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Automated Mobility and Inclusion as Educational Topics for Children and Juveniles and as Tasks and Responsibilities of Mobility Planning: Work-Report on the Project AM4Kids

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1 ABSTRACT

Automated mobility (AM) involves the increased use of digital information and communication technologies in all areas of traffic and mobility, particularly in the vehicle and mobility sector, in the infrastructure, transportation and the management of mobility-related processes (pre-, on- and post-trip). To ensure that the potentials of AM, like higher efficiency and improving accessibility, meet the demands and mobility patterns of different types of people, especially vulnerable ones like kids and people with disabilities, it is essential to make children and young adults aware of this complex and diverse topic already today. Therefore, planning and development activities in the mobility sector should involve this future generation and consider their ideas and concerns.

Planning and development activities should be considered from a holistic and inclusive perspective, considering a wide variety of traffic participant groups. In this context, the Austrian project AM4Kids[1] creates a direct interface between children and young adults and mobility planning. The scientists and planners take the role of facilitators of knowledge and accompany an inter and transdisciplinary, multi-level exchange between disciplines, such as transport planning, social science, mobility research, and actors from the inclusion sector. In the project, age-appropriate and gender-sensitive workshops, input lectures, and educational materials were developed and implemented by the interdisciplinary consortium of sociologists, transportation planners, landscape architects, civil engineers, software developers, and legal experts for the needs of people with disabilities.

This paper presents the methods applied in the corresponding project phases. Furthermore, a reflection on the achieved results and experiences from the activities in project phases 1 and 2 is provided.

Keywords: role of planning, automated mobility, children, awareness, inclusion

2 INITIAL SITUATION OF THE PROJECT

Today's children and juveniles will be tomorrow's users and decision makers of automated mobility (AM). In the set-up of the project AM4Kids, this coming generation gets in touch with various layers and themes of mobility, especially in the context of AM. The project provides them with an environment in which they can reflect on their mobility patterns and behaviour and learn about mobility demands,needs and situational requirements of various traffic participant groups. The aim is to raise awareness and sensitise children and juveniles on how AM and digitalisation fosters the development of a more and more inclusive traffic system which takes the demands and needs of people with disabilities into account. Furthermore, they shall learn about non-intended and non-anticipated consequences of AM, that is, barriers and gaps in the system for those groups which participation requirements are not appropriately met.

For this purpose, children and juveniles will discover the impact of AM from different perspectives (spatial planning, transport planning, automotive engineering, landscape design, civil engineering, software engineering). The chosen approach enhances cognitive abilities and creative thinking, both being highly relevant in the context of the ongoing digitalisation and automatisation.

[1] Project consortium: B-NK GmbH (lead) and partners TU Wien, Verkehrssystemplanung; Universität Wien, Institut für Soziologie and ZIS+P Verkehrsplanung.

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2.1 Automated mobility: disruptive development with a high potential for a more inclusive mobility system

Some transporation modes like trains or ships are already highly automatised. However, its application to street-based transportation modes like cars is much more complex due to a broad spectrum of different situations, actors and the interaction with other vehicles. The project AM4Kids focuses on the current development of automated vehicles in road traffic. Further studies and projects have dealt with the topic of AM, but mainly in the context of technology development and the necessary road infrastructure. Some studies, such as Heß and Polst (2017), discuss the social impacts of AM by combining different personas' everyday life and mobility patterns with new technological developments such as AM. Research often adresses elderly or disabled people to be significant user groups (Krail 2019; Lenz and Fraedrich 2015).

Designing inclusive AM for different user groups presupposes their active participationin the development process, and taking their mobility behaviour and requirements into account. AM is supposed to be a game changer in the transportation system, which does not only affect situational and infrastructural conditions but also new business models and various ownership models.

2.2 Ensuring equal access to infrastructure cannot be taken for granted

An everyday life understanding often associates modernisation processes with progress in science and technology. From a social science perspective, however, the core of modern society is the emergence of a civil sphere, a kind of community based on citizenship. Using the case of citizenship for the Negroe American, Parsons (1965, p. 1015) argued that inclusion, that is, '[t]he process by which previously excluded groups attain full citizenship or membership in the societal community [...]', constitutes the ongoing modernisation of modern society together with the differentiation of social structures and the pluralisation of forms of life. Technological development, however, is deeply enmeshed with issues of inclusion and exclusion, sometimes in surprising ways. In his provocative paper *Do Artifacts have Politics?*, Winner (1989) pointed to practices of road-building and the social distribution of transportation modes in the 1930s in New York city to show how the poorer Black American population was inhibited from using the generous, modern parkways of Long Island: 'Automobile-owning whites of 'upper' and 'comfortable middle classes', as he [i.e. New York city's town planner Robert Moses] called them, would be free to use the parkways for recreation and commuting. Poor people and blacks, who normally used public transit, were kept off the roads because the twelve-foot tall buses could not get through the overpasses.' (Winner, 1989, p. 123 sq.).

The relationships between technical structures and social inclusion and exclusion are not always intentionally established and so evident as in the case described by Winner. Infrastructure tends to be invisible and to become a taken for granted part of everyday life. This might be one reason why traffic participation is a key arena for expressing issues of inclusion and exclusion.

The challenges associated with digitalisation and automated mobility require a precise analysis and consideration in terms of inclusion. On the one hand, automated mobility promises to open up opportunities for various user groups. On the other hand, there is a risk that new technologies will reinforce social inequalities in terms of the distribution of access to the traffic system.

Often the transport systems lacks inclusive access. For example, a local train that people in wheelchairs can use without steps may satisfy the criteria of accessibility. However, inclusion requirements are not met if wheelchair users do not find the same facilities at the station as passengers who do not use wheelchairs. In practice, wheelchair users often do not have a table like the one available to passengers without disabilities - or the table is smaller, making it impossible to work with a laptop. Inclusion means that people with disabilities have access to use the same transport facilities as those without disabilities. Furthermore, they have the right to travel with their travel companions without disabilities – and not separate from them.

3 AUTOMATED MOBILITY IN THE AM4KIDS PROJECT

Focussing on inclusion and automated mobility, the project AM4Kids deals with transport planning and mobility research of tomorrow. The cooperation grants are aimed at educators who want to work with children and young people on future mobility issues.

Tomorrow's mobility will look different from the one we know today. In recent years, mobility has expanded to include several new mobility options, such as e-scooters, bicycles, hoverboards etc. How should or will mobility, taking self-driving (autonomous) cars into account, develop?

Automated mobility (AM) describes the increased use of information and communication technologies (ICT) not only in the vehicle sector itself but in all areas of transport and mobility, including infrastructure and the handling of mobility-related services (pre-, on- and post-trip). To adress automated mobility adequately, not only autonomous driving itself must be considered, but also issues such as orientation and navigation. This includes searching for the best connection in advance of a trip (pre-trip), the choice of means of transport and orientation on the way (on-trip) and the evaluation of the trip afterwards (post-trip).

To shape a sustainable and inclusive development of automated mobility, it is important to discuss this complex and multifaceted topic with children and young people already today. With the focus on inclusion, the aim is to understand how automation and digitalisation enable and/or restrict mobility of people with disabilities.

To establish an inclusive mobility system for all people, guaranteeing a seamless mobility chain from door to door is key. In reality, many different mobility barriers exist which must be considered in all their various forms to make the mobility system more inclusive. Therefore, the involvement of people with disabilities in the planning and implementation process is essential.

Automated mobility has the potential for independent mobility of people with disabilities, given that its various offers address the concrete and diverse needs of people with disabilities – pre-, on- and post-trip:

- It is essential that the pre-trip activities, e.g., obtaining information about the automated mobility services, the ordering, booking and payment process, and the reservation of any necessary assistance services, can be managed by people with disabilities as independently as possible. The consistent implementation of the multi-sense principle is mandatory.
- Barrier-free access for people with disability has to be ensured at all stages of the journey (on-trip). Starting with leaving one's home, this refers to access to AM services, the (possible) stop, transfer, equipment, information on and around the route, stage or vehicle, the stay in the means of transport itself (quality of stay and equipment) and ends when getting off near the destination as well as when leaving for and arriving at the destination address. This also includes making automated mobility services affordable. Moreover, the appropriate provision of the necessary information, applying the multi-sense principle, during the journey has to be considered due to risks and challenges, such as unplanned stops, and technical breakdowns, that may occur while using the automated mobility system.
- In the post-trip phase, people with disabilities' experiences of using the automated mobility system must be reflected, as well as any complaints to the operating company or, if necessary, parking the vehicle and providing services for the vehicle (e.g., charging the battery, collecting luggage, etc.) have to be considered.
- Ideally, inclusive planning and implementation address a broad variety of user groups (based on 'Design for All' principles). It can be calculated and financed similarly to conventional systems through economies of scale if widely rolled out and standardised. However, suppose particular technologies and requirements result in significantly higher costs for an inclusive mobility offer. In that case, funding from the public sector should be discussed to allocate funding in a socially and fairly balanced way.

4 METHODOLOGY

Having said this, it is important to show children and juveniles the enormous range of effects of automated mobility from the viewpoint of various interrelated perspectives (spatial planning, traffic planning, vehicle construction, landscape architecture, cultural engineering, software engineering, etc.). This also promotes the cognitive ability of networked and creative thinking, which is very important in advancing digitalisation and automation. In addition, the creative potential of children and young people is stimulated in the course of the research project and the interactive methodology (children and young people work with different role models

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in other settings), so the requirements for a future automated mobility system as well as innovative approaches to solutions for sensible use of technology are developed.

AM4Kids looks at the past, present and future of AM from children's and young people's the points of view. Children and young people investigate how and for whom traffic is – and is not – planned. Together with an interdisciplinary team, they adressesd the following questions: How do children and young people imagine the mobility of tomorrow? What are their wishes and expectations? What ideas do children and juveniles have about automation and digitalisation in the mobility sector? And what should not happen?

If people with disabilities shall obtain the status of full citizenship, they must also be involed in technology-oriented and research-intensive developments. For this reason, six educational institutions (primary and secondary levels 1 and 2 with children in the age group from 5 to 19 years) have been selected by inclusion-related criteria; accordingly, their pupils, children and juveniles, have a broad range of disabilities.

4.1 Knowledge building about mobility and inclusion in school contexts

With the help of role models, including people with disabilities, pupils have gained a first impression of job profiles that are little known, such as transport planning, (rail) vehicle construction, spatial planning, landscape architecture, cultural engineering or software engineering. In addition, children and young people experience inclusion directly: people with disabilities (our role models) are an active part of society and part of the technology-oriented and research-intensive community.

Within AM4Kids, pupils slip into the role of mobility experts. They reflect on their mobilities, think about possible developments in AM, learn about mobility needs and develop scenarios for the future.

The project comprises the following activities (August 2020 – July 2023):

- Introductory activities, such as expert lectures and workshops, shall trigger curiosity about transport planning, mobility research and inclusion.
- By walks and spatial explorations, pupils analyse the structural-spatial and transport infrastructures of their school environment.
- In excursions and workshops, children and young people learn to understand technical objects from a social science perspective. What consequences does the design of infrastructures, software solutions and vehicles have from the perspective of different road user groups?
- Transport planning methods such as surveying, counting, questioning etc. are used.
- In-depth workshops that focus on automated mobility are held.
- Pupils develop visions of the future and scenarios for automated mobility and discuss where the opportunities, risks and consequences lie for themselves and other groups of people.
- In a "Future Council" setting, children and young people will present their work.

4.1.1 Children and juveniles as transportation system planners

"Mobility sniffers" on the move (Part 1):

In the first part of the 'Mobility sniffers' module, we developed activities for primary schools which can be used independently by the teachers. The focus is on concepts: what do terms like mobility or transport mode denote? For this purpose, a mobility picture book and a poster on the characteristics of transport modes were developed.

The pupils learn about different modes of mobility by reflecting on their own and their family's mobility behaviour. Beforehand, the term mobility and the methods to measure mobility are introduced in an age-appropriate way. In addition, mobility is a mediator between the five basic activities: living, working, education, shopping and leisure (Sammer et al. 2019), which can take place at different locations through traffic and mobility. The method is a playful transfer of knowledge on transport and mobility.

"Mobility sniffers" on the move! (Part 2):

The second part of the 'Mobility sniffers'deals with getting acquainted with the school environment by using work tasks and first experiences by using traffic survey methods, traffic observations and traffic system analyses.

Mobility diaries provide group-specific tasks. By developing 'research questions' pupils learned practically that the type of task also requires a specific method for collecting traffic data. Traffic data of the traffic offers and demands of the users are the basis for analysing traffic problems and developing proposals for solutions. According to the questions, the pupils could conduct traffic counts under the supervision of mobility planners, observe certain street sections or public transport stops and take measurements (e.g. pavement widths). In this activity, a first feedback process from research questions to survey methods takes place.

In the school environment, conflicts relevant to traffic safety repeatedly occur due to parents' increasing drop-off and pick-up traffic of pupils. A school environment analysis from the children's point of view can help to raise awareness and increase consideration for the safety needs of children. The daily experiences of the pupils, as well as targeted traffic observations and mobility system analyses, serve as a starting point for a critical examination of the topic of traffic. The way to school is a significant environment for experience, learning and socialisation for pupils. Depending on the age of the children, this experience can be used to make them more aware of many phenomena in the field of traffic and mobility in different ways.

The methods include outdoor explorations, learning to interpret the school environment from a mobility planning perspective, recognising danger spots, and playful knowledge transfer.

4.1.2 Sensitisation workshops for children and young people

The Austrian association 'Hilfsgemeinschaft' [assistance community] offers workshops for children and young people to address the needs and demands of visually impaired and blind people. These workshops are inclusive and can be conducted with all participating educational institutions. Children learn about other disabilities based on the responses to their questions to people with disabilities.

4.1.3 Time travel into the past of mobility

To trigger the pupils' creativity regarding future mobility scenarios, they experience time travel to past visions of the future. The focus is on what ideas people had in the past about today's (their future) mobility and how individual vehicles have changed. The design of contemporary passenger cars, for example, is not much different from earlier carriages. This holds true, e.g., for new Tesla cars, which are considered innovative. The shape of the vehicles has not changed yet (and even in the design of trains, you find a similar carriage character). By working with film clips and texts from about 30 to 60 years ago, we will jointly analyse what was predicted, discussed, actually implemented and established back then for today.

4.2 Reflection of own mobility behaviour as well as recognition of the needs of other people by children and juveniles

In the context of the various activities, pupils reflected on their mobility patterns and possible developments in automated mobility based on adequate knowledge transfer (innovations, research projects, product developments). Moreover, they learned about the needs of other groups of people and developed scenarios for the future of mobility and transportation.

4.2.1 Age-appropriate use of mobility logbooks

As a useful method for identifying and reflecting on mobility needs, the mobility logbook is introduced as an observation, analysis and reflection tool in school classes. Children and juveniles are asked to document their mobility behaviour over several days. In addition to the surveys of trips and stages, pupils worked on further tasks, depending on the school level. To experience mobility from other perspectives within the family, the pupils asked their grown-up relatives at home about mobility in the past, today and tomorrow.

We developed a specific type of logbook for each school level: primary (age group 6 to 10 years), secondary level 1 (age group 10 to 14 years) and secondary level 2 (14 to 20 years). It should be noted that, in consultation with the teacher, we used the following higher-level documents for the workshops, depending on the teacher's discretion. As preparation for filling in the mobility logbook, exploratory walks in the school environment (see mobility-sniffers) are carried out shortly before in the primary and secondary level 1. In secondary level 2, a lecture on mobility behaviour is given as preparation. Direct reference is made to national studies of the Austrian Federal Ministry (BMK, 2016), such as *'Österreich unterwegs'*, ['Austria on the move'] and current mobility topics are explained. This insight into mobility research includes the definition of different terms, the systematics of means of transport, and the core contents and possible results of mobility surveys.

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In primary school, children record their trips from home to school for three days in a row. For this purpose, the day of the week and all modes of transport used for this trip are recorded on the worksheet and the duration of the entire trip in minutes. The second task relates to the routes on three different days in general. Four various destinations are distinguished: home, education/school, errands and leisure. In addition, a reference person for the pupil is asked about his or her trips to compare them.

The third task aims at getting the children to look at the development of modes of transport. For this purpose, children ask adult reference persons about the modes of transport of their childhood to compare them with today's transport modes. Building on the perspective of the past and the present, in task 4, the pupils design an (imagined) mode of transport for the future. In addition, the pupils describe why they would particularly like to travel with this mode of transport in the future. Finally, they chose one of the survey days, and visualise the route to school in a drawing.

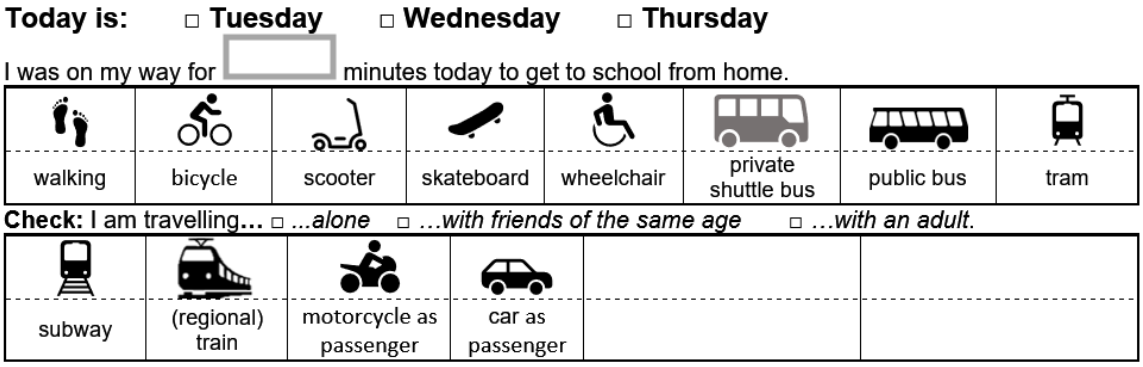

Fig. 1: Excerpt from the primary school mobility logbook

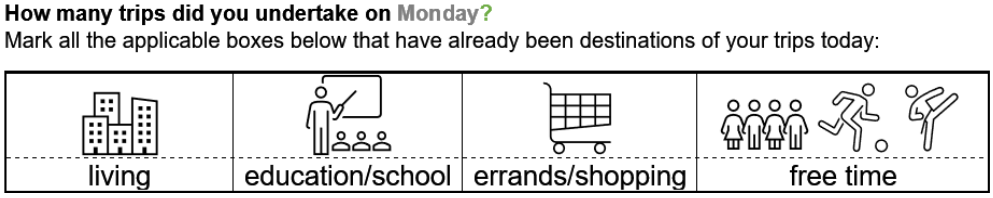

Fig. 2: Excerpt from the primary school trip recording

In secondary level 1, the documentation of the way to school is more finely grained as compared to the primary level. On three days, children record the individual stages of the way to school with exact times and means of transport. Task 2 requires the completion of the same route chain on three different days, whereby a distinction is made between home, education, work, leisure and going on errands.

The third task is to document the way to school in a self-drawn picture, in which challenging places and barriers are located. Moreover, the juveniles should note and explain which sections of the way to school they like. Finally, in task 4, current developments in the mobility sector are reflected together with a reference person. Which modes of transport have changed and which are new? How could people travel in the future? In addition, the children are asked what they would like to change on their way to school if they had the opportunity.

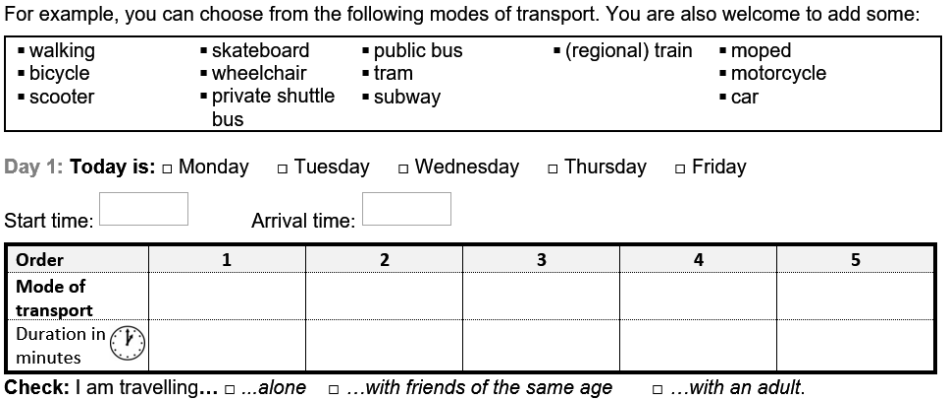

Fig. 3: Excerpt from the secondary level 1 mobility logbook

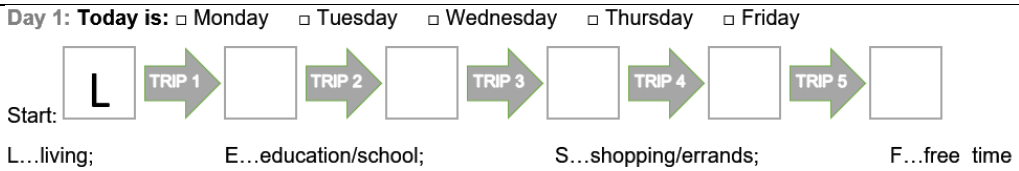

Fig. 4: Excerpt from the secondary level 1 school trip recording

In secondary level 2, the complexity of the enquiry about trips and stages increases significantly. The query is made with a digital PDF form that can be filled out interactively. All paths, including stages and trip chains, are entered in three different days by using a tabular structure.

In the second task, photos of the way to school can be uploaded in the document relating to the categories of general documentation, challenging places and barriers, and particularly positively perceived sections. The third task includes an interview with an adult reference person about their routine routes. This is followed by a comparison of the ways of the past and present from different perspectives. Finally, current developments in the mobility sector are reflected, similar to secondary level 2. Furthermore, ideas for modes of future transport are collected, whereby both writing and drawing can be used. Finally, suggestions to improve the way to school are documented and discussed.

Example for different trips during a day:

L…living; E…education/school; S…shopping/errands; F…free time

weekday / date dd.mm.yyyy	destination		Time recording start & arrival Time	mode of transport 1	mode of transport 2	mode of transport 3	mode of transport 4	mode of transport 5	distance in km (total)	route chain
	start	finish								
monday xx.xx.xxxx	L	E	06:45 / 07:20	walking 5 minutes	public bus 20 minutes	walking 5 minutes			20,0 km	example day 1:
monday xx.xx.xxxx	E	S	15:00 / 15:10	walking 10 minutes					0,7 km	L → E → S → L → →
monday xx.xx.xxxx	S	L	15:30 /16:10	walking 5 minutes	public bus 20 minutes	walking 5 minutes			20,0 km	

Fig. 5: Excerpt of the tabular mobility logbook for schools (secondary level 2)

4.3 Independent development of visions of the future and research questions by children and juveniles

The project's final phase will address the future of automated mobility and has not occurred yet. As already described, the whole process follows a sequence of steps of education that enable the pupils to discuss future developments in age-appropriate ways.

4.3.1 Future workshop on automated mobility

Children and young people will elaborate ideas and perceptions of future mobility in several interactive workshops. Building on the knowledge developed during the project, they tackle questions like: What should my future look like? How do I want to be on the road, for example, to school and travel? What impact do my visions have on co-citizens? How can people with disabilities benefit from this or possibly be negatively affected? The development and complexity of the future scenario will depend on the age group, the educational institution's requirements, and the research questions and conducted surveys. For example, students at an older age will also make links between different factors (environment, industry, economy, society, urban planning, individual groups). The workshop fosters creativity, uses playful approaches and takes advantage of group dynamics to make fun of shaping the future.

4.3.2 Future Council - 'Reality Check of our Future Scenarios'

The Future Council comprises the consortium and the pupils giving them opportunity for appreciative and critical feedback on the developed visions and scenarios. In a discussion on an equal footing, the participating classes discuss how the project ideas are relevant for future development of automated mobility. The Future Council focuses on the enterprising groups that will push innovation in the future: society, politics, industry and users. This means that all projects are considered far beyond being 'good' or 'bad'. Rather, their benefits for a wide range of target groups is evaluated. Getting feedback is essential for creativity and motivation and for dealing with future scenarios. Building on the discussions, children and young people enrich their plans.

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5 DISCUSSION

Within the AM4Kids project, children and juveniles have gained a wide range of knowledge about mobility, environmental conditions, automation, historical developments and different realities of living with disabilities in an age-appropriate way through expert lectures and workshops. Overall feedback from teachers and pupils was positive. The materials developed matched their purpose; the pupils were neither under- nor over-challenged.

In particular, the walks with the pupils in the school neighbourhood opened up discussions between the children and the researchers. Despite using the same materials and taking the same route, experiences varied significantly among school classes. It turned out that the topic of mobility is very present in all age groups. The children not only asked questions during the walk. They also began to think about how street environments could be designed. The groups discussed the advantages and disadvantages of different design elements. Topics initially addressed in a black and white mode of thinking (e.g. trees vs parking lanes for cars) were increasingly treated more reflectively, and different perspectives emerged. For example, one of the pupils said he dislikes pavement cafés because people smoke there, which bothers him. Instead, he would prefer a broader pavement to ride his scooter faster. In the same group, it was discussed that some people find the pavement cafés pleasant places to stay and would not want to miss them. Furthermore, the mobility logbooks are suitable for reflecting on how pupils travel compared to others and why this might be the case.

The teachers' feedback was mainly related to the fact that our interventions enabled children to deal with mobility issues at their own pace. This proved very valuable, especially for children with disabilities, as the street space and the whole environment were explored slowly and with many explanations and interactive tasks. The teachers said that children would not usually take the time to take notice of everyday things in such detail. The possibility to ask questions directly to experts during the workshops was also a great added value for both the children and the teachers.

An essential experience concerns the time factor and the sequence of presenting contents. In the first step, teachers worked with their pupils indenpendently by using documents. In the second step, short lectures before the third step in the form of field work took place (school environment and mobility logbook). In addition, prior knowledge helped a lot to work on the tasks and contents, which made it possible to have more engaged and informed discussions in the field.

At the primary level, among other things, measuring different elements of the street space (e.g. pavement widths, height of the pavement edge, bicycle parking facilities, cars and parking spaces) was top-rated. The teachers combined this task with current teaching content on areas and lengths.

Not only participants but also the researchers had learning experiences during the workshops. The team gathered many new insights on how children perceive street spaces and how different individual perceptions are. Although the focus of this project was purely on raising awareness and knowledge for the children, it can be clearly stated that participation in, e.g., design issues or mobility needs, requires detailed and step-by-step (knowledge) preparation. Direct interaction between researchers and pupils is essential, and a respectful discussion of ideas and visions with the children is indispensable. For example, designs of future modes of transport by primary school pupils show various approaches. However, they have one thing in common: almost all pupils noted that the mode of transport is electric or emits no CO_2. The conscious inclusion of pupils with disabilities and developing teaching materials in cooperation with teachers is highly recommended, as they know their pupils' needs best.

The researchers and planners involved in the project take several roles. They act as role models and experts and offer insight into occupational fields that are hardly known to most participating children. In addition, everyday situations in public spaces are discussed and explored with people with disabilities, making a change of perspective possible at all levels. The research and planning team is a mediator between these levels and simultaneously broadens its own perspectives. Another role of the researcher and planner is to impart knowledge from a technically correct point of view. The contents have to be adapted accordingly depending on the age group. Imparting knowledge and presenting facts as neutrally as possible helped the children to create their perspective on mobility-related topics and to discuss and reflect on them in the group. In the project's final phase, the researchers in the Future Council take a moderating role on the one hand and a feedback-giving role on the other. Thus, visions and ideas can be placed in different contexts.

6 CONCLUSION

Through contact with role models, including people with disabilities, children and juveniles gain a first impression about activities and job profiles of mobility research and planning. In addition, children and juveniles experience inclusion directly in every-day life contexts: people with disabilities are part and parcel of society and shall, therefore, be part of technology-oriented and research-intensive communities. The project sensitised children to mobility in the context of current technical developments and inclusion. Pupils from different educational institutions learn from interaction with research institutions and traffic related organisations. The knowledge thus acquired enables them to experience mobility from different perspectives and allows them to understand some of the implication of scientific concepts. It shows that in the course of pupils' participation processes, the age-appropriate and step-by-step development of knowledge is indispensable to make learning experriences sustainable and valuable.

7 ACKNOWLEDGEMENTS

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8 REFERENCES

BMK, Bundesministerium für Verkehr, Innovation und Technologie (2016): Österreich unterwegs - Ergebnisse der österreichweiten Mobilitätserhebung 2013/2014. Edited by Bundesministerium für Verkehr, Innovation und Technologie. Abteilung II / Infra 2: Infrastrukturplanung (BMVIT). Available online at https://www.bmk.gv.at/themen/verkehrsplanung/statistik/oesterreich_unterwegs/berichte.html, checked on 6/30/2022

Heß, Anne; Polst, Svenja (2017): Mobilität und Digitalisierung: Vier Zukunftsszenarien. Available online at https://www.bertelsmann-stiftung.de/fileadmin/files/BSt/Publikationen/GrauePublikationen/Studie_LK_Mobilitaet-und-Digitalisierung__Vier-Zukunftsszenarien_2017.pdf, 6/30/2022.

Knoll, Bente; Hofleitner, Birgit; Feßler, Anne Katrin; Hauger, Georg; Fian, Tabea; Adensam, Nadine et al. (2021): Automatisierte Mobilität inklusive! Edited by Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK). Available online at https://www.b-nk.at/bericht-automatisierte-mobilitaet-inklusive/, checked on 2/15/2022.

Krail, Michael; Hellekes, Jens; Schneider, Uta; Dütschke, Elisabeth; Schellert, Maximilian; Rüdiger, David et al. (2019): Energie- und Treibhausgaswirkungen des automatisierten und vernetzten Fahrens im Straßenverkehr. Wissenschaftliche Beratung des BMVI zur Mobilitäts- und Kraftstoffstrategie. Hg. v. Fraunhofer-Institut für System und Innovationsforschung (ISI). Karlsruhe. Available online at https://www.iml.fraunhofer.de/content/dam/iml/de/documents/OE%20320/Energie-und_Treibhausgaswirkungen_des_automatisierten_und_vernetzten_Fahrens_im_Stra%C3%9Fenverkehr.pdf, checked on 6/30/2022.

Lenz, Barbara; Fraedrich, Eva (2015): Neue Mobilitätskonzepte und autonomes Fahren: Potenziale der Veränderung. In: Markus Maurer, Christian Gerdes, Barbara Lenz und Hermann Winner (Hg.): Autonomes Fahren. Technische, rechtliche und gesellschaftliche Aspekte, Bd. 39: Springer Vieweg, S. 175–195, zuletzt geprüft am 05.02.2019.

Parsons, Talcott (1965): Full Citizenship for the Negroe American? A Sociological Problem. Daedalus 94(4), S. 1009–1054.

Sammer G., Röschel G., Sammer Gabriela: Mobilitätsverhalten der Grazer Wohnbevölkerung 2018, im Auftrag der Stadt Graz, Graz 2019

Winner, Langdon (1989): Do Artifacts Have Politics? Daedalus 109(1), S. 121–136.