The Legitimation of Quality Physics Education for Street-Connected Children and Street Youth

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Abstract

Worldwide, there are millions of children and youth living on the streets. While this is accepted as a sad reality when it comes to developing countries, many people are unaware that street youth also exist in Western countries, such as Germany. In both developing and developed countries young people on the streets face a plethora of challenges that make it difficult for them to access quality schooling. However, one of the demands of the SDG "Quality Education" is that children and youth in precarious living situations should be guaranteed access to all levels of education. In order to fulfill this goal different projects, for example street schools, are founded. Nowadays these projects often include physics education in their curriculum. This study has two goals. First, the life of street-connected children in developing countries and street youth in Germany is compared through an extensive literature review. Differences and similarities between these two groups and their reasons for leaving home are elaborated. Secondly, the question is answered to what extent physics education is necessary for street-connected children and street youth and consequently should be part of educational projects for them.

1. Background & Problem Definition

In September 2015, the United Nations General Assembly adopted the 17 Sustainable Development Goals (SDGs). These goals are meant to be promoted and hopefully achieved by the signatory nations within the next 15 years [1]. Each goal has several sub-goals in order to make the superior goals verifiable. The fourth development goal is "Quality Education". UNICEF defines quality education as education "[…] that helps them [, the children,] acquire basic literacy and numeracy, enjoy learning without fear, and feel valued and included, irrespective of where they come from" [2]. Among others, this SDG includes the following sub-goal: "By 2030, […] ensure equal access to all levels of education and vocational training for the vulnerable, including […] children in vulnerable situations" [1, p. 21]. Quality education should thus be provided to all children and young people with an emphasis on accessibility for those in precarious living situations.

One group that faces various barriers to accessing quality education worldwide is the group of street-connected children and street youth. Hoch defines the group of street youth in Germany as followed:

> We define street youth as young people under the age of 27 who do not have a permanent place of residence or do not stay in their registered place of residence (family or youth welfare facilities) for an unforeseeable time. This not only includes young people who live and sleep exclusively on the streets and do not have a roof over their heads, but also those who have found shelter with someone, e.g., with friends or in temporary emergency shelters. Thus, all homeless young people in Germany are of interest. [3, p. 14-15, translation by the authors]

As for the group of street-connected children, the following definition by Consortium for Street Children will be used. According to their definition, the term includes children who ...

> 1. Depend on the streets to live and / or work, either on their own, or with other children or family members; and
> 2. Have a strong connection to public spaces (e.g. streets, markets, parks, bus or train stations) and for whom the street plays a vital role in their everyday lives and identities. This wider group includes children who do not live or work on the street but regularly accompany other children or family members in the streets. [4]

The term "street children" is often criticised. For example, it is argued that the term has a negative connotation and could therefore lead to stigmatization and marginalization [5]. Hence, we deliberately decided against it in this paper and instead use the term "street-connected children" for children on the streets in developing countries. In Germany, using the term "street children" to describe street youth is also questioned, since the youth in Germany is mostly older than 14 years. An incorrect use of these terms could potentially result in creating unfitting parallels to street-connected children in developing countries

[5,6]. According to studies conducted by Hoch in 2016 and 2017, professionals in Germany do not consider the term "street youth" to be appropriate [3]. However, only around 19% of the 288 young people surveyed would not or rather not consider themselves to be street youth during their past or current time on the streets. [7]. Moreover, in the recent past, the term street youth has also been used in other Western countries, such as the USA or Canada [8].

Both these groups face various challenges and barriers to accessing quality education. If street-connected children and street youth resume their school career after dropping out of school previously, they will usually be placed back into the class level they abandoned. Thus, they have considerably younger classmates when they reenter school and they do not graduate from high school until a comparatively old age. For that reason, they often feel uncomfortable if not ashamed when returning to the classroom [9, 10]. Additionally, the use of drugs is most likely forbidden in schools, which poses a great problem for children and adolescents with a history of drug addiction [11]. Street-connected children and street youth also repeatedly report negative past school experiences, such as bullying or school anxiety [12, 13]. Specific to developing countries is the issue that street-connected children are unable to pay for school attendance, uniforms, and school materials as they are usually unable to raise these costs [5]. In Colombia, there are also public-school administrators who are of the opinion that street-connected children cannot be integrated into the school system [14].

Various projects around the world are dedicated to the task of making high-quality education accessible to street-connected children and street youth. These projects often tailor their programs directly to the needs and life experiences of their participants. Often, they include physics education in their curricula. One example is Patio13 in Colombia. Together with college-level education students they develop and test teaching methods and materials for physics education specifically designed for street-connected children [15]. In Germany, there are various projects, for example street schools, that offer support in the transition from the street to the classroom and in the achievement of an official school degree. Science knowledge is usually necessary for passing the final school examination. Therefore, science education is also included in most of the street school´s curricula. While it is generally accepted that street-connected children and street youth need to learn to read and write, it is often questioned whether knowledge of physics as part of science education is equally important. This paper aims to provide an answer to this question.

2. Research Questions

The central questions to be answered in this paper are as follows:

- How many street-connected children and street youth are there?
- How does the life of street-connected children in developing countries and street youth in Germany differ?
- To what extent is physics education necessary for street-connected children and street youth?

3. Method

In order to answer the first two questions, an extensive literature search was carried out, whereby studies, books and journal articles in English and German were analyzed. In particular, works were selected that describe the lives of street youth in Germany and of street-connected children in developing countries. In a first step, facts and figures concerning both groups were recorded individually. Subsequently, the causes for their life on the streets and the specific challenges associated with it were examined for each group separately. In the next step, similarities and differences were identified.

Furthermore, a literature research of physics didactic publications was conducted in order to find different arguments for physics education in general. The results were reviewed with respect to the lives of street-connected children and street youth. Thus, possible positive effects of physics education on their lives could be identified. These positive effects form the basis of the legitimisation and necessity of physics education for street-connect children and street youth.

4. Examples of Street Schools in Germany

In Germany, high-quality education for street youth, including physics education, often takes place in street schools. However, the definition of street schools is rather complex. According to Schroeder, street schools are schools on the margins,

> that respond to difficult or extreme life circumstances and in which older children and especially adolescents have to survive. It is a characteristic of these institutions that the sheer survival of the students must first be ensured through basic everyday care before educational work can begin. [16, p. 15, translated by the authors]

In this paper, we define street schools as institutions that offer formal education to street-connected children or street youth, while considering their living conditions and needs, and where they can obtain an accredited school degree. At the present stage of research, we are aware of ten street schools in Germany.

- Das andere SchulZimmer in Mannheim (https://www.das-andere-schulzimmer.de/)
- Freezone´s Straßenschule in Mannheim (http://www.freezone-mannheim.de/strassenschule.html)
- Manege-Schule in Berlin (https://www.manege-berlin.de/Angebote/Manege-Schule)

- Street College´s Lernlabor in Berlin (https://streetcollege.de/fachbereiche/fachbereich-lernlabor/)
- Treberhilfe´s Straßenschule in Dresden (https://www.treberhilfe-dresden.de/strassenschule-dresden/)
- Prejob of Off Road Kids Stiftung in cooperation with Flex-Fernschule in Dortmund (https://prejob.de/)
- Rampe´s BIX in Nürnberg (https://www.rampe-nbg.de/beschulung.html)
- Das Haus der Lebenschancen in Stuttgart (https://hdl-stuttgart.de/so-arbeiten-wir/)
- Gangway in Hamburg (https://www.gangway.hamburg/schulprojekte/)
- Jobkontor of Jugendsozialarbeit Schanzenviertel in Hamburg (https://js-schanze.de/jobkontor/)

5. Facts and Figures

In many countries, there are no reliable quantitative studies or statistics on the number of street-connected children or street youth. Figures found in the literature are often based on estimates that have little or no scientific basis [8]. Consequently, statements about the size and nature of this group can only be made and interpreted with great caution. There are several problems that make an exact analysis challenging. On one hand, the existing studies and estimates are based on different definitions, which means that comparability is unreliable at best [17]. Another difficulty in conducting a census is the rapidly changing life circumstances of street-connected children and street youth. Furthermore, their partial invisibility in the public space, for example due to repressive measures taken by the state, is another obstacle [8, 18]. Due to national and international refugee movements, these figures are subject to constant change, which must be considered when conducting reliable quantitative studies [5]. Nevertheless, it must be noted that local quantitative studies on the number of street-connected children and street youth have been steadily improving in recent years [8].

A frequently cited figure for the number of street-connected children and street youth worldwide is 100 million. This number is mainly provided by aid organizations, such as terre des hommes [19]. Even though Thomas de Benítez states [8] that this figure lacks scientific justification and is rather a rough estimate, it reveals the extent of the problem. In Germany, different numbers can be found in the relevant literature as well, which reflects the problem of quantification described above. According to a study by Beierle and Hoch [6], there are approximately 37,000 street youth in Germany, including all ages up to and including 26, with approximately 6,500 street youth being minors. This overlaps with the figures collected in a study by Mögling et al. [20], who estimate the number of homeless minor street youth to be 8500. On the other hand, the association Bundesarbeitsgemeinschaft Wohnungslosenhilfe [21] estimates that there are about 19000 minor street youth in Germany in 2018, and it must be noted that homeless recognised refugees were not considered. These numerical examples illustrate the difficulty of a statistical assessment of the phenomenon of street-connected children and street youth. What researchers and experts in Germany do largely agree on is the fact that this number is increasing (cf. e.g. [20] or [22]). In the global context, there are voices arguing that the overall number of street-connected children and street youth is growing [5]. However, other authors do not consider this statement to be sufficiently supported by scientific evidence [18]. In many regions worldwide, it is also reported that there are more boys than girls within these groups. In South Africa, between 80 and 90% are male; in Colombia, the figures range from 70 to 80% [5]. In Bolivia, about 60% of street-connected children and street youth are male [23]. Yet, it is also argued that there are individual regions to which these statistics do not apply. For example, in Accra, Ghana, there are more girls than boys living on the streets [8]. In Germany, according to Hoch [7], about 60% of the street youth are male, which is in line with the worldwide trend. Interestingly, in Germany, the gender ratio on the streets changes with age. There are more underage, female street youth, however, the ratio reverses towards boys after the age of 18 years. On average, street youth in Germany begin their life on the streets at the age of 16 [7]. In contrast, street-connected children frequently begin their street lives at an earlier age. In a study by Butterwegge et al. [23] conducted in Bolivia, street careers commence at an average age of 9.5 years. Weber and Sierra Jaramillo even speak of a worldwide average age of entry to the streets of eight years [14]. Furthermore, many street-connected children and street youth drop out of school and often do not continue their education later on [5]. Butterwegge et al. cites a statistic by Jorge Dominic, according to which only 69 percent of street-connected children in Bolivia attended school for a maximum of 4 years; 25 percent for a maximum of 6 years; and 6.4 percent graduating after 8 years [23]. In Germany, the number of school dropouts among street youth is also high. Of 205 street youth surveyed by Hoch, 59 reported that they had not graduated from school [7]. In a survey by Permien and Zink, about half of the 56 adolescents discontinued their schooling in seventh or eighth grade [11]. These figures become even more alarming when compared with Germany's overall school dropout rate of 6.6% in 2020 [24].

6. Street-Connected Children in Developing Countries and Street Youth in Germany – A Comparison

In our study, we tried to identify similarities and differences in the areas of "reasons for street careers", "everyday life on the streets," and "problems on the

streets", comparing street-connected children in developing countries to street youth in Germany.

Children and adolescents often do not only state one reason for their escape to the streets, but rather several push and pull factors [11]. Worldwide, negative experiences in the family of origin, such as neglect, abuse, violence, etc., are particularly crucial for this decision (cf. e.g. [7] or [18]). Throughout the world, families of street-connected children and street youth face similar problems. They deal with poverty due to unemployment or low-paying jobs, there are often unstable family structures, and parents are often addicted to alcohol or drugs (cf. e.g. [5] or [20]). A worldwide frequently named pull factor for escaping to the streets is the influence of peers (cf. e.g. [25] or [26]). Another push factor has to do with problems at school, for example conflicts with classmates or teachers [10]. Further causes, more commonly found in developing countries, are (internal) migration triggered by wars or natural disasters, or a lack of beneficial social systems [17]. However, as suggested by a study conducted by Hoch [7], a significant proportion of street youth in Germany have an immigrant background. Of the 259 interviewees, 22 have parents not native to Germany, and in the case of 27, neither the interviewee nor the parents were native Germans. Furthermore, poverty is believed to have a greater impact on street careers in developing countries. Because of financial problems parents often send children and adolescents to work or live on the streets, since they can no longer provide for them [27].

There are similar aspects to life on the streets in developing countries and in Germany. Thus, street-connected children and street youth face similar challenges all over the world, which can only be listed in brief here. The life on the streets and the often very difficult pasts lead to different psychological and physical impairments to health. Common mental and physical health problems of street-connected children and street youth include depression, attachment disorders, and attention deficit disorder [5, 18, 27]. According to Sulkowski and Michael [28], rates of attempted suicide among street youth in the U.S. vary between 20 and 40%, while the overall rate for youth is only 3%. Further health impairments worldwide are skin diseases, respiratory diseases, or sexually transmitted diseases (cf. e.g. [5] or [27]). Both, in Germany and in developing countries, drug consumption of street-connected children and street youth is often found. Therefore, they frequently suffer from drug addictions. Surveys in Colombia found that 80% of underaged street-connected children consume drugs, 40% even as young as 9 years old [14]. The type of drugs consumed varies from region to region [27]. In Germany as well as in developing countries, the line between legal and illegal activity on the streets is often blurred [5]. There are few opportunities to overcome the variety of problems which a life on the streets entails. Criminal behavior therefore is sometimes without alternative due to the realities of street life, for example due to drug-related crime [11]. Furthermore, street-connected children and street youth often face a life of poverty. They struggle to provide for their livelihood and thus frequently live from day to day. In Germany, state support is the primary source of income for 36% of the young people, followed by 23% earn money legally on the streets, and 11% who survive by financial support from private individuals [7]. In developing countries, there are often informal work opportunities on the streets, and street-connected children earn money by informal work such as collecting garbage, shining shoes, or selling various items. Government support, on the other hand, is rarely available. Therefore, street-connected children in developing countries are more vulnerable to poverty as compared to street youth in Germany [5]. Worldwide, street-connected children and street youth are exposed to violence, such as fighting due to group conflicts, sexual abuse by peers or adults, or humiliation by police and security forces (cf. e.g. [11] or [18]). In developing countries, experiences of violence are more common, and fights between street-connected children can and do often lead to life-threatening injuries [5]. Similarities between street-connected children and street youth can also be found in their thoughts about their future. Both groups desire to continue their education in order to obtain an accredited school degree. When asked what they wish their future to look like, many respond that they would like to start their own family, have a good job and their own apartment with a car (cf. e.g. [5] or [29]).

A further difference as listed above is the fact that the average age of entry to the streets is younger in developing countries than it is in Germany. This leads to an earlier termination of the individual´s formal education in developing countries. Accordingly, basic skills such as reading and writing are not always mastered [30]. In addition, the number of street-connected children or street young living in in their respective countries differ from one another. In Germany, approximately 37,000 young people up to the age of 26 live on the streets [6]. On the other hand, according to Agence Française de Développement [31], there are between 250,000 and 1 million street-connected children in the Philippines with a total population of approximately 108 million [32]. Lastly, we want to cite Thomas de Benítez: "The differences between 'street children' in East Africa and Western Europe or South America and South Asia can seem harsh. [...] But striking similarities have emerged from modern research." [8, p. 64].

7. The Need for Physics Education for Street-Connected Children and Street Youth

According to the SDG "Quality Education", street-connected children and street youth worldwide must have guaranteed access to all levels of education [1]. In 1989, this right to education for children and adolescents became contractual in the Convention on the

Rights of the Child of the United Nations [33]. The value of basic education for street-connected children and street youth is emphasised by various authors, and numerous arguments can be found in favor of it. As stated by Weber and Sierra Jaramillo, the possibility of a dignified life and a self-determined future stands and falls with education [5]. In the following, several of these justifications for the education of street-connected children and street youth will be outlined.

As already discussed in the previous chapter, street life worldwide entails a variety of challenges. These difficulties, such as dropping out of school or individual health problems, prevent street-connected children and street youth from developing and realising their full potential. According to the Convention on the Rights of the Child, education should lead to "the development of the child's personality, talents and mental and physical abilities to their fullest potential" [33]. Moreover, Corcoran and Wakia [34] have found that the more schooling street-connected children have received prior to their entry to the streets, the less deprivations they experience during their street episodes. General education helps to critically reflect one's own circumstances as well as their causes and to develop realistic strategies for exiting [20]. Quality education significantly improves the future prospects of street-connected children and street youth, since, as claimed by Weber and Sierra Jaramillo, it enables them to make appropriate use of the resources and opportunities available to them [5]. For instance, Hoch found that only 8% of the surveyed street youth were without health insurance. However, despite vulnerable health conditions, many street youths do not use their insurance and rarely visit doctors [6, 7]. Education could help adolescents adequately utilise the resource of free health care. The acquisition of educational qualifications also enables street-connected children and street youth to find a sufficiently paid employment whereby they can independently provide for their livelihoods. These opportunities would often be closed to them without an official educational diploma [30]. As Weber and Sierra Jaramillo point out, school education cannot guarantee social advancement, but without education there will certainly be none [5].

As stated by the Conference of the Ministers of Education and Cultural Affairs in Germany in 2004, knowledge of physics is an integral part of general education [35]. Accordingly, physics education must be part of educational projects for street-connected children and street youth in order to provide them with a high-quality education. As described above, street-connected children and street youth often drop out of school as they begin their life on the streets. Consequently, they have no official school degrees and show significant gaps in their knowledge. Among other things, this reduces their prospects on the labor market and makes it more difficult to leave street life [20]. Additionally, knowledge of physics, in combination with educational degrees, provides access to many technical and, in some cases, social professions as well as access to advanced educational programs. Physics education also enables a person to understand what different technical professions entail and helps them make more informed career choices [30, 35].

Life on the streets and the sometimes-traumatizing individual pasts lead to a variety of problems and deprivations for street-connected children and street youth. Due to these circumstances, they are often unable to develop various competences or can do so only marginally. This in turn can have a negative impact on leaving the streets or coping with everyday life on the streets. At this point we would like to show that with the help of physics education important skills of street-connected children and street youth can be developed. Thus, physics education has the potential to help street-connected children and street youth lead independent lives and leave the streets.

In their individual past and in their life on the streets, street-connected children and street youth have often had negative experiences with their family members, classmates, authorities, etc. and these experiences were often formative. For this reason, they tend to have problems building and maintaining healthy, sustainable, and collaborative relationships [13, 30]. Conflicts arise often leading to violent behaviour [23, 30]. It is known that street-connected children and street youth often live in the present and barely have the capacity to think about their future [5, 22]. However, the ability to make tangible, achievable plans is a crucial tool for leaving the streets [23]. Since leaving the streets after a longer period of time is not an easy task, street-connected children and street youth must have the wherewithal to identify and implement the necessary steps in order to start a life off the streets. Furthermore, discovering one's own talents and abilities plays a key role in educational work with street-connected children and street youth. Due to their vulnerable living conditions and their often-problem filled pasts, they frequently have low perceived self-efficacy. This means that they lack faith in their own abilities and assume in advance that they will not be able to complete a task. This can result in an apathetic attitude towards their lives and future prospects. The confidence in one's own strengths and the conviction that to a certain extent one can influence one´s circumstances can support the process of leaving the streets or taking care of yourself on the streets [5, 25].

Physics education can support street-connected children and street youth to promote or develop the aforementioned skills. In our opinion, student-centred methods such as student experiments or projects are particularly helpful. For instance, within the framework of experimenting in groups or projects, street-connected children and street youth can practice and develop a productive and trusting interpersonal relationships and team building [30]. Another

characteristic of physics is that predictions are made with the help of models and mathematical formulas. Mechanics, for example, deals with the movement of bodies and tries to describe their locations as precisely as possible through mathematical functions. The location of the body in the past, the present and the future should be calculable. This aspect of physics is also important for street-connected children and street youth, as it can support the development of skills in planning and visualizing one's own future and handling uncertainties in life [36]. With the help of experiments, for example, hypotheses can be generated through observation and these can in turn be tested in further experiments. Furthermore, projects in physics lessons can give street-connected children and street youth the opportunity to practise both planning and implementation under their own supervision [5, 37]. In addition, teaching physics can create opportunities to rediscover one´s own self-efficacy and thus strengthens confidence in one´s abilities. To achieve this, it is particularly important to create strength-oriented learning environments with real-life relevance in order to facilitate a sense of achievement [12, 30]. Projects in physics lessons are also particularly suitable for this purpose, as they can be used to deal with topics that are relevant to the children and young people and can be flexibly adapted to their needs [5, 22]. Through the experiences in these projects, they can also realise that they can actively shape their lives, implement appropriate plans and are thus not just pawns of their circumstances [38]. In general, project work is well suited for working with street-connected children and street youth, as they can discover their capabilities and strengths Furthermore, projects can easily be related to their everyday situations on the streets [37]. In addition, problem-solving skills can be developed through physics education and rational decision-making can be practised. In physics lessons, problems are worked on continuously, for which logical reasoning, creativity and the methods and approaches inherent in science are used [36, 39]. The Conference of the Ministers of Education and Cultural Affairs in Germany [35] describes these competences in physics lessons as knowledge acquisition and evaluation. Those skills help street-connected children and street youth in a practical way in their everyday life on the streets. For instance, they may benefit from asking themselves whether the benefits of drug use - coping with hunger, anxiety, cold, and boredom - outweigh the risks - addiction, cost, health effects.

Our final point pro physics education for street-connected children in developing countries and street youth in developed countries is in our opinion highly important. It should be mentioned that every person carries hidden potentials which should be fostered, among other things, through education. Street-connected children and street youth can also have scientific interests and abilities, and, like every human being, they have the right to find, develop and deepen these [40].

8. Outlook

This paper is part of a larger research project. Its main research interest is to find out how science education for street-connected children and street youth should look like in street schools in order to fulfil the SDG "Quality Education". Based on the results of this paper, an interview guideline will be created, which will then be used to interview those responsible for street schools and science teacher in German street schools. These interviews also aim to answer the question to what extent these street schools have the potential to realise the SDG "No Poverty" for their participants.

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