***A Child’s Human Right to Science***

**Introduction**

Children will significantly benefit from the human right to science.

A child’s human right to science raises questions for and opens the door to possible changes in young people’s lives. Extra considerations are needed to implement a young person’s human right to science, given their vulnerability and reliance on adults. These concerns may make the human rights objective of equality more challenging to achieve for young people. If implementation of the human right to science is implemented, young people may experience improvements in health, education, and other areas of life that science affects.

Article 15 of the International Covenant on Economic, Social and Cultural Rights obligates national governments to take steps so that the human right to science can be realized, including development of science and its diffusion, and ensuring respect of freedoms necessary to scientific research. To meet these obligations, a government must create an environment that allows for free scientific research, for which academic freedom is necessary. A national government must develop international communications about science and support international collaborations, as well as protect people from misuse of science.

A corollary to the right to benefits of scientific progress is a general principle that human rights are universal. An overarching goal for implementing human rights is to ensure use of human rights does not differ across suspect, discriminatory classes. Consequently, when implementing a human right such as the human right to science, this human right must benefit the “most disadvantaged and vulnerable.” The human right to science raises particular concerns. Chapman (2009) emphasizes that individuals have the right to be protected from harmful effects of science. Donders (2011) contends that states should not only prevent government agencies from harming people through science, they should protect people from harms arising from actions of third parties.

Given vulnerabilities of young people, and that young people must often rely on adults, extra attention must be given to children’s reliance on adults when it comes to this right. Are additional institutions and resources needed to ensure young people enjoy full entitlement to the right to benefits of scientific progress? Should independent children’s rights institutions, such as children’s ombudspersons, be asked to monitor enforcement of the human right to science for young people? Other questions must be answered when it comes to a child’s human right to science. What consequences do young people face if adults do not enjoy full entitlement to this right? What concerns arise for young people who do not live with and enjoy the support of their parents and families? Do governments need to take extra steps and devote extra resources to children who live in care of government or foster families?

How can the goal of equality be extended to young people when it comes to the human right to science? In terms of progressive realization and minimum core obligations, are young people entitled to similar or greater expectations to the human right to science relative to adults? How can national governments be sure that young people do not experience discrimination when it comes to their rights? Do differences by gender in who possesses university degrees in scientific disciplines and professions shape boys’ and girls’ exercise of their right to science? We know that gender composition of professions and occupations shape young people’s aspirations.

The human right to science will potentially benefit children in many ways. This right may yield better health outcomes and superior educations, for instance, all of which are considered rights under the Convention on the Rights of the Child. Indeed, the human right to science may intersect with several rights articulated in the UNCRC.

The right to science will affect a young person’s right to health, which can positively influence the right to survive and develop, one way being through science’s impacts on standards of living. Scientific advancements can provide cleaner environments and drinking water, access to sufficient nutritious foods, and adequate housing.

To take advantage of medical care, such as communicating concerns to providers and giving medical assent or consent, an understanding of scientific principles will encourage young people to ask questions and approach health care with less anxiety. Children will also benefit from the ability to access information that is important to their health and well-being through mass and social media.

One of the key means by which a young person can exercise the human right to science is through education. Technological advancements will benefit young people’s education. A young person’s internet access can supplement libraries and textbooks. These means must be available to all young people.

Another right belonging to young people is the ability to form an opinion and participate in decision making. Young people can participate in debates over deployment of scientific resources and trade-offs in how scientific resources are used and how decisions are made. Employing the right to information and learning how to digest such information will enable young people to express opinions about scientific progress and to use their votes.

Technology can help young people implement their rights, as well as thwart enforcement of their rights. In terms of helping young people, DNA evidence may enable a young person to enforce the right not to be illicitly transferred or trafficked, as well as to assure the presumption of innocence in a criminal trial. As Chapman has emphasized, technology can also be used to weaken rights, particularly those rights belonging to vulnerable groups. During armed conflict, technology can also be used to target locations where young people spend significant time, such as schools and homes. Internet technology is used to traffic young people, which violates Article 3 of the Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography. Medical technology is used to harvest and transfer organs illicitly, a violation of Article 3 of the Option Protocol on the sale of children, child prostitution, and child pornography.

In sum, the human right to science may enable young people to enforce existing rights, including the right to education. Science can also be used to weaken young people’s rights and harm their interests and welfare.

**Value of Indicators**

Indicators are useful tools to monitor implementation of human rights, including rights belonging to young people. An indicator can reveal whether a young person possesses the human right to science. An indicator can help identify what entities and individuals are responsible for implementing this human right. An indicator can then be used to determine whether that entity or individual has done its job: to what degree has that entity or individual implemented the human rights treaty?

One example of an indicator of a young person’s human right to science measures the outcome of proficiency. Trends in International Mathematics and Science Study (TIMSS;https://nces.ed.gov/timss/) data provide information on various aspects of young people’s education, focusing on mathematics and science. The TIMSS indicator below indicates science proficiency among young people who approximately are fourteen years old. For the year 2015, TIMSS data are available for thirty-seven countries.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Education system** | **Males' average scores** | **s.e.** | **Females' average scores** | **s.e.** | **Male-female difference in average scores** | **s.e.** |
| Australia | 515 | 3.0 | 510 | 3.4 | 5 | 3.4 |
| Bahrain | 442 | 3.4 | 492 | 3.2 | -50 | 5.0 |
| Canada | 529 | 2.7 | 524 | 2.2 | 5 | 2.3 |
| Chile | 460 | 4.1 | 448 | 3.6 | 12 | 4.8 |
| Chinese Taipei | 571 | 2.6 | 568 | 2.3 | 3 | 2.6 |
| Egypt | 364 | 5.4 | 377 | 5.9 | -13 | 7.6 |
| England-GBR | 536 | 4.5 | 537 | 4.7 | -1 | 5.2 |
| Georgia | 443 | 3.9 | 444 | 3.3 | -1 | 3.7 |
| Hong Kong | 551 | 4.9 | 540 | 4.2 | 10 | 4.6 |
| Hungary | 535 | 3.6 | 519 | 3.9 | 17 | 3.2 |
| Iran | 454 | 6.6 | 459 | 4.4 | -5 | 8.0 |
| Ireland | 529 | 3.9 | 531 | 2.8 | -2 | 3.7 |
| Israel | 504 | 4.7 | 510 | 4.1 | -6 | 4.1 |
| Italy | 504 | 2.6 | 494 | 3.0 | 10 | 2.7 |
| Japan | 570 | 2.5 | 571 | 2.2 | -1 | 3.1 |
| Jordan | 405 | 5.3 | 447 | 4.0 | -41 | 6.7 |
| Kazakhstan | 530 | 4.5 | 536 | 5.2 | -6 | 3.9 |
| Korea, Republic of | 557 | 2.8 | 554 | 2.2 | 3 | 2.7 |
| Kuwait | 387 | 8.2 | 434 | 5.1 | -47 | 8.7 |
| Lebanon | 393 | 6.7 | 403 | 4.9 | -10 | 4.7 |
| Lithuania | 519 | 3.4 | 520 | 3.3 | -1 | 3.7 |
| Malaysia | 466 | 4.8 | 476 | 4.0 | -10 | 3.5 |
| Malta | 477 | 2.2 | 485 | 2.2 | -8 | 3.1 |
| Morocco | 390 | 3.4 | 397 | 2.3 | -7 | 3.0 |
| New Zealand | 512 | 4.3 | 513 | 3.2 | -1 | 4.2 |
| Norway  | 511 | 3.2 | 507 | 3.1 | 4 | 2.9 |
| Oman | 433 | 3.6 | 478 | 2.9 | -45 | 4.4 |
| Qatar | 441 | 5.2 | 471 | 3.6 | -30 | 6.0 |
| Russian Federation | 546 | 4.3 | 542 | 4.6 | 4 | 3.0 |
| Saudi Arabia | 368 | 8.0 | 423 | 4.9 | -55 | 9.5 |
| Singapore | 597 | 4.0 | 596 | 3.3 | 1 | 3.7 |
| Slovenia | 549 | 2.7 | 553 | 2.8 | -4 | 2.7 |
| Sweden | 522 | 3.5 | 523 | 4.2 | -1 | 3.4 |
| Thailand | 445 | 5.2 | 465 | 4.4 | -20 | 4.8 |
| Turkey | 484 | 4.5 | 503 | 4.1 | -19 | 3.1 |
| United Arab Emirates | 461 | 4.4 | 492 | 3.5 | -31 | 6.7 |
| United States | 533 | 3.0 | 527 | 3.1 | 5 | 2.0 |

To be sure, other measures indicating degrees to which young people possess and can exercise the human right to science are available and should be studied. While these indicators can be useful, it is important to bear in mind that they are only one part of the picture of young people’s human right to science.

**Conclusion**

The work of the UN Committee on Economic, Social and Cultural Rights must be applauded. This General Comment both is insightful and forward looking. UN leaders, civil society actors, government experts, and scholars must continue to contribute efforts to clarify the meaning of the human right to science, and what its implications are for children’s rights and actors and institutions that will shape implementation of the right.

The human right to science may open the door to significant improvements in young people’s lives, and may at the same time produce greater vulnerability and inequality for young people. It is clear that implementation of the human right to science may lead to improvements in young people’s health and well-being, to greater participation in their communities, and to stronger legal protections, among other advances. To enjoy this right, however, children will rely on adults, particularly parents and caretakers, and institutions adults control, including schools and universities, to understand and benefit from this right. For instance, if a child’s parents do not possess strong science backgrounds, their efforts to help and protect their child may be limited. The society in which a child becomes an adult will shape a young person’s exercise of this right. If their community, for example, does not support equal education among girls and boys, children and their society will face long-term challenges in benefiting from science.

Indicators are important tools to monitor the human right to science, especially young people’s right to science. Some indicators are available and accessible to begin analyses of children’s human right to science, but development and dissemination of additional indicators is necessary.

Science has led and can continue to lead to technological progress, improvements in health and well-being, economic gains, international cooperation, and environmental security. Science helps humanity to thrive socially, environmentally, economically, and in other ways.

Education, unto itself, transcends these contributions. Science can satisfy our fundamental, human thirst for knowledge. Science can help us maintain our humanity. One benefit young people will experience is gaining knowledge for knowledge’s sake.

To foster knowledge, the human right to science must be implemented across the world. The human right to science can be implemented through science education, freedoms to do science, and disseminating scientific knowledge. Children stand to gain a great deal from the human right to science.