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The Coronavirus Pandemic: Towards a Crisis-Resistant Education System

Summary

The right to education is a human right. In spring 2020, it wasn't possible to ensure this right due to the closures of, and later on the restricted access to, educational institutions. Children and young people have been particularly affected by the measures to contain the coronavirus pandemic. The measures have placed significant burdens on families and dramatically limited educational opportunities.

Current data allow us to assume that children and young people can be infected and transmit the SARS-CoV-2 virus – although some evidence suggests that younger children are less affected than older children and youths. Therefore, it is imperative that protective measures be taken to keep the risk of outbreaks within educational institutions as low as possible.

Adjustments to the education system are still necessary to enable children and young people to exercise their right to education during the ongoing pandemic. The aim is to allow attendance at children's day-care centres and schools to remain as consistent as possible, since face-to-face contact between children and young people with qualified educators is especially important. This is of particular significance for early learning stages and during the first years of school. Therefore, the Leopoldina recommends the following:

- The total closure of educational institutions should be avoided as far as possible. For this to be achieved, it is essential to establish, where feasible, small, closed contact groups (epidemiological groups, e.g. school classes or core groups at children's day-care centres) with as little contact between the groups as possible. This will allow quicker tracing and containment of any coronavirus outbreaks. Low-threshold symptoms-based testing is crucial for early identification of such outbreaks. In order to reduce the probability of SARS-CoV-2 spreading, ensuring the implementation of distancing and hygiene rules and frequent air exchange inside educational institutions is vital. If the required distance cannot be maintained, students from Year 5 ("5. Klasse", 10–11 years of age) and above should wear mouth and nose protection, even within their epidemiological groups. For younger children, it is sufficient to wear mouth and nose protection only when outside of their epidemiological groups. Large events and gatherings may not take place. All measures should be continually adjusted to reflect the most recent scientific knowledge.

- If it is not possible to ensure consistent access to educational institutions, a programme is required that combines both classroom and remote learning. Facilitating learning and education is the primary mandate for educators – even when classes are held remotely. Parents can only provide limited support in this respect. It is crucial that digital teaching and learning opportunities are expanded. Specifically, high-quality didactic concepts and materials, learning platforms, practising new learning strategies, and good communication and support are essential. To be able to achieve all this, educators require support when it comes to the necessary digital infrastructure and technical equipment, the preparation of suitable digital teaching resources and materials, and appropriate further training opportunities.
- At the present time, families are taking on many additional responsibilities regarding caring for and educating children and young people. Therefore, it is important that the support for families improves and it is crucial to stay in contact with them, for example by offering regular contact hours, counselling and materials. Particular attention should be devoted to children and young people, as well as their families, who already required support and assistance before the coronavirus pandemic, both with regard to technological equipment and individual support. The goal must be to keep educational inequalities to an absolute minimum.
- Implementing all of these changes in educational institutions requires centrally managed support structures, for example through institutes and ministries of the German federal states, as well as a high level of flexibility on-site. To set up the necessary digital infrastructure for the educational institutions, it is recommended to establish a cross-state advisory board to define the necessary measures and coordinate their implementation.
- Accompanying research and evaluation projects are a key prerequisite for testing the effectiveness of the measures introduced so that any necessary adjustments can be made in order to adapt to the current situation.

Preamble

The right to education is a human right. Education promotes personal development and enables social, economic and cultural inclusion. It supports our society's internal stability and is a crucial factor for ensuring and further developing economic security. In Germany, all children aged one and above have the right to a place in a children's day-care centre and to the accompanying support, education and care. Compulsory education presupposes schools' educational mandate, with the aim of developing the capabilities and personalities of children and young people, enabling their informed participation in society and preparing them for career-oriented further qualifications.

However, the measures to halt the spread of the coronavirus pandemic have led to many day-care centres and schools being unable, in some cases over a period of several months, to fulfil their duty to educate and care for children and young people, or only being able to offer a very limited service. As of yet, there is no reliable technical and organisational infrastructure in place to compensate for the complete closure of educational institutions – the kind of which has not been seen in the history of the Federal Republic of Germany. For this reason, the task of compensating for the missing educational institutions has fallen, in many cases, to the families. When it comes to deciding how to best reach the children and young people entrusted to their care, as well as their families, day-care centres and schools are often left to manage on their own. The same is true when it comes to developing strategies to fulfil their educational duties from a distance. If measures are not taken soon to compensate for the resulting deficits, those affected could very well experience serious disadvantages in their later professional life, and society as a whole could experience a loss in achievement potential. Overall, it has been shown that the existing system is neither resilient enough nor able to react flexibly enough under crisis conditions. In many cases, there are no clearly defined processes for coordinating efforts between the parties involved. Often, suitable, secure and data-protection-compliant digital platforms and other tools are also lacking.

As long as there is neither a vaccine to curtail the pandemic, nor a widely available effective treatment for COVID-19, everyday life must be adapted so as to reduce the risk of infection. It is to be expected that in the coming school year, depending on the local infection levels, there will be outbreaks of the coronavirus within educational institutions. It is therefore necessary to organise and coordinate educational institutions so that they can work reliably and in a crisis-proof way, even during temporary or, if possible, partial shut-downs. The aim is to enable every child and young person to develop their performance and character to the best of their abilities. It is important to ensure the functionality of support structures for

children with physical or mental disabilities or other special educational needs, so that these children, too, can exercise their right to education.[1]

As the German National Academy of Sciences, the Leopoldina provides independent, science-based policy advice on scientific issues of social importance. The Academy draws up interdisciplinary statements on the basis of scientific knowledge. Therefore, this statement also reflects the perspectives of the scientific disciplines involved. Making decisions and considering the interests of the numerous stakeholders in the education and care sector (children and young people, parents, educators and authorities) is the responsibility of democratically legitimised policymakers.

This fifth ad-hoc statement on the coronavirus pandemic[2] is directed at those responsible for the shaping of the education system – from the respective ministries of the German federal states, the state institutes and educational institutions to individual day-care centres and schools. It is within their responsibility to create a culture of trust and facilitation in which all levels can work together on finding and implementing practical solutions that enable all children and young people to have access to an attractive learning structure.

Implementing these measures will not be without cost – which means that additional resources are needed. In the course of all the comprehensive measures to mitigate the effects of the pandemic, the education sector has seen comparatively few additional investments thus far. Considering the impending challenges that need to be overcome to adapt the educational system, a joint financial effort is required.

STARTING POSITION: EDUCATIONAL INSTITUTIONS DURING THE PANDEMIC

Scientific knowledge regarding SARS-CoV-2 and children and young people is constantly improving, thanks in particular to international studies (e.g. the DELVE Initiative, 2020). However, many questions still cannot be fully answered. A uniform picture regarding the role of children and adolescents in the occurrence of infections in general and at school has not yet emerged. Nevertheless, several tentative conclusions may be drawn.

Children and young people and SARS-CoV-2
Children and young people can be infected with the virus and can spread it. There are, however, multiple indications that specifically younger children (under 10 years of age) could play a lesser role in infection processes (Fontanet, Grant, et al., 2020; Gudbjartsson et al., 2020; Lavezzo et al., 2020; Park et al., 2020).

[1] The following recommendations do not separately address measures to ensure integration or inclusion. The specific characteristics of these situations merit separate attention but must always be taken into consideration.
[2] You can find all coronavirus pandemic statements from the Leopoldina here: https://www.leopoldina.org/en/press-1/news/ad-hoc-statement-coronavirus-pandemic/

When children and young people are infected, they show no or only mild symptoms more frequently than adults, only rarely display severe symptoms and the fatality rate is extremely low (e.g. Castagnoli et al., 2020; Hoang et al., 2020). Asymptomatic patients and very mild and non-specific symptoms often present a particular challenge in controlling the spread of the infection, since the infection can spread largely unnoticed.

Transmission in educational institutions
Generally, it is possible for SARS-CoV-2 to spread within educational institutions. For example, a large outbreak was observed in a secondary school in France in February before the general closure of schools (Fontanet, Tondeur, et al., 2020).

Over the past few months, a number of countries have had experience with the re-opening of schools. Some countries, such as Denmark and Norway, have been able to allow schools to continue without further closures thus far. In countries like South Korea and Israel however, where initially the virus seemed to be under control, schools had to close again due to increasing infection levels and a spread of cases in several secondary institutions (e.g. Stein-Zamir et al., 2020).

Strategy
Germany must be prepared for the possibility of school-related outbreaks. Especially in view of increasing national and international mobility, a shift from outdoor to indoor activities in the autumn and winter, and the start of the cold and flu season, this appears all the more urgent.

Therefore, the Leopoldina recommends the following measures as a matter of priority:

1. **Creating limited and sustained small epidemiological groups within all educational institutions** (e.g. school classes or core groups in children's day-care centres) that may not mix. In upper school years, courses are to be adapted using digital solutions;
2. A **systematic testing strategy** that provides for immediate testing of all symptomatic school pupils and children in day-care centres, as well as employees and educators;
3. If an infection case surfaces in an educational institution, a **mitigating strategy** must be in place. The aim is to avoid further closure of the respective educational institution as far as possible by applying the mitigating measures to a limited contact group (epidemiological group).

It is imperative to avoid contagion in educational institutions as much as possible with a **set of preventative measures** and to communicate the significance of these measures to everyone affected. These measures, alongside those mentioned above, include the following: maintaining distance between the groups by creating physical or time buffers, as well as the known protective measures (such as frequent air exchange) and hygiene practices. If the required distance cannot be maintained, students from Year 5 ("5. Klasse", 10–11 years of age) and above should wear mouth and nose protection, even within their epidemiological groups. For younger children, it is sufficient to wear mouth and nose protection only when outside of their epidemiological groups. Large events and gatherings may not take place.

Conclusion

Controlling the infection rate is the prerequisite for allowing classroom learning in educational institutions to take place for as long as, and as comprehensively, as possible, and for ensuring that the number of children and young people affected by school closures is kept to a minimum.

1. Maintaining access to educational institutions for as long as possible during the pandemic

As places of social interaction, play and learning, day-care centres and schools are crucial to the development of children and young people (Bronfenbrenner & Morris, 2007; Hamre & Pianta, 2007). They enable subject-specific learning and allow children and young people to interact with one another, as well as with educators, providing the space to improve their social, emotional and personal skills. Digital options alone cannot substitute for these tasks. Physical attendance at educational institutions is particularly important for young children, while older children and young people can – although not exclusively – use digital learning resources at home.

Keeping educational institutions open as long as possible is of great significance for the development opportunities of children and young people, and this should be considered a high priority for the good of society as a whole. Therefore, it is important to work together at all levels, and to engage in creating practical solutions in ongoing exceptional circumstances.

Recommendations

- The total closure of educational institutions should be avoided as far as possible. For this to be achieved, it is essential to establish, where possible, small, closed contact groups (epidemiological groups, e.g. school classes or core groups at day-care centres) with as little contact between the groups as possible.
- To identify possible outbreaks of SARS-CoV-2 at an early stage, it is crucial that a systematic testing strategy is established, providing immediate testing of all symptomatic children and young people, as well as educators and staff. Deviations from these recommendations should be considered for pre-school children with mild symptoms.
- In the case of a confirmed infection, a reasonable and efficient course of action is to immediately place the person and those who were in contact with the infected person – also known as their contact cluster – in quarantine. This should allow quicker tracing and containment of any coronavirus outbreaks. Therefore, it is important that educational institutions enquire immediately whether an absence is health-related.
- In order to minimise the likelihood of spreading SARS-CoV-2, hygiene and infection prevention measures – such as frequent air exchange, establishing epidemiological groups and social distancing – should be implemented to the greatest possible extent. If the required distance cannot be maintained, students from Year 5 (“5. Klasse”, 10–11 years of age) and above should wear mouth and nose protection, even within their epidemiological groups. It is sufficient for younger children to wear their mouth and nose protection only when outside of their epidemiological groups. It is crucial that these topics are regularly discussed and conveyed in educational institutions. Large events and gatherings may not take place.

- To enable educational institutions to fulfil their tasks with as few restrictions as possible, they require support in implementing the recommended measures. Therefore, the local authorities and the authorities responsible for infection prevention should work closely with educational institutions. Concrete measures include: a) regular updating of infection prevention and hygiene measures according to the latest medical research; b) a differentiated approach to estimating the local infection rate; c) low-threshold, symptom-based testing, supplemented by strategic testing at educational institutions; as well as d) organising a rapid quarantine procedure for contact clusters around people with proven infections.
- In order to ensure that the educational needs of children and young people continue to be met under pandemic conditions, the federal-state ministries and institutes for teacher professional development should develop framework concepts for the organisation of classroom, hybrid and remote learning models as well as the necessary personnel deployment. These frameworks should also take into account the deployment of educators who belong to risk groups, so that all available human resources are effectively used. The frameworks can be used by day-care centres and school management teams, in close coordination with day-care and school authorities, to produce organisation and personnel deployment plans that are adapted to local circumstances.
- Structural and organisational adjustments are necessary in order to establish the recommended small, closed groups (epidemiological groups) in educational institutions. Switching rooms should be avoided, educators should change between groups as little as possible and the contact between the groups should be reduced even when outside. Opening up and leasing additional learning space can help with physical distancing. Further options could be explored for day-care centres and, if necessary, primary schools, for example by integrating outdoor educational and learning activities systematically into the everyday routine. In addition to creating a physical buffer, it is also possible to create temporal buffers by utilising afternoons and, if necessary, Saturdays for learning opportunities.
- For those children and young people who, according to doctors, are at particular risk of contracting more severe cases of SARS-CoV-2, solutions should be found for further integration into the educational system, and these should be tailored as far as possible to their individual needs. This also includes children and young people living with at-risk people in their household.
- For the planning and further adaptation of measures to contain the pandemic's spread, it is important to increase the involvement of children and young people in epidemiological studies.

- The question of how education can be organised while helping to prevent the spread of a pandemic should be given individual and significant weight in future pandemic planning. Education experts could make a significant contribution to the revision of the National Pandemic Plan by the Robert Koch Institute.

THE COMPATIBILITY OF EDUCATION AND PANDEMIC CONTROL: DIGITAL TRANSFORMATION OF SCHOOL LEARNING IN DENMARK

One country where the school year continued largely unhindered during the pandemic despite a lockdown is Denmark. This was possible because Danish schools have relied heavily on the use of digital applications for years. In Denmark, the digitalisation of the school system began with the turn of the millennium. In the years thereafter, schools received the necessary infrastructure – internet connections, computer equipment, interactive whiteboards, etc. – coupled with learning platforms and software for collaborative work. Furthermore, two thirds of Danish teachers say that they regularly exchange views on the use of digital learning applications in the classroom and collaborate accordingly. Almost all teachers and students use software to enable collaborative work (Eickelmann et al., 2019), and 85% of students work together online on school topics inside and outside of school (Fraillon et al., 2020).

Thanks to these existing digital learning structures, Denmark was able to react relatively quickly and flexibly to the requirements for slowing the pandemic's spread. Because both students and teachers already had access to the necessary digital devices and had the required practice collaborating online, it was possible to shut school buildings relatively early during the peak of the coronavirus pandemic without needing to interrupt the term. At the same time, the well-established remote learning methods also allowed the re-opening of schools to be orchestrated with great flexibility, with only the younger students returning to classroom learning at first with strict distancing and hygiene regulations. The distancing regulations were also able to be maintained as the older age groups transitioned back into classroom learning, while flexible models of classroom and remote learning enabled small groups to attend school in a shift system (Couzin-Frankel et al., 2020; Stage et al., 2020).

2. Developing concepts for integrating classroom and remote learning

Even in the event of the partial closure or temporary total closure of institutions, it is important to maintain the quality of education to the greatest extent possible. Therefore, it is helpful to plan for scenarios where there has to be a switch between classroom and remote learning phases, along with periods of fully remote learning (Sung et al., 2017; Wagner et al., 2020). This presupposes that the prerequisite conditions are in place to enable educators to carry out their core mandate of educating children and young people at the same level throughout all the different phases. The responsible ministries of the German federal states can help by initiating the development and procurement of the appropriate quality-assured and data-protection-compliant content based on best practice examples (see the section "The compatibility of education and pandemic control: digital transformation of school learning in Denmark" above). Parents and family members cannot replace trained educators (Köller et al., 2020).

Recommendations

- Compared to classroom learning, remote learning phases require, in certain aspects, additional legal certainty and commitment. This could be created with the assistance of cross-state framework regulations and standards via the Conference of Ministers for Youth and Family Affairs ("Jugend- und Familienministerkonferenz", JFMK) and the Standing Conference of the Ministers of Education and Cultural Affairs of the States in the Federal Republic of Germany ("Kultusministerkonferenz", KMK) regarding, for example, testing regulations or the use of digital communication platforms. The supervisory authorities could also significantly reduce the strain on educational institutions in matters of data protection – for example when contacting parents, children and young people or when using platforms – by ensuring clear and unified legal interpretation and transparency, and illustrating data-protection-compliant solutions.
- Preparing a functional digital infrastructure (see Chapter 3) and learning platforms for direct communication are key components for successful educational work at a distance. Using this infrastructure, educators could provide children, young people or their parents with quality-assured materials and content, and they can interact and directly discuss educational content via video conferencing systems. The German Federal Government and federal states should quickly develop solutions that allow all educators access to data-protection-compliant, tested learning platforms and video conferencing systems. In order to ensure equal participation in remote learning, it must be guaranteed that all children and young people have access to the necessary digital devices for this purpose.
- Quality-tested concepts, materials and software provide valuable support to educators for remote learning. These include, for example, interactive learning software that can support skills acquisition, and media aimed specifically at younger children. Moreover,

media that can be introduced in the remote learning phases, such as tutorials, texts and assignments, can help to make the integration of the different learning phases easier for educators. Remote learning concepts should also provide for phases of individual and cooperative learning.

- Existing software and digital learning materials require compilation and comprehensive evaluation, which could be coordinated and supported by the responsible advisory boards or state institutes. Checking and evaluating these materials according to standardised, research-based criteria can also provide a good basis for the desired target of introducing a certification system for digital learning software.
- One possible approach for providing quality-tested digital materials involves introducing cross-state curated platforms for Open Educational Resources (OER). Another approach entails collaboration with commercial software and hardware providers, whereby corporations offer hardware and software with favourable conditions or could take part in the creation of certified, intelligent learning software.
- The use of digital devices requires training and practice and should therefore not only be limited to remote learning. Stronger integration of digital devices in classroom learning is also recommended (laptop classes). Though this primarily affects students at secondary level, it should also be adapted to suit the ages of children in day-care centres and primary schools where this is possible and makes sense.
- Because it cannot simply be assumed that children and young people possess the skills for self-regulated learning during remote learning phases, it is necessary to explicitly practise appropriate learning and behaviour strategies with the students. Particular attention should be paid to age-appropriate motivation. These remote learning periods also require reliable communication and students to be personally supported by educators. This is in order to ensure that children and young people receive regular and meaningful feedback on their learning and development processes and outcomes, containing concrete guidance for further work and progress. Concepts need to be developed and deployed to achieve this.
- To enable regular monitoring of learning achievements and fair grading thereof, assessments and tests should continue to take place (Hattie, 2009). The methods of assessment must also be adapted appropriately to the respective pandemic situation and legally defined test formats must be established.
- Introducing multi-professional teams as task forces within educational institutions and their support structures can help to pool resources and relieve the burden on management teams by, for example, taking on responsibility for coordinating with the subject-specific supervisory bodies, the discussions with parents, and contacting hard-to-reach children and young people.

CROSS-STATE ADVISORY BODY FOR INTRODUCING DIGITAL INFRASTRUCTURE

The coronavirus pandemic has demonstrated the importance of digitalising educational infrastructure. Digitalisation contributes to successfully overcoming crises by enabling greater flexibility. Building a digital infrastructure is a substantial challenge (Eickelmann et al., 2019) that affects all federal states equally. Cooperation creates synergies, allows optimal implementation of available expertise and helps to avoid redundancies in development. The compatibility of these cooperatively developed structures could also allow for children and young people in all federal states to be given similar initial conditions and opportunities.

Coordinated expertise makes it easier to establish data-protection-compliant platforms for communication and exchanging data. The same is true for developing solutions to provide educational institutions with the best-possible equipment, to establish internet connections or organise technical support and maintenance. Establishing software solutions, high-quality learning media, and concepts for the didactic integration of digital aids into learning processes is a highly complex task. Individual schools, communities or educational support institutions cannot be left to attempt to meet these challenges alone. By introducing a cross-state advisory board that combines the expertise of trained educators, scientists, government representatives and state officials for educational policy, it would be possible to voice recommendations for coordinated, comprehensive solutions for the educational institutions in all 16 German federal states.

3. Providing digital infrastructure

In 2016, the Standing Conference of the Ministers of Education and Cultural Affairs (KMK) listed the central goals for schools regarding “Education in the Digital World” (KMK strategy paper “Bildung in der digitalen Welt”, 2016). The first financial requirements for this were provided by the “Digital Pact for Schools” initiative (“DigitalPakt Schule”). However, due to the renewed urgency of implementation driven by the coronavirus pandemic, there is a need for action that goes beyond the resources provided for schools by the German Federal Ministry of Education and Research (“Bundesministerium für Bildung und Forschung”, BMBF) in their immediate provision programme (“Sofortausstattungsprogramm”). There has yet to be a similar initiative for day-care institutions.

Recommendations

- To coordinate and organise the complex implementation processes, it is recommended to set up a support committee or board comprised of experts from the sectors of educational administration, educational practice and research, and information and knowledge management (see the section “Cross-state advisory body for introducing digital infrastructure” above).
- Fast internet connections and the availability of digital devices are two basic infrastructure requirements for digital learning. It is therefore necessary to use the money provided by the German Federal Government and federal states within the “Digital Pact for Schools” as quickly as possible to build a comprehensive infrastructure. It is also important to eradicate the existing regional inequalities in the accessibility of digital infrastructure, as well as to remove the differences in equipment levels between the different types of school.

- Educational institutions require support for these complex tasks from both the federal states and the school authorities ("Schulträger"), also with regard to the efficient use of existing resources. It is also important that federal states define hardware standards and implement systems that are as standardised as possible. These include in particular stable and data-protection-compliant systems for video conferencing, data transfer and feedback.
- Day-care centres also require infrastructure for digital communication with families and the use of digital media for early learning. This could be realised by developing a foundational digitalisation strategy in which local authorities and representatives from the German Federal Government, the federal state governments, and the municipalities confer about the necessary frameworks and steps for implementing the measures.
- Remote learning often presents a major challenge for educators to adequately monitor and support the learning performance and achievements of children and young people. Here, it will be important to accelerate the development of intelligent tutoring systems that can actively support students in reaching their learning goals (Olsen et al., 2019) for the various areas of education, different subjects and age groups. Since this development cannot be achieved by text-book publishers alone, it would be conceivable, for example, for the German Federal Government and the federal state governments to start an initiative to provide intelligent learning software that brings together partners from various relevant sectors. These should also explicitly consider the development of digital learning media for older children in day-care centres.
- Technical support and maintenance are necessary requirements for the successful use of digital media. The success of these steps can be ensured by creating IT administration positions for individual institutions or regional groups of institutions.

4. Supporting educators in the professional use of digital media

Many German educators are now only just becoming familiar with digital media to support individual education and learning processes (Eickelmann et al., 2019). A major reason for this is that the digitalisation process is not yet well advanced in many schools in Germany. It is also necessary to push forward a corresponding process in the day-care sector to enable personnel to digitally communicate with families.

Recommendations

- Educators require support to acquire the relevant technical knowledge to create resources in the digital space that are cognitively demanding and promote learning. The provision of long-term technical, media and subject-didactic training can significantly contribute to improving the situation. The comprehensive availability of these educational offers could be coordinated and ensured via overarching institutions such as state institutes and, if necessary, day-care support institutions and youth welfare services.

- A good scientific basis and systematic evaluation are required in order to utilise further-education concepts for creating high-quality media and methodologies for the use of digital media in teaching, or for learning with older day-care children in the future. These could be ensured if universities, as well as federal state and further-education institutes, enter into new targeted partnerships for this purpose.
- The skills required for the didactic use of digital tools – including platforms, learning software and resources for monitoring performance and determining the level of development – could be taught comprehensively by making them a fixed part of educators' initial and further training in the long term.

5. Expanding cooperation and communication with parents and families

Cooperation between educational institutions and families is already of great importance under normal circumstances, especially in day-care centres and primary schools (Cook et al., 2018). At a time when children cannot attend their day-care centres or schools due to pandemic mitigation measures, it is especially important for educational institutions to discuss educational goals and methods, inspiring concepts of engagement and learning support with families.

Recommendations

- It is recommended that day-care centres and schools further strengthen their cooperation with families by expanding communication channels, for example by using video conferencing, and provide simple options for contact like regular office hours (online, by telephone or in person). Stable schooling and parenting partnerships are always of great relevance, but especially now in the light of the pandemic.
- Reachability is a prerequisite for communication with parents and families. To achieve this, educators require access to the relevant contact data.
- Parents and carers often need assistance to be able to best support their children during the remote learning phases. Parents of day-care and primary school children in particular can receive support through "activity packages" of materials and learning aids. As well as adapting the existing informative, inspirational and learning resources, the development of digital materials with age-appropriate stimulation and support is also recommended. Youth welfare services and institutes of the federal states and school authorities can contribute by preparing suitable information material. Counselling on how to effectively support at-home learning (e.g. active support, motivation for learning and achieving, dealing with failures) would also be helpful. Opening up selected activities to parents could achieve increased participation in the learning process, which may also have a supportive effect.

- All measures directed at supporting parents should always take into consideration the widely varying family situations. For example, home-visit programmes for children from families in difficult situations or requiring a particularly high degree of support can make a positive contribution, as can the development of multilingual resources. Educational institutions should be provided with the necessary means to cover the staff required for this kind of offer.

6. Additional support for children and young people with learning difficulties and lower achievement levels

After lengthy closures of day-care centres and schools, a significant proportion of children and young people in Germany require additional support (Wößmann, 2020). This affects those who already had existing learning difficulties or disadvantages, as well as those whose problems only manifested during the school closures. Individual support strategies are required to give those affected the chance to develop in a way that is appropriate for their age, to compensate for deficits in their school education, and to maintain cohesion between children and young people in the same age group, day-care group and school class (Karoly et al., 2005). It is also important to systematically support educators in their work with materials and further training. Specific care concepts, which also include the independent child and youth welfare organisations, offer additional support for children, young people, and families with high support needs.

Recommendations

- Additional support should be provided in day-care centres and schools as continuously as possible in order to avoid the further increase of deficits that have developed in recent months.
- The federal states should provide schools with the necessary capacities to offer additional support in parallel to regular classes, with supplementary courses during the school year or intensive courses during school holidays, supported by digital tools. Such support requires qualified personnel, and the integration of volunteer, non-pedagogically qualified assistants should only be considered for care and support if required. Similar support should be developed for pre-school children who are behind in their learning and development compared to other children due to a lack of support opportunities.
- To ensure that children and young people are not overburdened with catching up on too much content in too little time, the support should focus primarily on maths and language skills, as well as basic competencies that lay the groundwork for further learning (Prediger et al., 2019; Souvignier, 2016). Good methods include creating opportunities for small-group learning, either in person or via video conferencing, in order to allow communication and collaboration regarding the contents of the lesson.

- Due to the measures to limit the spread of the coronavirus pandemic, additional personnel is required at day-care centres and schools so that educators can fulfil their educational mandate. Other personnel who would be available for tasks such as care, supervision or administration tasks could be recruited from trainee teachers and trainees in educational professions, interns or qualified volunteers, for example.

7. Strengthening fundamental knowledge and improving information

Due to the coronavirus pandemic, access to day-care centres and schools for educational research has been subject to restrictions in almost all federal states due to possible burdens and infection risks. To allow science to also contribute to finding solutions in the education sector and to ensure measures can be more directly targeted, research should be carried out immediately and across the board, evaluating the effects of the pandemic on the education system.

Recommendations

- Appropriate studies are required to scientifically evaluate the effects of the closure of day-care centres and schools due to the coronavirus pandemic as well as the effectiveness of newly introduced teaching and learning methods. To achieve this, the responsible authorities need to give researchers access to educational institutions while adhering to safety regulations. It is essential that the competency tests and comparison studies (PISA, country comparison) that would have been conducted under normal circumstances or that have been delayed due to the current situation are now carried out as soon as possible and that they are expanded to deal with coronavirus-specific topics. These studies can significantly contribute to creating a comprehensive assessment of the learning progress of affected children and young people.
- It is equally important to ascertain and evaluate, through panel studies, the short and long-term effects of the restrictions caused by the pandemic on the cognitive and psychosocial development of children and young people.
- Creating a representative picture of day-care and school children's learning environments during the pandemic, for example in relation to at-home learning environments, access to digital devices and support measures from family and educators, would be of equal relevance.
- The current pedagogical and didactic measures can be continuously improved and further developed if their effectiveness and practical implementation are examined by concurrent evaluation studies. The evaluations must be carried out in accordance with scientific standards in order to demonstrate the effects and effectiveness of the various measures, especially of new learning formats – for example, the combination of classroom and remote learning or in the case of additional support.

- Coordinated initiatives for educational research into coronavirus-relevant topics by the German Federal Government, federal states and funding agencies can contribute to networking the various key players in the field and driving forward the implementation of the research and evaluation work discussed above.

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