are flush with the floor or those that are placed in mat recesses to prevent slipping or tripping. Equipment elements must not restrict the usable width of circulation and manoeuvring areas and must be tactilely detectable as an obstacle for long-stick users. In addition to visual signage, a clear arrangement of furniture and wayfinding can guide, warn and inform visitors. Haptic and acoustic features can be helpful here, and not only for visually impaired people.

The placement of signage, controls, emergency calls and public telephones should be firmly fixed to the wall at an acceptable height.

- The difference between external and internal lighting levels should be <50 lux.
- A good wayfinding and orientation system improves visibility.
- Entrances should be clearly identifiable and as transparent as possible.
- Shading and indirect lighting devices can be used to avoid direct light irradiation and glare.

Light

The entrance area should be illuminated well, with high contrasts and ample, uniform lighting, avoiding glare. Make sure the area is clearly visible during the day and well-lit at night.

Entrances to rooms that remain open after dark should be sufficiently illuminated in any case.

The leading edges of stairs, steps, ramps or lifts must be clearly demarcated and well-lit to minimise tripping hazards.

Adjacent stairwells, corridors and entrances should be illuminated with at least 100 lux, 150 lux and 200 lux respectively, and should be clearly visible and recognisable by design, material and colour. Unobstructed, direct lines of sight support quick orientation.

A carefully designed lighting and illumination concept serves everyone and especially people with impaired vision and/or hearing ability.

- Using sound-absorbing materials in the ceiling and wall areas as well as for the furniture to lower sound levels and stop sound from spreading.
- Sound-source segregation by, e.g., grouping noisy areas from silent areas.
- Creating good lighting and visibility conditions.

9.3 Classrooms

C

Function

A classroom should provide a variety of stimuli and take into account the different possibilities of the students. The room and the equipment should allow for different learning tasks, methods and also social and working forms. Thus, the more flexible and easily changeable the room, the better learning can be designed.

In addition, the room should provide materials that are needed for learning e.g. learning software, tools and technical aids that are stored on site.

This approach must be implemented inclusively, taking into account the furniture, lighting, aeration and acoustics. The focus is on necessary individual requirements, whether structural or technical, which should enable all pupils to participate.

An inclusively designed classroom enables quite and concentrated work and provides visual and auditory reference to the teachers and classmates.

Photo: Arrchitektei Mey

Equipment / Furnishing

Sufficient size is important for the classroom to provide enough space for bulky aids and adequate space for movement between the furniture and in the corridors. A linear arrangement of the flexible furniture parallel to the walls provides structural order. Adequate storage space should preferably be placed against the wall.

Tables and chairs should be ergonomically adjustable to optimise seating comfort. This can be achieved by adjusting the height of the furniture or by offering a choice of different types of chairs. The blackboard in the classroom should be securely attached to the walls; folding panels that protrude into the room should be avoided.

The colour scheme of the classroom should be bright and friendly and prevent glare. The play of colours and contrasts can be used conceptually to facilitate clarity.

- sufficient space
- linear arrangement in the room
- storage space
- height adjustable furniture
- securely fixed board without folding wings
- high-contrast design

Picture: GIZ

Picture: Spaysis

Picture: A. Plümmer

Light

A suitable lighting concept in classrooms is achieved through a combination of natural and artificial light. To prevent glare, sun protection devices may be installed outside, in the form of slats, and/or inside, as curtains.

The natural lighting concept is supplemented by artificial light consisting of a main light source and several secondary light sources. Lighting from the left is free of shadows only for right-handers, which should be taken into account.

More than the lighting, the shadows cast by people sitting in front might pose a problem, which is why spotlights should be mounted as high as possible. A clear view of the teacher and classmates increases students' ability to concentrate as well as their motivation. In addition, the teacher/lecturer should always stand in front of a glare-free and non-reflective wall.

- Use sunshades.
- Main light source in combination with secondary light sources.
- Avoid Glare and casting shadows.
- Use matt and non-reflective surfaces.

Acoustics

The acoustics of a classroom space refers to the physical space of the classroom. The key thing in classroom, for teachers and students alike, is speech intelligibility – both in traditional frontal teaching and in group teaching. Classrooms with poor room acoustics make speech comprehension and audibility very difficult.

Multiple reflections from the ceiling and walls (echoes) can increase the sound level. Students and teachers have to raise their voices to be heard, this leads to stress and fatigue.

Sound-absorbing measures on the ceiling that reduce low-frequency background noise and reverberation time, correctly installed sound-absorbing wall panels and adequate furniture can improve the structure of the sound field.

In addition to these measures, the following have proven useful:

- Create a seating arrangement in such a way that everyone can see who is speaking.
- Increase the volume and clarity of spoken words, with technical aids if necessary.
- Create good light and visibility conditions.

9.4 Dining areas / Canteen

D

Function

Canteens are often multi-functional spaces where many people gather. Here, an inviting design, good lighting and ventilation and effective room acoustics play a mayor role. The location should be conneced with the entrance area and be easy to reach and to access for people with different abilities. This area should be next to at least one barrier-free sanitary room.

Depending on the use of the space, the arrangement of tables and chairs can differ a lot, e.g. from long rows of tables to rows of seats for an event with a podium. In all cases, the requirements of the different users must be regarded. This applies to accessibility and approachability, the space required for the freedom of movement, but also the design of the furnishings and fixtures according to the rules of the IAD Principles which enable adequate use.

Photo: GIZ

Equipment / Furnishing

Organizing equipment in the dining area should be determined by functionality and the type of environment anticipated as guided by the utility and universal design techniques.

The equipment in the dining area is to be arranged linearly around a focal point with the complement of all other accessories. Tables with rounded edges should have clear space around them to facilitate use by all forms of mobility aid users. Furniture should be durable and comfortable benches and/ or adjustable chairs for inclusivity.

Arrangement of the equipment like sinks and other accessories should be flexible, adjustable enough to support accessibility and free movement. The arrangements of lockers should preferable be along the walls to create uninterrupted aisles.

- Seating arrangement
- Space used at table
- Size and type of Furniture
- Space allowance for furniture
- Space around the furniture for passage and accessing

Photo: GIZ

Photo: Ecophon

Photo: Elbschule, Klier, Dorfmüller
Arch.: info@doseundpartner.de

Light

For a space like a dining hall, it is prudent to provide both natural and artificial lighting for wayfinding and usage. Due to the different types of use taking place in these areas the lighting scheme has to respond to different furniture settings and creates optimal visual conditions for all activities. The goal of lighting is to ensure that everyone can see well.

In case of an assembly the podium must be well lit, with an optional spotlight on the speaker. Uniform illumination must be provided to ensure that those at the back of the hall can see the podium clearly. Additionally accent lighting can be provided to highlight specific fixtures of the hall.

The often high noise levels in such spaces make it essential to clearly and visibly mark access points and passageways. Emergency alarm systems must be clearly visible to all.

- Avoid the use of direct light fixtures.
- Aisles and accessible routes must be clearly defined and well-lit.
- Employ diffuse lighting to ensure uniform illuminance across the space.
- Use accents to highlight the podium.
- Provide visual orientation systems.

Acoustics

In most schools, the assembly hall serves as a refectory/dining hall on normal days and is used for religious and entertainment activities on weekends. This must be taken into account when considering the acoustic treatment of such a room. Even if such a space is used in different ways, improving the acoustic environment usually has great benefits for all uses.

The typical canteen is a large open space with a high ceiling and a large distance between the origin and destination of the sound. The equipment noise is high as students converse while eating, handling dishes and cutlery, which can create a very stressful environment. Therefore, it is important to prevent the sound level from escalating and spreading in all directions and into adjacent areas by reducing echoes and reverberation times to a minimum.

- Use a highly sound-absorbing ceiling.
- Cover as much as possible of the walls with wall absorbers.
- Zone places of excessively intrusive noise.
- Place loudspeakers near the podium
- Restrict sound to the interior.

9.5 LAB / Workshops

L

Function

Laboratories / Workshops can be set up very differently depending on the professional orientation. Nevertheless, it must be possible for students with and without disabilities alike to use this space for what it is intended for in the usual way and without additional effort or assistance. The various workplaces should be individually adaptable in their dimensions and ergonomics, but also height-adjustable, accessible from below and, if necessary, equipped with grab rails and fixation devices.

Equipment elements in laboratories must be accessible for seated and standing persons, e.g. emergency stop controls. For safety reasons, as an orientation aid and to facilitate the recognition and use of facilities, equipment and controls, laboratories must have visible contrast. Good lighting and unobstructed visual references are essential for all users.

Photo: GIZ

Equipment / Furnishing

Workshop/ laboratories space should be good enough to support the installation and movement of equipment and users.

Equipment should be distributed evenly with light equipment fixed firmly to the walls where applicable. Heavy equipment is to be placed on a levelled and firm floor. The furniture and workstation should be individually height adjustable, accessible from underneath and comfortable with arm or neck rest where necessary.

The furniture and workstation should not obstruct movement and spaces kept in between should be wide enough to support mobile aid users. Phones, call bells and other emergency alarm gadgets and demonstration board if needed should be accessibly fixed firmly on walls with directional signage and at an acceptable height with no overhangs.

- Ensure workshop and laboratories are adaptable and multi-purpose
- Equipment should be need specific
- Utility and equipment controls are to be within easy reach from a standing or seated position.
- Ensure that the arrangement of equipment promotes safety of all users

Picture: Ecophon

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

9.6 Open Learning Spaces

Function

Conceptually, this is a step away from frontal teaching towards the promotion of individual learning needs.

Open Learning Spaces in this regard refers to alternative forms of learning areas which provide students with the opportunity to learn and interact outside of the traditional classroom setting.

They include indoor and/or covered outdoor areas where students can have group discussions or individual learning programmes.

The goal is simply to provide equal access to students who would like to engage in informal learning within these areas to be able to do so comfortably and efficiently. It is important to ensure that the layout of open learning spaces is logical and easy to understand by users with a variety of abilities.

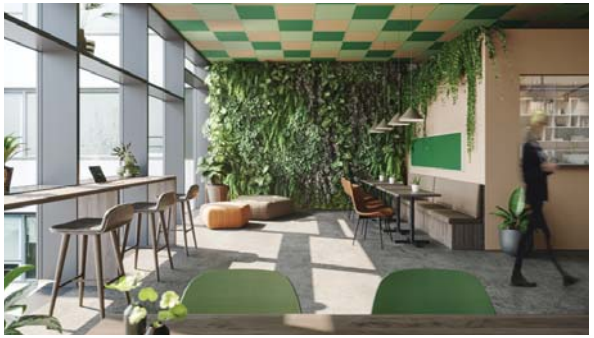


Photo: Ecophon. Biophiles design

Equipment / Furnishing

The open space learning areas should be sizable enough to improve ventilation and also support learning equipment.

The arrangement of equipment should be learner centred, developmental and age appropriate, comfortable, inclusive and inspirational.

Preference may be given to a position that allows all equipment to be placed linearly according to an appropriate pattern to facilitate free movement and reduce accidents.

The Equipment should be fixed on a non-slippery level and firm surface while visual, audio and audio visual equipment are to be fixed at a pivotal point accessible for both learners and tutors to improve the dissemination of information. To further improve accessibility, consideration may be given to:

- Ensure that the layout of open learning spaces is logical and easy to understand but trigger a good sensation.
- Ensure interactive displays are accessible to everyone and easy to use.
- Provide accessible information and equipment in advance to support self-directed learning

Photo: Ecophon, Bewley School

Light

Depending on the type of set-up and the intended use of the open learning space, lighting requirements may vary. Such learning spaces are characterised by individual learning, discussions and group work in mini-groups that take place outside the classroom.

They are areas such as extended corridor spaces that are suitable for learning but also for retreat. The lighting here is also similar to the lighting in classrooms, with the difference that it can be adapted to the respective use. For example, lighting can be adapted to seating groups creating group discussion areas that allow for effective communication and the promotion of ideas. It should be noted that the different types of lighting include a visual link for the use of sign language. Unobstructed sight and eye connections between teacher, students and tutors are important.

- Lighting for grouped seating
- Task lighting for individual learning
- Uniform lighting and unobstructed sightings for visual connection
- Outdoor areas: prevent glare and provide shade

Acoustics

Due to the nature of TVET education, not all classroom learning can take place indoors.

Open learning spaces/landscapes are suitable alternatively for group work and discussions. Such spaces can also generate noise that is disruptive to other learning rooms, so sound insulation and control is necessary.

If acoustics are not handled properly, sound will spread throughout the room and disturb other classes and groups. This causes disruptive sounds, to build up, forcing students to raise their voices, which in turn increases the noise level. All in all, this would lead to a space where students find it difficult to concentrate and where teachers find it difficult to help and guide students.

A well-designed concept for room acoustics can demonstrably succeed if it is targeted to:

- Zoning to contain noise levels e.g. with mobile partitions
- Reduction of sound intensity by using absorbing materials for ceiling and wall
- Group seating must have sound absorbing materials.
- Improving speech intelligibility enable wellbeing due to calmer behaviour

9.7 Retreat / Therapy rooms

R

Function

The relaxation or retreat room in schools is intended to provide students and teachers with a time-out from the daily school routine. Its main purpose is to provide a place to retreat and, if necessary, to calm down in the event of stressful situations.

It should also be possible to have individual conversations or therapeutic support in peace and quiet outside of the classroom. It is important that the furnishings and room qualities are well designed and allow for a variety of uses. Resting, lying down, relaxing , reading a book, listening to music. In a protected setting, you can talk to individuals, discuss things in small groups or work in a concentrated manner. The users should be able to develop freely here. Such a retreat is particularly important for all-day schools, but all other schools also benefit from a space like this.

Photo: A. Plümmer

Equipment / Furnishing

A retreat room should not be visible from the outside so that students do not feel observed. Ideally, a separate room can be set up. If this room is integrated into an open learning space concept, it must provide sufficient screening from the rest of the room so that there are corners that are not directly visible. This can be achieved by shelves, partitions or even high seating elements. It is important that these elements can be arranged flexibly to create different spaces and zones depending on the kind of activity and needs of the users.

Furniture can vary from reclining options, comfortable seating and tables where students can sit together to play, draw or work concentrated. Adaptation to the individual needs of the users in the sense of the IAD principles is to be strived for

- Ensure that the furniture and furnishings are comfortable and inclusive
- Adopt the use of tactile fabrics or surfaces.
- Ensure that seating arrangements allow free movements.
- Avoid harsh overhead lighting

Photo: A. Plümmer

Light

Sufficient lighting is very important for a retreat room. Ideally, there should be sufficient daylight in the room, but this should be supported by artificial lighting. This should be a soothing, warm light that creates a pleasant, relaxed atmosphere. In addition, the lighting should be indirect, so that the room is diffusely and not centrally illuminated to avoid glare and sensory overload. This can be achieved by using several small lamps instead of central lighting. This allows the lighting mood to be adjusted according to the situation and the needs of the students , which is also possible through dimmable lighting options.

The colour scheme in the room, also, should support the calm atmosphere by using bright, warm pastel tones that that match the furnishings. All surfaces should be matt and avoid glare.

- Main light source in combination with secondary light sources.
- Avoid glare and casting shadows.
- Use matt and non-reflective surfaces.

Acoustics

In order for the retreat room to be truly quiet, it is important that no noise from outside enters the room. Consider sound and noise protection as early as the structural planning stage, on the one hand with building acoustics measures but also when determining the location of the room. In order to further reduce noise pollution in the retreat room, it is important that as much sound as possible is absorbed in the room and the reverberation time is reduced.

This can be supported by appropriate furnishing, for example open shelving, which at the same time allows for flexible zoning. But sofa corners or carpets laid out on the floor can also help to reduce the sound in the room and thus create a quiet atmosphere. In general, the better the sound can be absorbed, the quieter the room and this has a pleasant effect on the atmosphere.

- Reduce sound intensity and minimise sound propagation by using absorbing materials for ceiling and wall
- Improve speech intelligibility by ensuring good room acoustics and shortened reverberation times

9.8 Sanitary rooms / Restrooms

S

Function

Accessible restrooms need to be designed so as to be usable for their intended purpose by all users of the school (i.e. students, staff, and visitors). Toilet, changing room and shower facilities for staff should be separated from those provided for students. At least one WC must be accessible to wheelchair users within both staff and students washrooms, whereas wash hand basins should be placed at heights accessible to all users. Where urinals are provided for male washrooms, the ratio of WC cubicles to urinals should be 1 to 2 or greater. That is, there may be more urinals in proportion to the number of WC cubicles for male washrooms.

Sanitary disposal units should be provided in all toilets used by girls, and ample space should be provided to comfortably use the WC where there is an adjacent sanitary disposal unit.

Equipment / Furnishing

The rest room is the key to easy accessility in general. The arrangement of the equipment should be on a clear, firm, non-slippery floor area sizable enough to facilitate free turning for all forms of mobile aid users. Equipment should not be placed to limit door rotations and the mounting of wash room accessories should be inclusive, flexible, adaptable and adjustable. Urinal screens and any other form of compartment should be designed to reduce protrusion.

The choice and arrangement of W/Cs, Wash hand basins, door knobs and other utility equipment should be flexible enough to complement hand strength and the dexterity to operate the systems. The arrangements of the accessories and the equipment should be coordinated and coordinative in operations.

Photo: Angelika Plümmer

- Arrange cubicles, urinals and hand-washing facilities logically
- Install washbasins at different height
- Employ suitable wash room accessories

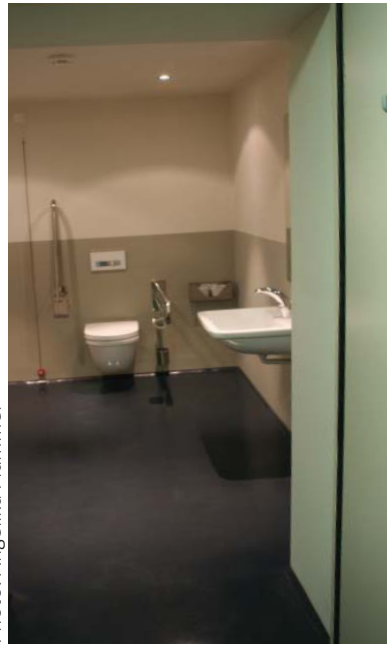


Photo: Angelika Plümmer

Light

Sanitary facilities must always be well-lit. A lighting intensity of 200 to 300 lux is required. Ultraviolet lighting, which is sometimes used in toilet facilities to deter drug use, should not be used in accessible toilets. Lighting fixtures must be glare-free and their temperature should not compete with the tiles/finish of the washrooms. Some restroom finishes can be highly glossy and reflective, thus creating visual discomfort.

A careful selection of materials can promote visual clarity for washrooms.

Access doors to restrooms must be clearly visible; they should be large and high-contrast and should also be marked in braille.

Make sure toilet buttons, brushes and pares are easy to find, highlighted in contrasting colours. Hooks for coats, bags and canes for the blind in the restrooms turn out to be helpful.

- Maintain a general luminance level of 200-300lx
- Use contrast to highlight doors, handles, fixtures etc.
- Ensure ease of navigating to fixture and fittings
- Carefully select materials to reduce visual noise

Acoustics

The acoustics of restrooms can have a dramatically high impact on noise levels, and thus require attention. Since this space is solely used by students, it is susceptible to high noise levels, as students sometimes use these spaces in pairs and groups. Especially during class time, these rooms need to maintain the low noise level required for effective teaching and learning, so as not to disturb adjacent classrooms and corridors. In addition, toilets and shower rooms often have hard surfaces such as ceramic tiles on walls and floors that reflect sound, further increasing noise levels.

Additionally, noise generated in these spaces must be controlled so as not to stress students. A sound-absorbing ceiling in this type of space must have high absorption qualities and withstand high humidity and cleaning demands.

- Consideration of room acoustics.
- Reduce reverberation time through sound absorption.
- Emergency call system can be detected visually and tactilely.
- Pleasant and high-contrast design.

9.9 Sport facilities

S

Function

Sports and physical education programs are highly beneficial for all students in TVETs in Ghana.

It should be noted that individuals with disabilities who participate in sports have higher self-esteem, better body images and higher rates of academic success. Thus, there is the need for TVETs in the country to construct multipurpose sport facilities to encourage physical training and wellness. The goal is to make these facilities readily accessible for competitors and spectators.

The design and maintenance need to follow the IAD principles. These could include considering the need of students and staff living with sensory, cognitive and mobility impairments. There should be easy access to the sports arena, locker rooms and sporting equipment for competitors, whereas designated seating areas should also be accessible to a variety of spectators

Photo: C. Ruhe, Elbsschool

Equipment / Furnishing

A poorly arranged equipment at a sport facility can isolate users, create challenges and increase hazards. Equipment arrangement should consider the physical, sensory and other forms of disabilities of all ages. Spaces for indoor and outdoor sports activity should be sizeable enough to prevent cluttering of sport equipment.

Seating should be systematically arranged to accommodate the movement areas required in each case. Equipment in fitting and changing rooms should be inclusive and on a level, non-slip floor. Training equipment and machines should be adjustable in height and flexibly arranged to promote accessibility for all. Display boards, whether conventional or electronic, should be large enough and in accessible locations. In general an optimum of safety, flexibility, adaptability, functionality and capacity for simultaneous use should be provided.

- Priority is to be given to equipment that are resistant to vandalism and are easy to maintain
- Ensuring that equipment are installed to meet compliance requirement
- Ensure that appropriate instructions for use are provided for all equipment

Photo: Ecophon, Sol Plaatjiie

Light

Visual communication is critical to sporting success. Thus, the design of a sports facility should promote good visual clarity, as well as auditory comprehensibility for both athletes and audience. Outdoor sport arenas, like those of most TVET institutes, must be designed to limit the effects of glare from the sun.

An effective orientation of the playing field promotes good visual comfort for all. Indoor facilities, gyms with their locker rooms and stores must have good lighting levels for optimal use. Here, consistent illuminance is important.

Persons with sight impairment might even be provided with an audio commentary facility to fully enjoy and participate in these activities. Braille should be added to seats and a good, clearly audible alarm system is important in sports facilities as well in case of an emergency.

- Create good visual clarity for athletes and spectators.
- Limit glare from the sun.
- Uniform lighting levels.
- Braille should be used for information.
- Provide audio-commentary capability.
- Audible alarms systems for emergency.

Acoustics

Akin to recreation and socialising, sports facilities have high sound levels either from supporting spectators or from the sports activities itself. Whether indoors or outdoors, maintaining acceptable levels of sound is critical for the wellbeing of all.

The design and planning of such outdoor facilities must be done to ensure attenuation of sound for the well-being of all, but critically, for participants and spectators with hearing impairments. Indoor sports facilities, in particular, must attenuate the sound from sporting activities and cheering crowds.

The main goal for good hearing in sporting facilities must be to reduce sound levels and improve speech intelligibility by limiting visual and background noises. This can be done in an indoor environment by:

- Use of high-quality sound-absorbing materials on walls and ceilings to reduce the sound level and reverberation time.
- Installation of a floor covering that reduces impact sound.
- Ensuring spatial and informational visual clarity and intelligibility.
- Offering multi-sensory alarm and emergency call systems.

9.10 Team room / Staff / Administration

Function

Staff rooms/lounge are private spaces where staff of schools can have a break, relax and have informal and formal meetings and conversations with other teachers outside their timetabled lessons. It should have a welcoming and relaxing atmosphere, as well as offer the opportunity for teachers to meet students or quests in a more private atmosphere. As such, the location of a teachers' lounge should preferably be away from internal and external sources of noise from the classrooms and are accessible to all.

Furniture and equipment's within the lounge should meet varying individual needs, as well as with accessible seating for staff members who use wheelchairs and other walking aids. Countertops and storage cabinets for kitchenettes must also be accessible to all staff with adequate circulation routes, free of obstructions.

Equipment / Furnishing

As one of the most important rooms for educators, the team room offers workstations and sufficient storage space at their disposal. A clearly defined space, large enough to separate the different uses is advisable. In addition, separate material storage, short distances to the cloakroom, staff sanitary area, tea kitchen and an internal connection to the administration are recommended. The team room should open up to the Open Learning Spaces to provide visual contact with this area.

The facility should be designed inclusively, clearly structured and large enough to offer requested mobility. Different, individually adaptable furniture e.g. height-adjustable tables allow working both sitting and standing. Sufficient connections should be provided for technical equipment.

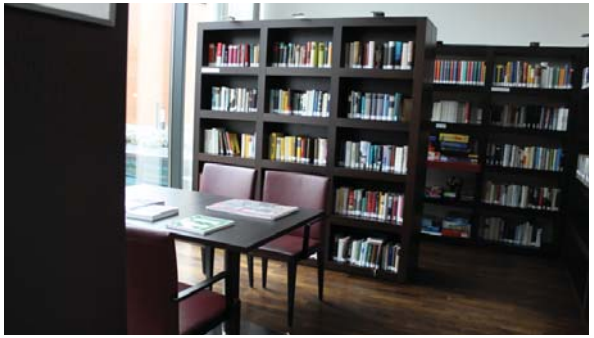


Photo: A. Plümmer

- Design the equipment in such a way that it promotes teachers' individual performance.
- Allow space to stretch out and come together in small groups
- Provide adaptable furniture and sufficient connections for technical devices
- Establish a visual link between the staff room and the student area.

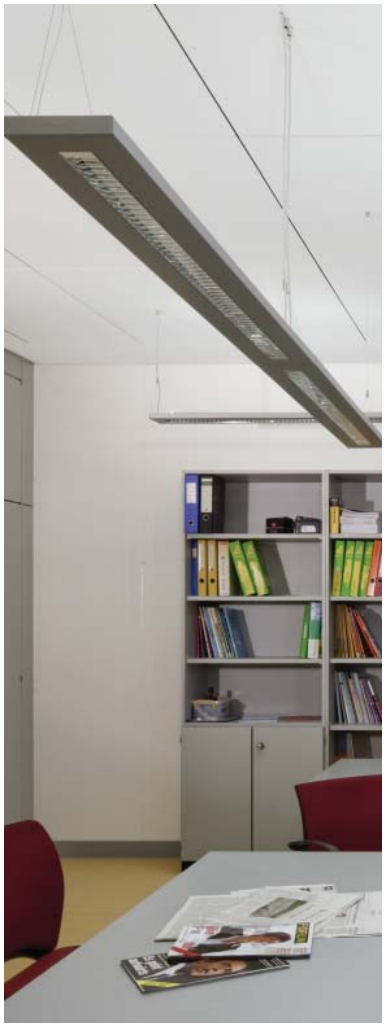


Photo: Ecophon

Light

The lighting in a staff room should be bright and friendly and should be adaptable to the different activities that take place in the room.

Soft, atmospheric lighting allows for relaxation or personal conversations. Uniform, indirect but high illuminance promotes cooperation and communication among colleagues. Uniform, glare-free lighting is useful for conducting conferences.

However, if other tasks such as marking scripts and taking notes are to be performed, additional task lighting should be provided. Individually adjustable lighting with at least 500 lux provides a well-lit environment. To improve visual clarity, ensure unobstructed lines of sight throughout the area and make sure that glare and reflections are avoided. Ordered visual and lighting conditions have a relieving effect not only on those with visual/ hearing impairments.

- Ensure a high level of visual connection.
- Maintain an ambient level of light for coordination.
- Provide light fixtures for individual use.
- Avoid glare and visual noise.
- Provide task-appropriate lighting.

Acoustics

The staff room is used as a relaxation space as well as a formal and informal space and needs to provide the best acoustic environment to fulfil its multiple uses efficiently.

Staff rooms are a private space away from students where staff can take a break, relax and have informal and formal meetings with other teachers outside of class. Therefore, the acoustic requirements of such a space must ensure optimal sound levels with changing use. Calm and a quiet atmosphere is requested when teachers are correcting scripts or preparing for the next lesson, whereas clear speech intelligibility is instrumental in conversation. An efficient acoustic, lighting concept should consider the specific needs of teachers with hearing impairments. To improve these indoor conditions, the following basic acoustic principles are sufficient:

- Reduce background noise levels.
- Reduce reverberation by increasing the absorption of the surrounding materials.
- Keep sound from spreading and disturbing colleagues by zoning different areas and creating visual connections.
- Implement: optimal lighting.

9.11 Yard / Campus / Open Spaces

Function

Access routes on the compound include paths, pavements and other rights of way, such as pedestrian routes around the campus. Zoning of the different areas helps to orientate and, where appropriate, provides tactile guidance e.g. lawn edging stone.

It is important that all existing routes and outdoor furniture are well maintained at all times and facilitate universal access.

The width of an access route should be sufficient to enable people to move in both directions and pass each other with ease. The surface of outdoor areas should be designed in such a way to be able to cushion falls and meet relevant safety standards.

Avoid the use of unnecessary changes in levels in outdoor spaces in order to eliminate the need for a ramp or steps as much as possible.

Equipment / Furnishing

To promote safety, accessibility and usability of equipment in open spaces, the equipment and its organisation should be appropriate for the space available and organised according to the specific use and functionality. Depending on the situation, it may be useful to roof parts of the outdoor space either as sun or rain protection.

The type and nature of equipment should be appropriate for open spaces to promote inclusive social interactions and commoning as part of the learning and socialisation process.

As part of the effort to promote a truly inclusive open space, the arrangement of equipment should be flexible, adaptable, user-friendly and usable and save. So where necessary, equipment should be fixed by bolting or welding to flat and solid floors. Multisensory signposts as orientation aids should be continuous.

Photo: After School Africa

- Avoiding conflicting routes between different groups
- Open space should be accessible to all and support forms of exterior activities in a convenient manner
- Arrangement of equipment can promote a very good image of the school and foster a sense of inclusiveness

Photo: A. Plümmer, Wien

Photo: A. Bäppler

Light

The general design of open spaces or campus must critically look at the navigational needs of the visually impaired persons. Innovation wayfinding systems must be employed for the learners to find their way round the campus with little to no assistance.

The layout must be easy to navigate with clearly demarcated zones for academic, recreational and residential zones. All external areas and accessible routes must be well illuminated at night. Signs and notices must be clearly visible with legible fonts and contrasting backgrounds.

The outdoors must not differ so much in character, which can confuse a first-time visitor. Blending the general lighting idea from the indoors with the outdoors ensures continuity and a holistic ambiance

- Provide visual and auditory guidance and orientation systems.
- Parking areas and accessible routes should be easily recognisable and illuminated after dark
- All Buildings must be clearly locatable and accessible without barriers
- A good visual connection between interesting points on campus is desirable

Acoustics

A serene learning environment has great benefits for all stakeholders. Students, teachers, authorities and neighbouring communities all benefit from a peaceful campus setting of a TVET Institution. Once the acoustical environment within buildings is controlled, this in turn generates a much quieter campus.

It must be noted that the main objective of a noise-free environment is not the total elimination of noise on the campus, as this is impossible, but rather the attenuation of the noise generated to acceptable levels that promotes effective teaching, learning and communication.

Not only persons with visual impairments, who depend greatly on their hearing ability for orientation and wayfinding, benefit from such an environment, which is very helpful to all its users.

- Ensure separation of noisy and quiet areas at the intersection of indoors and outdoors in advance of planning.
- Provide clear sight lines to important buildings/facilities.
- Provide visual alarms for emergencies.
- Use trees and plants as visual buffers for undisturbed areas.

Checklist - Rating System

A. B. Marful, D. Y. A. Duah, A. Plummer, J. A. Danquah

10

Key Theme:

- **Checklist and rating system for assessing and surveying inclusive school buildings.**

Barrier-free building - Auditing Checklist

This checklist and rating system has been developed specifically to inform, guide, assess, manage, and maintain facilities in the barrier free concept of inclusive education. The tools are taken from existing local and international laws and standards such as ISO 21542, the DIN 18040-I and the Ghana accessibility standard for built environment.
The result is a standardised assessment tool that is useful for implementing and removing barriers on the educational campuses. The tool is not exhaustive enough, however, the key components of barrier free policy covered in the access education slogan - get there, get in, get involved and get out reflected in the three strands of approachability, accessibility and usability are used as the very foundation of assessing emerging-inclusive educational physical environment.

The tool containing the key performance indicators is divided accordingly into sections with assigned weights depending on the variable indicators being assessed. Each indicator is given a score by the auditor according to the condition of the indicator described. A cumulative score is given to each section and the total score is placed on the scale of ranking from 1-star with less than 59 points to 5-star with about 247 points.

Any practitioner or professional using the tool must first be conversant with the barrier free policies and laws, especially, BAF manual for TVET, the inclusive education policy, the Ghana accessibility code. The checklist may be used as a basic tool and may be further developed and innovated by the user depending on the type of building or service been audited. At the end of each audit there should be a remarks page indicating observations and suggestion for remedy if any. An example is shown in the table below:

Item/location	Observation/defects	Recommendations
Ramp located at administration block	Ramp is steep with gradient of 1:10; and with handrails as safety guide and support	Reduce gradient to 1:15 and install horizontal handrails according to accessible standard

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

I. EXTERIOR AREAS

0	0	0		**APPROACHABILITY- GET THERE (12%)**	**36** Points Possible
0	0	0		**Access, Infrastructure, Outdoor Facilities**	**28 Points Possible**
Yes	?	No			
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
Yes	?	No			
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

####	###	###		FINDABILITY- GET INFORMED (8%)	26 Points Possible
0	0	0		Access, Infrastructure, Outdoor Facilities	26 Points Possible
Yes	?	No			
Y			Prereq 1	**Reliable, early information, directories, route guidance support orientationan to the wide variety of users**	Required
			Credit 1	Clear spatial structuring and planning improves orientation and thus safety	2
			Credit 2	All pedestrian, vehicular, and emergency routes should all be clearly identified and provide easy access	2
			Credit 3	Provide easy understandable maps of the facility showing the distrubtion and location of the key areas	2
			Credit 4	Signages and way-finding strategies must be logical and consistent in design and distribution throughout the building	2
			Credit 5	Show exiting details for emergency situations or other important instructional information	2
			Credit 6	Good sight lines and sufficient lighting is required to interpret sign language adequately and to enable visual communication	2
			Credit 7	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
			Credit 8	Lettering, signs, pictograms, colour contrasts, audio output and a differentiated choice of products and materials support a consistent orientation system	2
			Credit 9	Information with text should be supplemented with international graphical symbols to facilitate comprehension	1
			Credit 10	Ensure that all signage, signage supports or other information strategies do not intrude into normal walking areas	1
			Credit 11	Push-buttons or other controls accessing public information systems should be readable in standing and seating position	1
			Credit 12	Signage should generally be designed using highly visible and contrasting colours and tone	2
			Credit 13	All cane detectable surfaces used as warning devices should be clearly differentiated from surrounding paving sur	1
			Credit 14	Lettering size should be legible at typical viewing distances (e.g., from the road, approach route, parking area, etc.	2
			Credit 15	Transparent, translucent interfaces between the rooms or from the inside to the outside create visual relationships	1
			Credit 16	Ensure good lighting condition as adapted, uniform, indirect lighting, avoiding glare, backlighting	1
			Credit 17	Provide signage and out door facilities within the concourse of stalls for information and direction purposes	1

II. INDOOR AREAS

Yes	?	No			
0	0	0	**ACCESSIBILITY- GET IN - HORIZONTAL (20%)**		**62** Points Possible
0	0	0	**Entrances**		**12 Points Possible**
Y			**Prereq 1**	**Minimum width: 91,5 cm, the entrance should be clearly perceptible, easy to open and close, safe to pass**	Required
			Credit 1	Stepless main access level difference bridged with accessible ramp	1
			Credit 2	Threshold-free door, max. level differences up to 1,3 cm	2
			Credit 3	All main entrances and and other accessible entrances should be protected by a canopy or overhang	2
			Credit 4	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
			Credit 5	Equipment elements must not extend into required movement areas	2
			Credit 6	Recommended mounting height of door hardware from grade, including pulls and push plates (76 - 106.5 cm)	2
			Credit 7	The relevant movement areas are respected	2
0	0	0	**Door / Doorways**		**21** Points Possible
Y			**Prereq 1**	**Minimum width of all accessible doors to and in the rooms (91.5 cm)**	Required
			Credit 1	Minimun clear aisles width (1.10m low use areas) (120 cm) / turning space 160 x160 cm all 3000 m	2
			Credit 2	Height of door handle (86.5 -122 cm)	2
			Credit 3	Required movement areas in front of doors (1,50 m door outward /120 cm inward swings)	2
			Credit 4	Wing door: Clear space next to the door area (60 cm towards, 30 cm away from person)	2
			Credit 5	Height for the arrangement of door signage (135 - 152.5 cm)	2
			Credit 6	Max hight for lip, threshold or step at the entry of doors (< 1,3 cm)	2
			Credit 7	High-contrast design concept as orientation aid	1
			Credit 8	Orientation aids visually and acoustically perceptible	2
			Credit 9	Door signage adapted to the age groups to be used	2
			Credit 10	Opening force for interior doors using closers (22 N)	2
			Credit 11	Anti-pinch protection for all doors	2
0	0	0	**Interior Routes- Horizontal Access (Guided Pathways)**		**6 Points Possible**
Y			**Prereq 1**	**Main connections: high-contrast and tactile highlighting**	Required
			Credit 1	Orientation aids recognizable from the wheelchair	3
			Credit 2	Orientation aids visually and acoustically perceptible (2-sense principle)	1
			Credit 3	Well illuminated and glare-free	2

####	###	###	**Corridors / Passagways**		**13** Points Possible
Yes	?	No			
Y			**Prereq 1**	**Orientation aids recognizable from the wheelchair**	Required
			Credit 1	Minimum width 120 cm, turning space 160 x 160 cm at every 2000 m	2
			Credit 2	Alternative widths in high public areas 167.5 - 200 cm	1
			Credit 3	Minimum width for clear aisles or passages, low use areas (110 cm)	1
			Credit 6	Orientation aids visually and acoustically perceptible	1
			Credit 7	Bright and glare-free	2
			Credit 8	Findability of presences through high-contrast design (material and colour)	2
			Credit 9	should be clear of protruding objects like wall hangings and air conditioner units	2
			Credit 10	Tactile floor coverings (material and color)	2

0	0	0	**Windows**		**10 Points Possible**
Yes	?	No			
Y			**Prereq 1**	**Easy to reached and operated by all usergroups**	Required
			Credit 1	Limits for mounting of controls for window blinds, drapes or louvers (120 cm)	2
			Credit 2	Max gripping heigh for window handles / opening hardware (106.5 cm)	2
			Credit 3	Max. height of sill from the floor (76 cm)	1
			Credit 4	No interruptions of the eyelevel of seated persons (between 107-120 cm from floor)	1
			Credit 5	No dazzling windows at the end of the corridor	2
			Credit 6	High-contrast design	2

####	###	###	ACCESSIBILITY- GET IN - VERTICAL (14%)		45 Points Possible
0	0	0	**Stairs**		**17 Points Possible**
Yes	?	No			
Y			**Prereq 1**	**Stairs are no Barrierfree Access, unless fitted with lift platfom**	Required
			Credit 1	Height of continuous handrails, possibly on both sides (86.5 cm)	1
			Credit 2	Lead handrail at least 30 cm beyond entrance and exit	2
			Credit 3	Gradient ratio (18/26 cm), max. setback, risers (2 cm)	2
			Credit 4	Threads should have non-slip material finsish	2
			Credit 5	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	
			Credit 6	Cane-detectable barrier should be provided where the headroom of stairs underside is less than (198 cm)	2
			Credit 7	Intermediate landing for stairs with more than (10) steps	2
			Credit 8	Mark threshold front edges of all level changes by both distinct colours and textural changes	2
			Credit 9	Illuminate well and evenly (100 lux.)	2
			Credit 10	Floor structure in front of stairs are detected visually and tactilely (91.5 cm)	2

0	0	0	**Ramps**		**12 Points Possible**
Yes	?	No			
Y			**Prereq 1**	**Ramps are designed to meet accessible standards with preferred gradient of 1:15**	Required
			Credit 1	Required width of interior ramps between handrails at both sides (90 - 110 cm)	2
			Credit 2	Non slip floor, with tactile floor mounted at beginning and end of each flight (76.5 cm deep)	2
			Credit 3	Min. depth of intermediate level landing (1,67 m) in depth by the width of the ramp	1
			Credit 4	Landing at top and bottom of the ramp shall be a minimum of 167 x 167 cm	1
			Credit 5	Height of recommended up-stand kerb or solid barrier on either side (5 cm)	1
			Credit 6	Mounting height of handrails on ramps (86.5 - 96.5 cm)	1
			Credit 7	Max. length of ramp between level landing areas (900 cm)	1
			Credit 8	The handrail should be smooth and continuous from the beginning to the end of the ramp andnin. extension of handrail beyond the top and bottom of the ramps (30 cm)	1
			Credit 9	Provide sufficient illumination at every flight and landing of a stepped access route	2

Yes	?	No			
0	0	0	**Elevators and Lifts**		**16 Points Possible**
Y					
			Prereq 1	**Elevator must comply with the recent Ghana Accessibility Standards for Built Environment**	Required
			Credit 1	Manoeuvring area in front of the lift should (167.5 x 167.5 cm)	2
			Credit 2	Min. size of at least one elevator to accommodate a tretcher in institutional facilities (172.5 x 228.5 cm)	2
			Credit 3	Recommended access width (minimum clear width 91.5 cm)	2
			Credit 4	Axial height of the horizontal control panel (80 - 110 cm)	2
			Credit 5	Extended door opening times (20 secs)	1
			Credit 6	Height of light barriers (15 cm and 91 cm) and a rear mirror inside lift	1
			Credit 7	Select access control panel , has high-contrast design of the control panel	1
			Credit 8	Cotrol panel tactile detectable, with buttons instead of touch panel	2
			Credit 9	Emergency call actuation is also optical	1
			Credit 10	hand rails is present at both the rear and sides of the lift car	1
			Credit 11	There is a live attendant within reach when needed	1

Yes	?	No			
0	0	0	**USABILITY - GET ALONG (11%)**		**35** Points Possible
0	0	0	**Interior Amenities (Ligtning Concepts)**		**7 Points Possible**
Y					
			Prereq 1	**An environment that is visually adapted supports well-being and safety**	Required
			Credit 1	Uniform, matt and glare-free lighting and finish of all surfaces	1
			Credit 2	Sufficient vertical and horizontal light levels to interpret signages as well lip-reading	2
			Credit 3	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
			Credit 4	Use of high-contrast and adequate colours	2
			Credit 5	Good sight lines and a sufficant mix of natural and artifical light is required	1
			Refer to chapter 8.2 IDA Principles - Visuality		

Yes	?	No			
0	0	0	**Interior Amenities (Acoustic Concept)**		**7** Points Possible
Y					
			Prereq 1	**An environment that is acoustically adapted supports well-being and safety**	Required
			Credit 1	Reduction of the noise level with 120 dB limit	1
			Credit 2	Reduction of reverberation time	2
			Credit 3	Round attenuation	2
			Credit 4	Public address, paging systems or inductive slops are usefully employed	2
			Refer to 8.3 IDA Principles - Audiability		

0	0	0			
Yes	?	No			
Y			**Interior Systems and Controls**		**21 Points Possible**
			Prereq 1	**Information, controls and devices must be accessible and legible for all users**	Required
			Credit 1	In front of operating devices movement area	2
			Credit 2	Lockers, telephone, etc. accessible from at least one side with a wheelchair	2
			Credit 3	Depth x width of clear maneuvering space in front of counter a min. 50 cm deep knee recess (120 x 180 cm)	2
			Credit 4	Movement area for lateral approach (120 x 150 cm)	2
			Credit 5	Necessary lateral distance next to doors or control panels (> 60 cm)	2
			Credit 6	Height of devices, controls, etc, above floor level (80 - 110 cm)	2
			Credit 7	Minimum width of self-service units (angled or long units need 100 cm)	2
			Credit 8	MaxImum force for operation of switches and push-buttons (2.5 < x< 5.0 N)	2
			Credit 9	High-contrast operating elements based on the two-senses principle design	1
			Credit 10	Recognition effect for the same operation	2
			Credit 11	Function triggering must be clearly signaled	2

0	0	0			
0	**0**	**0**	**SPECIAL FACILITIES AND AREAS (32%)**		**98 Points Possible**
0	**0**	**0**	**Classrooms/ Laboratories/ Workshops**		**24 Points Possible**
Yes	?	No			
Y			**Prereq 1**	**Provide a variety of stimuli concidering student´s different abilities**	Required
			Credit 1	Provide movement areas for turning wheelchair users and width in between tables (120 cm)	2
			Credit 2	Adequate storage should be placed against the wall	2
			Credit 3	Adjustable tables to vary heights to suit antropometric needs and underrideability	1
			Credit 4	Assistive aids for barrier-free reception on information to various zones and spaces	2
			Credit 5	Accessible use of computers must be ensured by means of suitablehardware and software	2
			Credit 6	**Regarding the 2- Sense Principles - through acoustics, lighting or tactile information**	1
			Credit 7	High-contrast design with high luminance	2
			Credit 8	Variable tables and chairs with seating arrangement to ensure visual contact	2
			Credit 9	Cabinets and boards should not have swing doors or folding wings	2
			Credit 10	Low parapet heights allow a view in a seated position	2
			Credit 11	Increase the volumne and clarity of spoken words by short reverberation time and low total noise level pay	2
			Credit 12	possibly arrangement of insulation in the ceiling and back wall area	2
			Credit 13	Create good light and visibilty conditions in such a way that everyone can see who is speaking	2

E

L

A

Refer to chapter 9.3 Room Guides - Classroom

0	0	0		Canteen, Cafeteria, Libraries, Reading Areas and Open Learning Areas		19 Points Possible
Yes	?	No				
Y			F	**Prereq 1**	**Alternative: step-free diversions with lifting platform, stair lift, lift (old building)**	Required
			E	Credit 1	Accessibility, barrier free and threshold-less	2
				Credit 2	Min. width of main entrance (120 cm)	2
				Credit 3	Min. clear width of access in front of a row for disabled people (90 cm, peferable 120 cm)	2
				Credit 4	WC nearby (especially at the canteen and cafeteria)	2
				Credit 5	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
			L	Credit 6	Glare-free lighting and uniform illumination (200 lux)	2
				Credit 7	Door signage adapted to the age groups to be used	2
			A	Credit 8	Room acoustic measures and Deaf Space mesuares	2
				Credit 9	Installation of an acoustic amplification system	2
				Credit 10	Display panels should support the amplification system	2

Refer to chapter 9.4 Room Guides - Dining areas / Canteen

0	0	0		Sports, Gymnasiums, Changing Rooms and Audience Areas		14 Points Possible
Yes	?	No				
Y			F	**Prereq 1**	**Ensure barrier-free access and usability for all usergroups**	Required
			E	Credit 1	The usability of sports and play equipment must be pay attention to rhe satanding and sitting position	1
				Credit 2	Observe standing and movement area for wheelchair space (90 cm x 140 cm)	1
				Credit 3	For seating in rows, provide in front of the wheelchair user, additional 90 cm to pass other users (105 cm x 230 cm)	1
				Credit 4	Provide seating for persons accompanying wheelchair users in the immediate vicinity	2
				Credit 5	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
			L	Credit 6	Glare-free lighting and uniform illumination to create good visual clarity for athletes and spectators (200 lux)	2
				Credit 7	Visual aids as braille or audio commentary facilities shoud be use for information and communication	2
			A	Credit 8	Ensure spatial and informational visual clarity and intelligibillity	2
				Credit 9	Installation of inductive hearing aids, FM loops or other assistive assistive listening systems as needed	2

Refer to chapter (9.9) Room Guides - Sport facilities

0	0	0		Retreat Rooms for Pupils with Special Educational Needs		13 Points Possible
Yes	?	No				
Y			F	Prereq 1	**Rooms to provide students and teachers with a time-out from the daily school routine.**	Required
			E	Credit 1	Ensure a variety of furniture and funishings that are comfortable and inclusive	2
				Credit 2	All arrangments should allow free movement and free access (91.5 cm, 120 cm, 150 x 150 cm)	2
				Credit 3	Adopt the use of tactile fabrics or use-adapted surfaces	2
			L	Credit 4	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
				Credit 5	Combination of sufficant main light and artifical light to be adjusted according the situation	2
				Credit 6	Avoid harsh overhead lightning, glare and casting shadows	2
			A	Credit 7	Reduce sound intensity and sound propagation by absorbing materials to provide a high speech intelligibillit	2

Refer to chapter 9.7 Room Guides - Retreat /Therapy rooms

0	0	0		Sanitary / Restrooms		28 Points Possible
Yes	?	No				
Y			F	Prereq 1	**Provide at least 1 wheelchair accessible WC for small facilities or per sanitary facility or one on every floor (depending on the size of the institution)**	Required
			E	Credit 1	Min. room size (165 x 180 cm)	2
				Credit 2	Movement areas in front of sanitary objects - movement areas may overlap (150 x 150 cm)	2
				Credit 3	Pre-wall installations to be provided with reinforcements, height-adjustable washbasins and toilets, various support and grab rails at the toilet, washbasin and the shower area	3
				Credit 4	**Regarde the 2- Sense Principles - through acoustics, lighting or tactile information**	1
				Credit 5	Door opening to the outside (min. width 91,5 cm)	2
				Credit 6	Equipment should be on a clear, firm, non-slippery floor area	2
			L	Credit 7	Maintain a luminance level is 200 to 300 lux	2
				Credit 8	Use contrast to highlight doors, handles, fixtures etc	2
				Credit 9	Tactile on wall surfaces for easily identification of objects in the room	2
			A	Credit 10	Provide sound-absorbing ceiling with high absorption qualities that withstand high humidity and cleaning	2
				Credit 11	The emergency call system is visually contrasting, tactilely detectable, easy to find	1

Yes	?	No			
0	0	0	**Additional features**		
Y			**Prereq 1**	**In some cases it may be advisable to install a couch in the sanitary / restroom**	Required
			Credit 1	Deep of movement area in front of couch, security against unattended use (150 cm)	2
			Credit 2	Hight of the couch is 46-48 cm	1
			Credit 3	Surface for couch should be hard-wearing and easy to clean	2
			Credit 4	Movement areas are also designed for accompanying persons	2

Refer to chapter 9.8 Sanitary room / Restroom

Yes	?	No			
0	0	0	**SECURITY - GET OUT (3 %)**		**10** Points Possible
0	0	0	**Emergency Concepts and Systems**		**10 Points Possible**
Y			**Prereq 1**	**A fire protection / emergency concept is to be developed right at the beginning of the planning phase that consider people with mobil and sensory restrictions**	Required
			Credit 1	Emergency call system can be operated from WC and while lying down	3
			Credit 2	Actuation of the emergency call system in the lift (elevator) can be perceived acoustically and visually	3
			Credit 3	An emergency and fire protection concept that considers all user groups is coordinated with the relevant authorities	2
			Credit 4	Where safe-holding areas are provided, they should be equipped with emergency lighting, a two-way communication system, as well as separate ventilation so that they can be used when normal building systems	2

Legend:

F	Function
E	Equipment
L	Light
A	Acoustics

Yes	?	No		
0	0	0	**Project Totals (Certification estimates)**	**312 Points**

1 Star: 59 points, **2 Star:** 122 points, **3 Star:** 184 points, **4 Star:** 247 **5 Star:** above 247

Max Exterior Points	**62 points**
Max. Interior Points	**250 points**

The Way Forward

D. Y. A. Duah, A. B. Marful, A. Plümmer

11

Key theme:

- **Juxtapositions**
  (Existing vs. Proposed Situations of Inclusive Environments)

Suggested measures

Rendering: Farid Farhat

- signage and orientation
- zoning area with priority for the pedestrians
- accessible outdoor facilities for all

Current situation

1

- mixed traffic areas with priority for cars and motorbikes
- footpaths are partly narrowed, possibly littered.
- too little public green

Suggested measures

Rendering: Nora Kramer

- zoning area with priority for the pedestrians
- parking area for cars, motorbikes and bicycles
- pedestrian area and crossing

Current situation

- typical entrance situation
- steps to the covered walkway area
- no easy access for mobility restricted people

2

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**

Current situation

3

- designed entrance area with water gutter and stairs leading to high leveled passage
- no barrier free access

Suggested measures

Rendering: Nora Kramer

- ramp
- upstand as a fall protection
- using coulour and signage for orientation

Epilogue

A. Plümmer

12

This handout provides practical assistance to support planners in the barrier-free and accesible conversion of existing schools and the construction of new schools in Ghana. Accessibility should ideally be considered and planned for from the beginning.

A targeted intervention can lead to self-determined participation with relatively little effort. This does not only apply to the architectural design of structural measures. Coherence and transparency in planning and execution are therefore also part of experienced accessibility as well as the involvement of the different users.

In the minds of many, accessibility means taking specific limitations of individuals into account.

However this handbook creates an awareness that all people benefit from accessibility. Even if only about:

- 10% of them are absolutely dependent on barrier-free construction
- 40% of the users will benefit from the safe environment,
- 100% of all users will find a barrier-free environment conducive to the learning process.

The accessible school is open to all people in their individual needs. Based on this, it consciously pursues a holistic approach that creates intuitive access to unrestricted shared learning. A shift in thinking about inclusion is essential and necessary.

Ghana is a leader in education among the countries of sub-Saharan Africa and, as a democratic independent state, also well networked.

Thus, there is great interest in creating prototypical examples of inclusion and sustainability in TVETs and in helping to shape the implementation of the global goals of the United Nations.

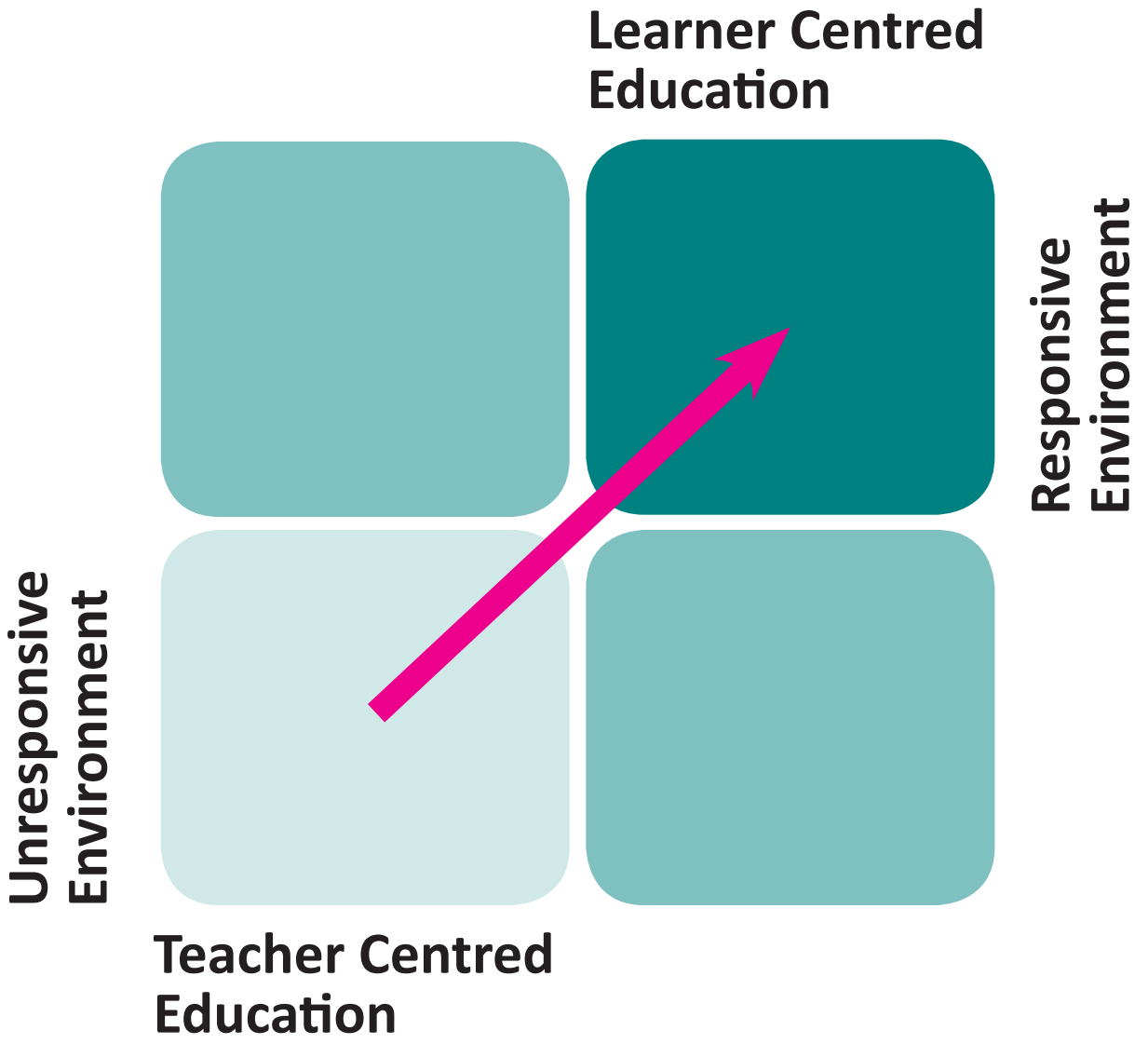
With the implementation of inclusion in TVETs, 5 of the 17 sustainability goals are fulfilled at the same time; the right to equitable education and work, the elimination of inequality, the transformation of the built environment and the convergence of changing consciousness and interconnectedness.

The future of schooling is moving away from teacher-centred frontal teaching in which children passively follow lessons.

Instead, the pupils are placed in the centre and their environment is responsive, adapted to learning from a supportive point of view.

By empowering all young people through education and work, they transform and strengthen a society characterised by belonging, confidence and agency. A society strengthened by diversity and agility.

Dipl.-Ing. A.Plümmer, *Architect / barrier free Expert/ Project lead and Senior Lecturer at Frankfurt University of Applied Scienes, Interdisciplinary Master Inclusive Design M.Sc. and Sustainable Structure M.Eng*



The picture shows the shift in the educational environment from a more teacher-centred to a learner-centred education- and learning environment that is not static but responsive to different needs

Adapted from:
https://casestudyeg.paperform.co/

Impression of the Survey

D. Y. Duah

13

Surveying

Photographing

Interviewing

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