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AfroSAFE: Safe System for radical improvement of road safety in low- and middle-income African countries

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Deliverable 7.2

Centre of excellence, including online portal with educational and training material and activities

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Contents

Summary

Deliverable 7.2 explains the backbone of the AfroSAFE Academy and the main approach adopted for the development of suitable and adapted training and capacity building activities targeted to fill the training gaps identified in Task 7.1. The main outcomes of these activities include a road safety curriculum and a web-based centre of excellence. In more detail, this includes a structure and outline of a road safety curriculum that can be taught at a graduate traffic safety course in the African universities. This curriculum is composed of three main parts: framing the challenge; solutions and implementation areas; and perspectives. A modular structure has been selected, in which each part is composed of several modules. The web-based centre of excellence, called AfroSAFE Academy, serves as the platform which hosts the developed curriculum and training activities which can be further disseminated. It also provides a platform for networking and creating opportunities for academics and practitioners to jointly discuss traffic safety issues, exchange knowledge and opinions. More specifically, the following activities have been carried out: online webinars with key professionals in the field of traffic safety, organization and communication about the series of AfroSAFE conferences in the participating African countries, organization of researcher' course in conjunction with the AfroSAFE conferences, building a library of recommended scientific literature relevant for traffic safety in LMICs, and a platform to communicate and disseminate scientific and educational publications on traffic safety in LMIC. This deliverable elaborates on both the curriculum development and the AfroSAFE Academy.

1 Introduction

Deliverable 7.2 presents the foundation of the AfroSAFE Academy and outlines the main approach adopted for developing targeted training and capacity-building activities designed to address the training gaps identified in Task 7.1. This includes the design of a comprehensive road safety curriculum and the establishment of a web-based Centre of Excellence, the AfroSAFE Academy. This deliverable elaborates on both the curriculum development process and the establishment of the AfroSAFE Academy. The detailed content of the output is available on the AfroSAFE Academy website: https://www.ictct.net/afrosafe/

2 Road Safety Curriculum Development

2.1 Motivation

While the Safe System approach, emphasizing shared responsibility and system-wide resilience, has become the foundation of road safety strategies in high-income countries, leading to substantial improvements, its implementation across Africa remains limited. Education and professional training are essential to advancing this paradigm shift toward the Safe System. However, findings from AfroSAFE project (D7.1) indicate that universities across the African continent give limited attention to road safety education. Consequently, a road safety curriculum is proposed to address both the key pillars of the Safe System approach and the fundamental principles of road safety.

2.2 Approach

Few main principles guided the strategy for designing a road safety curriculum. The first principle is that road safety is a multidimensional and multidisciplinary topic, that requires knowledge integration from different disciplines, e.g., road engineering, social sciences, behavioural sciences. The second principle, which follows from the first, is that such a curriculum would be of interest to different groups coming from different backgrounds, and therefore, a modular structure would be useful. The third principle, is that the curriculum needs to start from the fundamental knowledge on road safety (e.g., problem scope, traffic safety data, accident topology), followed by more specialized modules diving into the implementation areas (e.g., Safe System pillars, road safety knowledge, traffic safety measures), and ending with additional modules that would provide additional knowledge from different perspectives (e.g., active mobility, technology, economical aspects).

We opted to develop a curriculum outline rather than fully prepared presentation slides because each teacher has their own teaching and presentation style. To teach effectively, a teacher must engage deeply with the material—reading, analysing, and preparing beyond simply relying on pre-made slides. Providing an outline encourages teachers to adapt the content to their approach, ensuring serious preparation and a richer learning experience for students.

Following the identification of the modules, and the different topics under each module, the development phase of these modules would follow. Most contemporary methods for designing teaching use the constructive alignment (Biggs, 1996), which is an outcomes-based and learner-centric approach to teaching. The focus of the educator is then on what to teach, how to teach, and how to evaluate the effectiveness of the teaching (Marzano et al., 2001). The teaching and assessment methods are then designed to achieve those outcomes and to assess the standard at which they have been achieved (Biggs & Tang, 2014). Therefore, the starting point in designing any teaching is to define the intended learning outcomes. One of the well-known and used taxonomies in education for formulating clear and measurable learning objectives is the Bloom's taxonomy (Bloom et al., 1956). It guides educators to focus on a range of cognitive skills with increasing difficulty levels. These are: remembering, understanding, applying, analysing, evaluating, and creating. Following this, the teaching activities and strategy can be designed.

Active learning is a widely popular teaching strategy. It is a leaner-centric teaching method commonly used in higher education. Active learning is an instructional method of engaging learners in the learning process by designing meaningful learning activities (Prince, 2004). This evokes the learner's thinking about the learning activities they are performing. Using problems as a basis for learning appears to be one of the more broadly applicable strategies to promote active learning (Misseyanni et al., 2018). It includes learning initiated by problems, self-directed learning, and collaborative learning in small groups (Hung et al., 2008). This approach is based on the premise that the learner's motivation increases when responsibility for the solution to the problem and the process rests with

the learner, and student ownership for learning increases. It empowers learners to apply knowledge and skills to develop a viable solution to a defined problem (Walker et al., 2015).

The above contemporary teaching methods were followed when designing the road safety curriculum for academic education. Implementing this curriculum and following the contemporary teaching methods to deliver the modules will create a new generation of professionals that are well equipped with the needed knowledge and tools to solve complex road safety problems.

To have consistency in the module description and depth level among the different modules prepared by the different partners in the AfroSAFE project, TU Delft prepared a template guideline that can be used by the partners when they developed the different modules.

The modules and all course material will become available online on the AfroSAFE Academy website under Creative Commons license, free for any African university to integrate them in own education: https://www.ictct.net/afrosafe/education/

2.3 Curriculum

First, a high-level road safety education curriculum that addresses the identified gaps in D7.1 is presented. Figure 1 outlines the structure of the curriculum which is composed of three main parts: framing the challenge; solutions and implementation areas; and perspectives. A modular structure has been selected, in which each part is composed of several modules. The following paragraphs provide explanations and further details on the different parts and modules proposed in the curriculum.

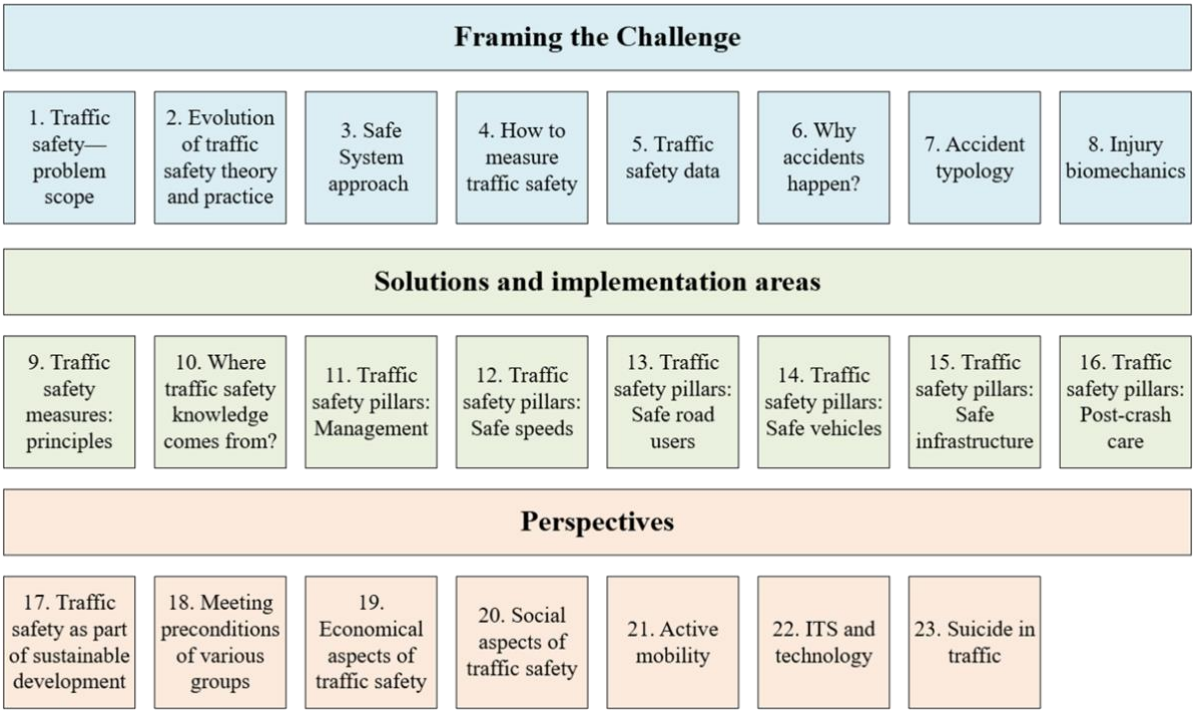

Figure 1: Structure and outline of the proposed road safety curriculum

2.3.1 Framing the challenge

The main goal of this first part is to provide the learner an in-depth understanding of the size and scope of the problem, its evolution, and its burden on society, as well as, to explain the necessity of the safe system approach and its main guiding principles. This first part sets the stage to make a change in the mindset of the learner with respect to why accidents happen and the need for a paradigm shift in the African countries regarding the causation of accidents. This is crucial to lay a solid ground

on which the next topics, of the necessity of accident data collection and understanding of accident typology, and how to measure traffic safety, become imperative for improving road safety. The module on injury biomechanics complements the understanding of one of the main principles in safe system approach which states that the human body has a limited tolerance for external forces.

2.3.2 Solutions and implementation areas

Once the road safety problem is correctly framed and understood, the learner can move ahead with understanding the main possible solutions and implementation areas. This includes understanding of the different existing traffic safety measures, the road safety problems that these safety measures help to solve, their effects on accidents and injuries, their costs, and their benefits in relation to their costs. It is also of crucial importance that these measures are evidence based, and therefore, understanding where traffic safety knowledge comes from is important. Following this, the learner can delve deeper into the different pillars of the safe system approach. For example, for a professional at the public road authority the module on safe infrastructure would be most relevant to follow. However, a broader understanding of the other pillars would be desirable as the road safety topic is a multidimensional topic, involving aspects related to the road, the human, and the vehicle.

2.3.3 Perspectives

The third part of the proposed road safety curriculum resonate with the sustainable development goals proposed by the World Health Organization during the 3rd global ministerial conference on road safety (ref), where road safety is integrated among the sustainable development goals. Furthermore, in this part the learner is provided with a deeper understanding of road safety needs of special groups, as people with disabilities, elderly, and active mobility, but also the opportunities and risks of recent trends and disruptive technologies in the field of transportation, such as connectivity and advancement in vehicle technology. In addition, the social dimension of road safety that addresses aspects such as inclusion, social justice, equality, and social culture is of importance to understand. Finally, the economical dimension is critical, especially in the African countries where the resources are limited, methods such as cost-benefit analysis and multicriteria analysis are crucial to make the correct decisions and actions. This would highlight the social and economic costs of road accidents, which in many African countries are still largely missing.

This proposed comprehensive road safety curriculum can equip professionals with a strong foundation in road safety knowledge, as well as the essential methods and tools needed to make significant advancements in improving road safety within their countries

For each module the following items were included in the proposed curriculum:

- **Short introduction** about the module
- **Learning outcomes:** were defined following Bloom's taxonomy (Bloom, 1956). It guides educators to focus on a range of cognitive skills with increasing difficulty levels. These are: remembering, understanding, applying, analysing, evaluating, and creating.
- **Key messages to learners:** key messages were provided which are the key takeaways for learners. Key messages defined were concise and focused on the core concepts.
- **Learning activities:** In each module between minimum 3 and maximum 5 exercises were provided. These exercises varied between testing the learned concepts and the fundamental knowledge and those that require applying the knowledge on use cases and specific situations – tailored to the African context.
- **Assessment quizes:** The assessment quiz can include as well between 3 to 5 questions testing whether the learner has achieved the learning objectives in the module. These could be open questions or multiple-choice questions.

- **Recommended reading and resources for students:** These are resources which the learners could refer to for enhancing their learning process and providing further explanations of the concepts.
- **Recommended (additional) reading for teacher:** These are resources which the teacher can use to develop the detailed presentations for each module.

2.4 AfroSAFE Academy

2.4.1 Purpose

The main purpose of developing a web-based centre of excellence, called AfroSAFE Academy, is to establish a platform for dialogue and knowledge exchange among academics and professionals on road safety topics and the societal needs. It is the place where they meet, discuss, learn, and develop together evidence-based road safety knowledge. It aims to make research career attractive, and researchers' voice heard by the politicians and decision makers, and by this, empowering researchers.

It also features the developed curriculum and training activities (discussed in section 2.3) which will be available for further dissemination and provide a platform for distance online learning. It also provides a platform for networking and creating opportunities for academics and practitioners to jointly discuss traffic safety issues, exchange knowledge and opinions.

2.4.2 AfroSAFE Academy Activities

AfroSAFE Academy initiated and established several activities. More specifically, the following activities have been carried out:

Webinars: AfroSAFE Academy has organized so far 14 webinars with renowned speakers recognized internationally in the traffic safety field. These webinars are open to the public and dedicated for academics and professionals from different countries worldwide (not only Africa). These webinars are recorded and can be re-watched by any interested person in road safety, and especially academics and professionals. Noticeable in these webinars is the significant share of speakers from the African countries, and other low-and-middle-income countries as summarized in Table 1.

Table 2: Summary of the webinars that took place within the AfroSAFE Academy[1]

Webinar speaker	Role	Webinar title
Henk Stipdonk	Director of KiM (Knowledge Institute for Mobility Policy) in the Netherlands	The link between road safety policy and research
Boniphace Kutela	Associate Research Engineer at the Texas A&M Transportation Institute (TTI)	Leveraging social media data to understand roadway crashes in Tanzania
Matts-Åke Belin	Global Lead for Decade of Action for Road Safety, World Health Organization	Systematic collaboration for safer road traffic
Meleckidzedeck Khayesi	WHO Headquarters in Geneva, Switzerland	Paulo Freire's "praxis" and implication for a transformative road safety policy in Africa.
Geetam Tiwari	Professor at the Indian Institute of Technology Delhi, India	Global road safety trends in low- and middle-income countries and challenges to meet road safety targets'
Fred Wegman	Emeritus Professor of Delft University of Technology, the Netherlands	Dutch experiences on Sustainable Safety and its implementation for cyclists
George Daffa	Tanzania National Roads Agency (TANROADS)	Tanzania experience in undertaking road safety audits of road network
AfroSAFE Academy and Vision Zero Academy (Sweden), Institute of Transport Economics (Norway) and Society of Road Safety Ambassadors (Botswana)		Can we transfer Safe System practices to African context?'
Sonja Forward	Swedish National Road and Transport Research Institute Sweden	Rethinking how driver training can contribute to safer road traffic'
Valerian Kwigizile	Associate director of the Transportation Research Center for Livable Communities (TRCLC) at Western Michigan University, USA	Using crowdsourced data to enhance estimation of non-motorized traffic volume'
Williams Ackaah	Principal Research Scientist at the Building and Road Research Institute of the Council for Scientific and Industrial Research (CSIR-BRRI) and the Dean of the Faculty of Built Environment at the CSIR	State of Road Traffic Safety in Ghana
Sam Clark	TRANSAID	Helmets on heads: a call to action to address motorcycle safety in East Africa
Allen Mate	ZRTSA	Zambia Road Transport Safety Agency – Lessons learned from the Fleet Safety Management Project in Zambia
Thomas Miyoba	ZRST	Sexual Harassment in Public Transport in Zambia: Prevalence, Challenges, and Interventions

[1] Access to all webinars can be reached via this link: https://www.ictct.net/afrosafe/webinars/

AfroSAFE conferences: AfroSAFE Academy also organizes an annual AfroSAFE conference in collaboration with local organizing committees in the participating African countries in AfroSAFE. The intention that the AfroSAFE conference series continues beyond the lifetime of the AfroSAFE project.

The first successful AfroSAFE international conference organized in collaboration of the University of Dar Es Salaam in Tanzania (12-14 June 2024) on the theme of "Knowledge-based traffic safety management for African countries", a second conference was organized in Winneba, Ghana (12 – 15 August 2025) in collaboration with the University of Education Winneba. The theme of the conference in Ghana was "Data-driven discourse on Safe System approach in Africa". Conference participants were given the possibility to submit full papers to the special volume of the Traffic Safety Research journal (ISSN 2004-3082) devoted to the topic of traffic safety in low- and middle-income countries. Autoliv sponsored financially the conference. The third AfroSAFE conference will be organized by Zambia Road Safety Trust in Lusaka 8–12 June 2026 (see Figure 2). The conference topic is 'Building sustainable road safety systems for Africa: from data to implementation and ownership'. Both Kenya and Nigeria expressed interest to host the AfroSAFE conference following the project lifetime.

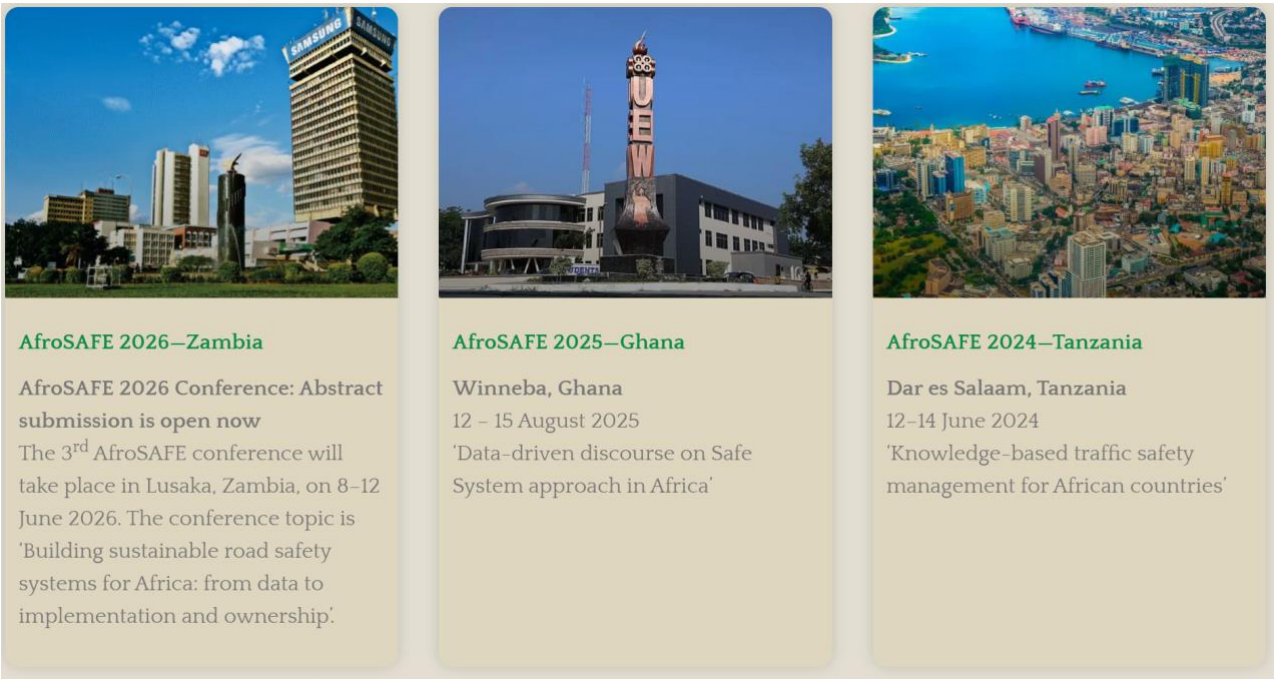

Figure 2: AfroSAFE annual international conferences.

AfroSAFE traffic safety course: In connection to the main conference event, AfroSAFE Academy organizes a one-day course for researchers in traffic safety. The course targets primarily scholars active in research on traffic safety, but also for practitioners who want to get a more solid understanding of the subject they are dealing with. The purpose of the course is to provide a holistic view on traffic safety, particularly emphasizing the Safe System as the state-of-the-art approach to traffic safety management. Speakers in the researchers traffic safety course consisted of both speakers from African countries and European countries.

Library of scientific literature relevant for traffic safety in LMICs: AfroSAFE Academy created an online webpage on the AfroSAFE academy website with fundamental works relevant for traffic safety in LMICs. These fundamental works are organized following the pillar of the Safe System approach:

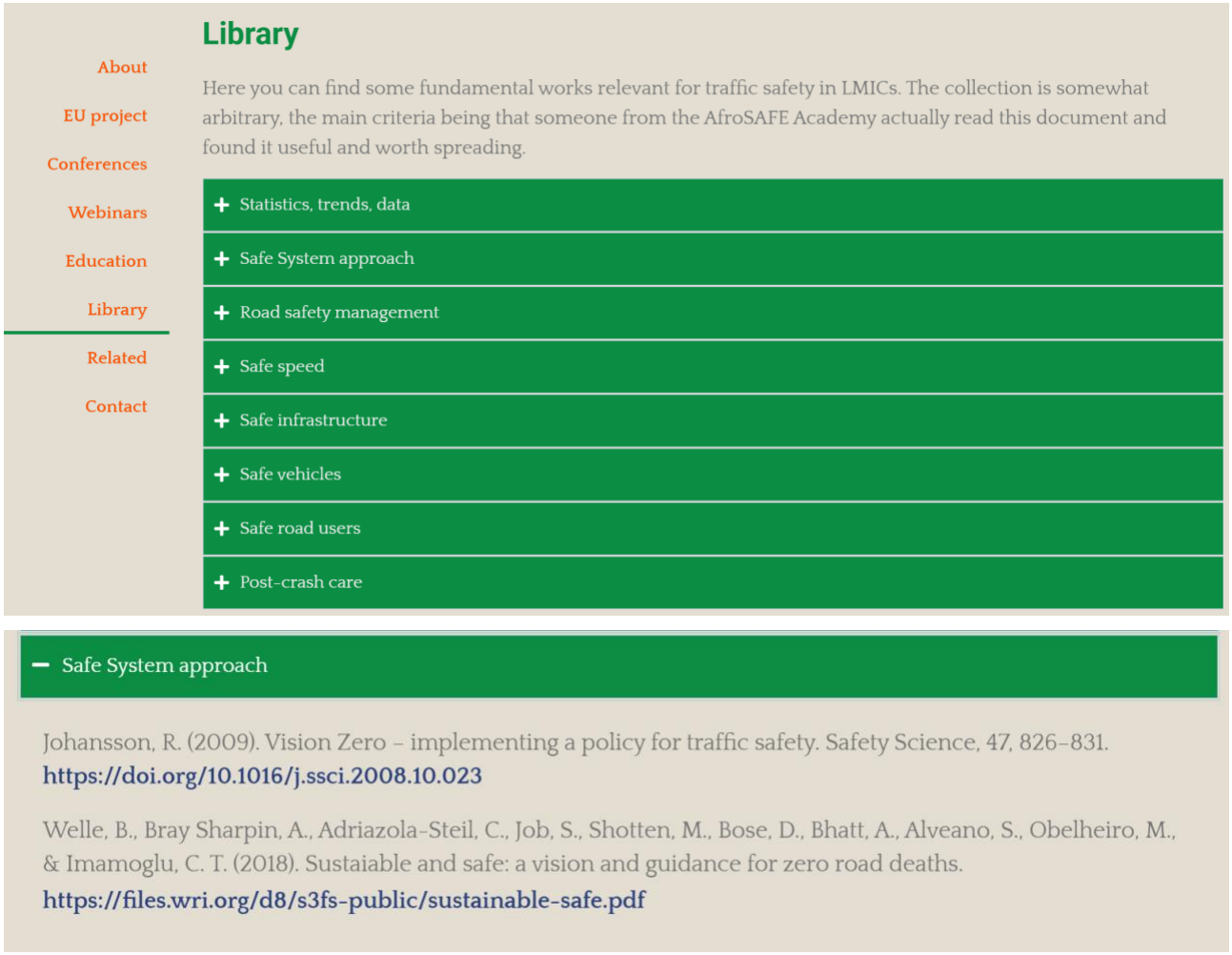

Figure 3: AfroSAFE Academy library of fundamental works on road safety (top) and an example for one of the pillars (bottom).

Educational curriculum: The educational curriculum developed in Task 7.3 is made publicly available for interested academics on the AfroSAFE website. In its full form, the curriculum is sufficient for a master-level university course. Its various parts, however, can be used for bachelor education, or as a complementary component in other course not entirely devoted to traffic safety (e.g. road engineering, public health, etc.). All course materials are provided under Creative Commons license, free for any African university to use and integrate them integrating in own teaching. Figure 4 presents the layout of the AfroSAFE traffic safety educational curriculum.

Figure 4: Layout of the AfroSAFE traffic safety educational curriculum.

The curriculum is made for teachers as the target audience (not students directly). These materials should be used as a starting point for developing the traffic safety course (or a course module, or a single lecture) on traffic safety. This approach is chosen rather than providing fully prepared course because everyone’s teaching and presentation styles are unique. To deliver an effective lecture, the lecturer needs to engage deeply with the material—using the recommended resources in each

module—through reading, reflecting, and preparing beyond simply taking a set of slides made by someone else (see one example of a module in Figure 5). Lecturers are encouraged to adapt the contents to their own approach and teaching context, ensuring their own in-depth knowledge of the subject and a richer learning experience for their students.

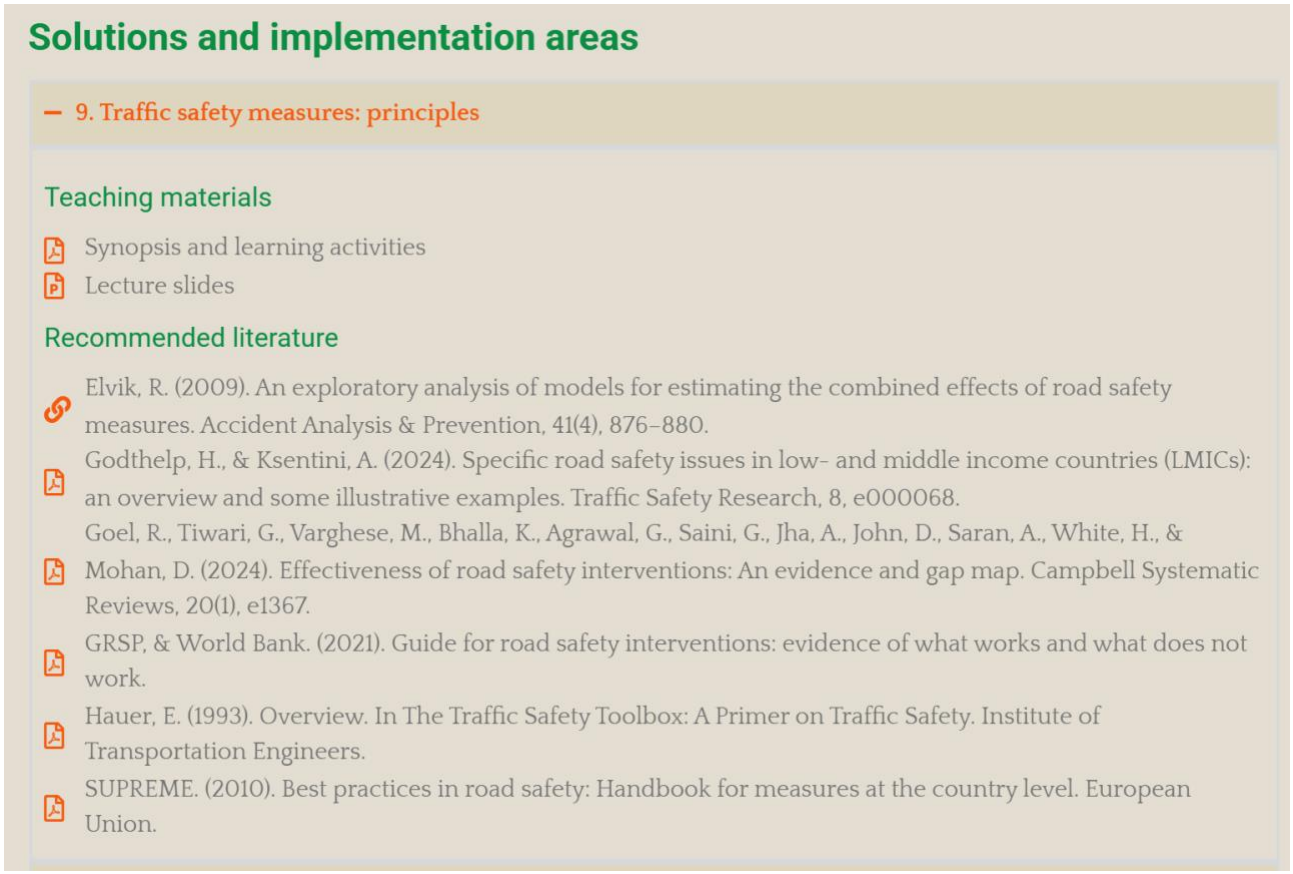

Figure 5: Example of the content of one module.

3 Discussion

Regarding the road safety curriculum, it is recommended that the design of the educational curricula will be embeded within real-world contexts by applying problem-based and project-based learning techniques. Using these effective techniques an active and dynamic cycle of experience-reflection is activated which enhances the learners' learning process. These learning techniques are learner-centric and focus on engaging the learners in meaningful learning activities that support their awareness and self-regulation of their learning. Learners learn by doing which leads to increasing learners’ capacity for solving meaningful problems. This way of learning stimulates the learners’ motivation to learn and see the relevance to their future roles. It also emphasizes that the responsibility for learning rests on the learner. This can practically be done for example by including real use-case problems, where the learners work in groups in a cooperative way to solve that problem.

Educational modules should follow a constructive alignment where the learning objectives, learning activities and the assessment are in-line and synced with each other. In other words, the learning activities should be able to support the student in achieving the defined learning objectives, and the assessment activities should test whether the student has acquired the knowledge and skills covered in the course. The learning objectives of the course should be SMART, i.e., specific, measurable, attainable, relevant and time bound.

Lecturers and academics are recommended to use the proposed curriculum and dive deep into the resources provided to expand their knowledge on a certain traffic safety topic, and based on that develop their lectures, with a student-centric approach, and adjust the content of the lecture (e.g., examples given) to the particular context of their country.

The AfroSAFE Academy is active and running, but it would require continuous monitoring and maintenance in terms of keeping the knowledge updated, and the dialogue between researchers and practitioners on-going using the online webinars and annual conferences as a mean to an end.

4 Conclusions

The AfroSAFE Academy has been established as a web-based (online) centre of excellence including online portal with educational and training material and activities, as well as a platform for continuing the discussion and dialogue on the topic of traffic safety by researchers and practitioners. To sustain its continuation beyond the life-time of the AfroSAFE project, ‘change-agents’ from the participating African countries were identified and currently play a significant role in the steering committee of the AfroSAFE Academy, and they will be the ones that will drive to its continuation.

5 Acknowledgements

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