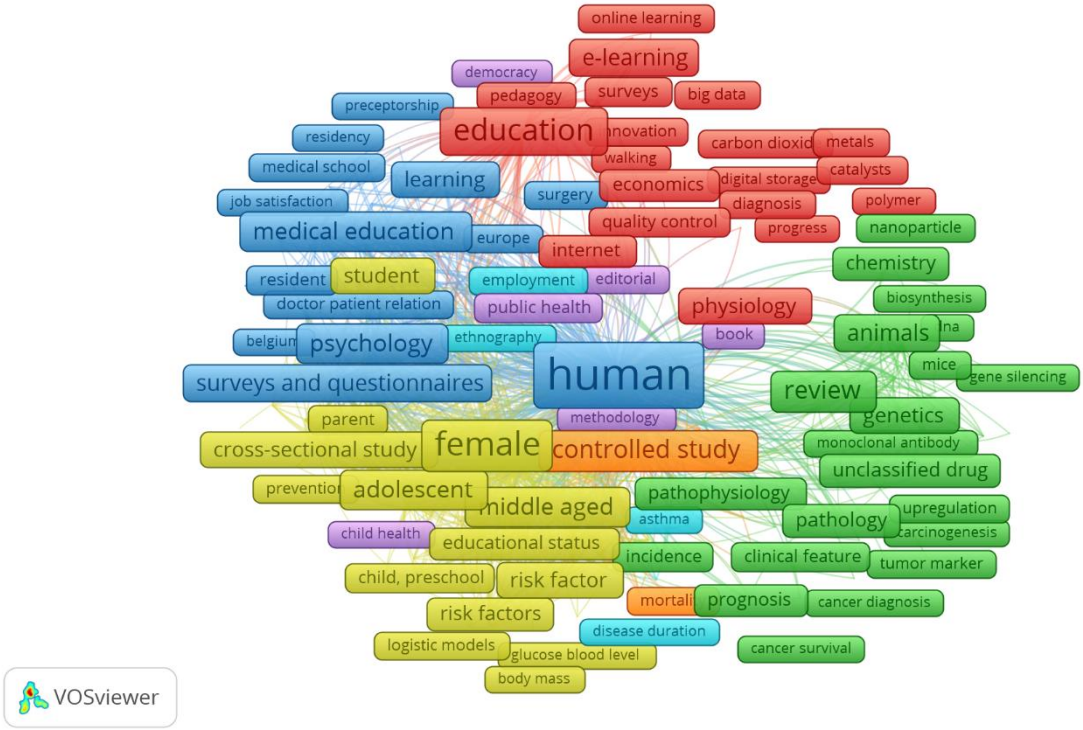
SDG4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

SUMMARY

Original search string: 577,990 document results

TITLE-ABS-KEY((progress OR schooling OR {school attendance} OR {school enrollment} OR {school enrolment} OR {inclusive education} OR {quality education} OR {quality of education} OR {education quality} OR {parental education} OR {parent involvement} OR {parenting techniques} OR {parenting technique} OR {female education} OR {girls education} OR {women's education} OR {girls' education} OR {education enrolment} OR {education enrollment} OR {nursery education} OR {primary education} OR {secondary education} OR {further education} OR {tertiary education} OR {higher education} OR literacy OR proficiency OR numeracy OR {learning outcome} OR {learning outcomes} OR {learning environment} OR {learning environments} OR {vocational training} OR {technical training} OR {access to education} OR {education access} OR {educational access} OR {educational resources} OR {educational resource} OR scholarship* OR teacher* OR {early childhood education} OR {relevance of education} OR {education relevance} OR {formal learning} OR {informal learning} OR {formal training} OR {informal training} OR {practical learning} OR internship* OR apprenticeship* OR {primary school} OR {secondary school} OR {high school} OR {primary schools} OR {secondary schools} OR {high schools} OR {school fee} OR {school fees} OR {learning material} OR {learning materials} OR classroom* OR {distance to school} OR {school distance} OR {school safety} OR {safety in school} OR {lifelong learning} OR {e-learning} OR {digital learning} OR {m-learning} OR {class-based learning} OR {hybrid learning} OR books OR {learning opportunities} OR {learning opportunity})) AND PUBYEAR BEF 2018 AND PUBYEAR AFT 2012

Graphical summary of co-occurrence of terms from 2000 randomly selected results:



Second updated search query: 21,747 document results

TITLE-ABS-KEY ((*school* OR *education* OR *educational*) AND (*{school attendance}* OR *{school enrollment}* OR *{school enrolment}* OR *{inclusive education}* OR *{educational inequality}* OR *{education quality}* OR *{educational enrolment}* OR *{educational enrollment}* OR *{adult literacy}* OR *{numeracy rate}* OR *{educational environment}* OR *{educational access}* OR (*{development aid}* AND *{teacher training}*) OR *{early childhood education}* OR *{basic education}* OR *{affordable education}* OR *{educational financial aid}* OR *{school safety}* OR *{safety in school}* OR (*{learning opportunities}* AND (*{gender disparities}* OR *empowerment*)) OR (*{learning opportunity}* AND (*{gender disparities}* OR *empowerment*)) OR *{youth empowerment}* OR *{women empowerment}* OR *{equal opportunities}* OR *{child labour}* OR *{child labor}* OR *{discriminatory}* OR *{educational inequality}* OR *{educational gap}* OR (*{poverty trap}* AND *{schooling}*) OR *{special education needs}* OR *{inclusive education system}* OR (*{schooling}* AND (*{gender disparities}* OR *{ethnic disparities}* OR *{racial disparities}*)) OR *{education exclusion}* OR *{education dropouts}* OR *{global citizenship}* OR *{sustainable development education}* OR *{environmental education}* OR *{education policy}* OR *{educational policies}* OR *{international education}* OR *{education reform}* OR (*{educational reform}* AND *{developing countries}*) OR *{educational governance}* OR (*{developing countries}* AND *{school effects}*) OR *{education expenditure}* OR *{foreign aid}* OR (*{teacher training}* AND *{developing countries}*) OR *{teacher attrition}*) AND NOT *{health literacy}*) AND PUBYEAR < *2018* AND PUBYEAR > *2012*

PROCESS

The first stage of this review was to compare the original search string to the targets listed under the Sustainable Development Goal (SDG).

SDG targets listed here: https://sustainabledevelopment.un.org/sdg4

The purpose of this stage was to understand whether the Scopus results correctly reflected the theme of the SDG. The SDGs were unanimously agreed by member states of the United Nations, with very deliberate language and scope/ exclusions, so the results of this analysis should accurately reflect the specific SDG themes.

SDG 4 promotes **inclusive, equitable and accessible quality education**. Primary and secondary education should be available for boys and girls, specific focus lies on the achievement of literacy and numeracy. Both sexes should have access to pre-primary education. Equal access for women and men to affordable higher end (technical, vocational, tertiary education) education. This should increase their skillsets, particularly in ICT, to take up employment. Gender, class and race disparities should be eliminated to ensure inclusive and equitable access to all layers of the educational system. In addition, sustainable development and lifestyles should be promoted through **global citizenship education** and **education for sustainable development**. **Development assistance** to least developed countries should be promoted through **scholarships and teacher training aids**.

A Scopus search was conducted using the original search string. This returned 577,990 document results.

The top 20 cited articles were reviewed. None of the 20 articles closely reflect the theme of the SDG. These articles covered topics in the field of medicine, ecology, physics, social sciences, molecular biology and earth sciences. However, it should be noted that the majority of these results were included due to a hit on the keywords 'book' and 'progress'.

Top 20 most cited articles listed in Scopus from the original search string:

*red text shows articles which do not closely match the theme of the SDG

Title	Year	Source title	Cited by	EID
Cancer statistics, 2016	2016	CA Cancer Journal for Clinicians	14582	2-s2.0-84954400636
Cancer statistics, 2013	2013	CA Cancer Journal for Clinicians	10099	2-s2.0-84872967522
Cancer statistics, 2014	2014	CA Cancer Journal for Clinicians	9294	2-s2.0-84892805731
Cancer statistics, 2015	2015	CA Cancer Journal for Clinicians	9088	2-s2.0-84920837701
The Theory of Island biogeography (MPB-1)	2015	The Theory of Island Biogeography (MPB-1)	7962	2-s2.0-84957970989
Convection in porous media	2013	Convection in Porous Media	4842	2-s2.0-84949463627
Nutritional Epidemiology	2013	Nutritional Epidemiology	4657	2-s2.0-84921763923
Trigonometric series	2015	Trigonometric Series	4014	2-s2.0-84953751498
Computer simulation of liquids: Second edition	2017	Computer Simulation of	3969	2-s2.0-85052507481

		Liquids: Second Edition		
Review of particle physics	2016	Chinese Physics C	3394	2-s2.0-85049178969
The global city: New York, London, Tokyo	2013	The Global City: New York, London, Tokyo	3382	2-s2.0-84890760536
Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013	2015	The Lancet	3197	2-s2.0-84920703518
Solvent engineering for high-performance inorganic-organic hybrid perovskite solar cells	2014	Nature Materials	3163	2-s2.0-84928951451
Laboratory life: The construction of scientific facts	2013	Laboratory Life: The Construction of Scientific Facts	3073	2-s2.0-84923806250
Multivariate analysis of ecological data using Canoco 5	2014	Multivariate Analysis of Ecological Data Using CANOCO 5	2882	2-s2.0-84923171042
Flows in networks	2015	Flows in Networks	2841	2-s2.0-84957946170
The emergence of perovskite solar cells	2014	Nature Photonics	2577	2-s2.0-84903544471
Stimuli-responsive nanocarriers for drug delivery	2013	Nature Materials	2454	2-s2.0-84886292840
Progress, challenges, and opportunities in two-dimensional materials beyond graphene	2013	ACS Nano	2269	2-s2.0-84876539655
STRING v9.1: Protein-protein interaction networks, with increased coverage and integration	2013	Nucleic Acids Research	2266	2-s2.0-84876515907

In addition, a randomised sample of 20 articles were reviewed. Fifteen of the 20 articles do not closely reflect the theme of the SDG. About half of these articles relate to healthcare, others to wide ranging topics on improvements within the educational system (but not closely related to the SDG's theme), governance, physics, chemistry, engineering and theology.

Randomised sample of 20 articles listed in Scopus from the original search string:

*red text shows articles which do not closely match the theme of the SDG

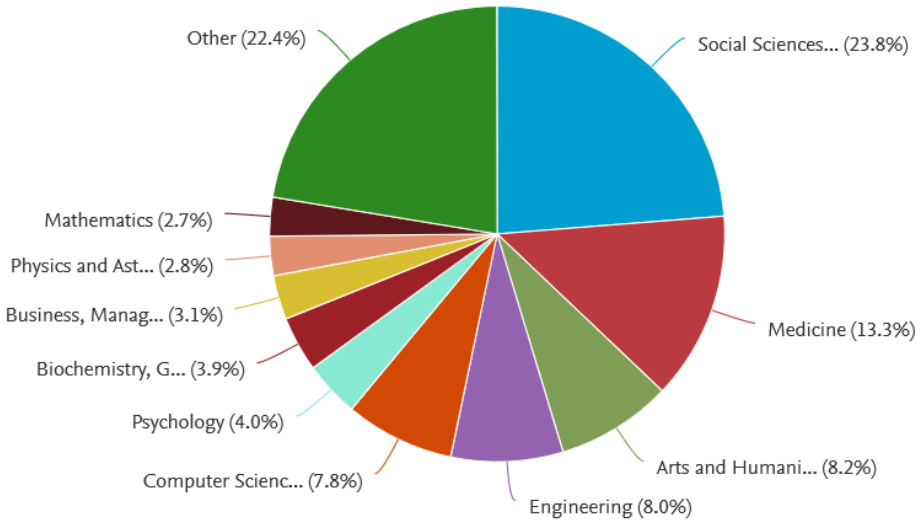
Title	Year	Source title	Cited by	EID
Introduction.	2017		10	2-s2.0-85040855755
Comprehensive review of the evidence regarding the effectiveness of community-based primary health care in improving maternal, neonatal and child health: 6. strategies used by effective projects	2017	Journal of Global Health	10	2-s2.0-85032344980
An exploratory study of adult learners' perceptions of online learning: Minority students in continuing education	2016	Educational Technology Research and Development	9	2-s2.0-84961217917
Beyond Copying: A Comparison of Multi-Component Interventions on Chinese Early Literacy Skills	2017	International Journal of	7	2-s2.0-85019433760

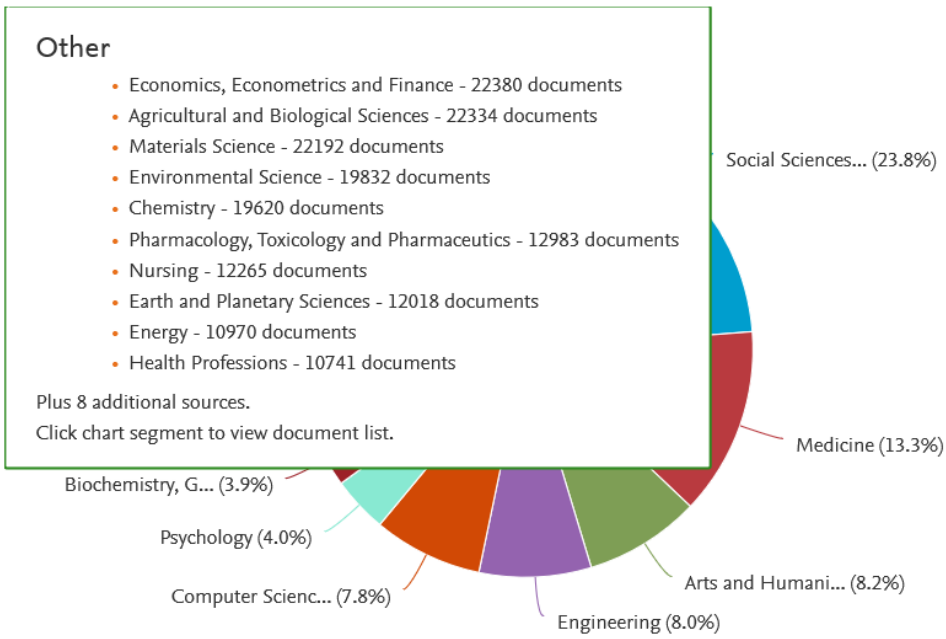
		Behavioral Development		
Technology-enhanced feedback for pupils and parents in Finnish basic education	2017	Computers and Education	5	2-s2.0-85012066384
Rapid antidepressant effects of Yueju: A new look at the function and mechanism of an old herbal medicine	2017	Journal of Ethnopharmacology	4	2-s2.0-85016744024
The modelled cost-effectiveness of cognitive dissonance for the prevention of anorexia nervosa and bulimia nervosa in adolescent girls in Australia	2017	International Journal of Eating Disorders	3	2-s2.0-85016276859
Reforming NGO accountability: Supply vs. Demand-driven models	2016	International Studies Review	3	2-s2.0-85019644208
Measurement of gamma-ray production cross sections in Li and F induced by protons from 810 to 3700 keV	2017	Nuclear Instruments and Methods in Physics Research, Section B: Beam Interactions with Materials and Atoms	2	2-s2.0-85013410611
Citizenship in Myanmar: Ways of being in and from Burma	2017	Citizenship in Myanmar: Ways of Being in and from Burma	2	2-s2.0-85057971418
Electrochromic Properties of Polyaniline Films on Graphene-ITO Composite Electrode	2017	Gaodeng Xuexiao Huaxue Xuebao/Chemical Journal of Chinese Universities	1	2-s2.0-85021239029
Conformality on Semi-Riemannian Manifolds	2016	Mediterranean Journal of Mathematics	1	2-s2.0-84937909557
Mobile phone text messaging to increase student participation: An experience in a blended course	2016	Proceedings of the ACM Symposium on Applied Computing	1	2-s2.0-84975867896
Erratum to: Photonics and Nanophotonics and Information and Communication Technologies in Modern Food Packaging (Nanoscale Research Letters, (2015), 10, 1, (229), 10.1186/s11671-015-0939-7)	2017	Nanoscale Research Letters	0	2-s2.0-85015045049
Teleology in the ancient world: Philosophical and medical approaches	2017	Teleology in the Ancient World: Philosophical and Medical Approaches	0	2-s2.0-85048122929
The perception of cultural value towards college students: A case study in higher education	2017	Proceedings - 2017 10th International Conference on Human System Interactions, HSI 2017	0	2-s2.0-85030247425
Using WebGL in developing interactive virtual laboratories for distance engineering education	2017	ASEE Annual Conference and Exposition,	0	2-s2.0-85030565860

		Conference Proceedings		
Blessed among women?: Mothers and motherhood in the new testament	2017	Blessed among Women?: Mothers and Motherhood in the New Testament	0	2-s2.0-85049442160
Inhibition of miR-720 suppresses cell migration and invasion in prostate cancer by targeting StarD13	2017	Biomedical Research (India)	0	2-s2.0-85042328999
Individual comparison of three antiamonio therapies for treatment of hepatic encephalopathy [Comparación individual de tres terapias antiamonio en el tratamiento de la encefalopatía hepática]	2016	Medicina Interna de Mexico	0	2-s2.0-84980022381

In addition, a general analysis was conducted of the document results and the fields these are published in. See below for the results.

Documents by subject area





The general analysis of the document results confirms the results of the analysis of the top 20 cited and the randomised sample. 'Social Sciences', the field in which you'd mainly expect document results for this SDG, provides about 1/4th of the document results. The remaining 3/4th of the document results relate to a variety of fields. Quite some articles are published in the field of 'Medicine', 'Arts and Humanities' and 'Engineering'. This is confirmed by the irrelevant articles that were found in the other analyses. The 'Other' field provides nearly 1/4th of the articles, with a variety of subfields that are not expected to provide articles that are closely related to the theme of SDG 4.

The analyses show that the current search query retrieves articles from a large variety of fields. It was also noticed that the original search query contains several keywords that are too general on their own. This was shown in the analyses but also when analysing the search query itself. Keywords such as 'progress' or 'books' lead to document results that are not related to the theme of the SDG and can be matched with keywords (or just the document format) of articles in all fields in Scopus. It is recommended to clean up the query by either narrowing down keywords or deleting keywords to provide a query that retrieves a higher number of articles that are closely related to the theme of the SDG.

Update 1) The search keywords were edited to remove the broader search terms, or to make them more specific by combining with other search keywords.

The original search query contained many broad keywords and keywords that do not relate to the theme of the SDG. This led to the large number of hits, and the large number of document results that do not closely reflect the theme and targets of the SDG. First priority is to clean up the query by excluding the keywords that are either not needed, irrelevant or that primarily link to articles that do not relate the theme of the SDG. Later on, further steps will be taken to add more keywords to build a new and more comprehensive query that retrieves relevant document results.

<u>Original search string: 577,990 document results</u>

TITLE-ABS-KEY((progress OR schooling OR {school attendance} OR {school enrollment} OR {school enrolment} OR {inclusive education} OR {quality education} OR {quality of education} OR {education quality} OR {parental education} OR {parent involvement} OR {parenting techniques} OR {parenting technique} OR {female education} OR {girls education} OR {women's education} OR {girls' education} OR {education enrolment} OR {education enrollment} OR {nursery education} OR {primary education} OR {secondary education} OR {further education} OR {tertiary education} OR {higher education} OR

literacy OR proficiency OR numeracy OR {learning outcome} OR {learning outcomes} OR {learning environment} OR {learning environments} OR {vocational training} OR {technical training} OR {access to education} OR {education access} OR {educational access} OR {educational resources} OR {educational resource} OR scholarship* OR teacher* OR {early childhood education} OR {relevance of education} OR {education relevance} OR {formal learning} OR {informal learning} OR {formal training} OR {informal training} OR {practical learning} OR internship* OR apprenticeship* OR {primary school} OR {secondary school} OR {high school} OR {primary schools} OR {secondary schools} OR {high schools} OR {school fee} OR {school fees} OR {learning material} OR {learning materials} OR classroom* OR {distance to school} OR {school distance} OR {school safety} OR {safety in school} OR {lifelong learning} OR {e-learning} OR {digital learning} OR {m-learning} OR {class-based learning} OR {hybrid learning} OR books OR {learning opportunities} OR {learning opportunity})) AND PUBYEAR BEF 2018 AND PUBYEAR AFT 2012

Rationale for deleted keywords:

query term	**decision**	**rationale**
Progress	Deleted	On its own this keyword will generate results that relate to a variety of fields. It does also not specifically relate to one of the targets of the SDG, therefore deleted
Schooling	Deleted	Too broad on its own, generates results ranging from food availability to engineering, deleted as or keywords related to education or schools are assumed to generate the same results
Quality education	Deleted	Three query terms for the same keyword; deleted this query term
{quality of education}	Deleted	Three query terms for the same keyword; deleted this query term
{parental education}	Deleted	Not directly related to the targets
{parental involvement}	Deleted	Will result in all types of hits on childhood development, not necessarily education
{parenting techniques}	Deleted	Will result in all types of hits on childhood development, not necessarily education
{parenting technique}	Deleted	Will result in all types of hits on childhood development, not necessarily education
{education enrolment}	Changed to {educational enrolment}	Changed to a more common phrase used in studies
{education enrollment}	Changed to {educational enrollment	Changed to a more common phrase
female education} / {girls education} / {women's education} / {girls' education}	Deleted	Deleted to clean up the query and results are included by other keywords
{higher education}	Deleted	Deleted as this keyword let to hits in institutions / authors, thus leading to a variety of articles not relevant for the SDG
Literacy	Changed to ({adult literacy}	The keyword 'literacy' linked to the majority of health studies, changed to 'adult literacy'.
Proficiency	Deleted	Too global, deleted as writing proficiency is included as 'literacy' and math proficiency is included as 'numeracy' which are the main

		targets of the SDG in terms of specific skills to establish.
{learning outcome}	Deleted	Could lead to hits on all kinds of articles as these are often specified in an abstract. They do also not indicate any targets of the SDG
{learning outcomes}	Deleted	Could lead to hits on all kinds of articles as these are often specified in an abstract. They do also not indicate any targets of the SDG
{learning environment}	Changed to ({educational environment}	The keyword on its own can also relate to learning environments in decision-making, IT, etc. Narrowed down to {educational environment} to exclude these articles
{learning environments}	See above	See above
{vocational training}	Deleted	{vocational training} on its own brings up a large variety of unrelated articles ranging from IT to physics, any keyword related to education in general is assumed to give similar results
{technical training}	Deleted	Deleted as it does barely bring up any articles that are relevant for the SDG, not as a keyword on its own neither when it is combined with keywords that relate to the targets of the SDG
{access to education}	Deleted	Three query terms to indicate one keyword, deleted two of these
{education access}	Deleted	Three query terms to indicate one keyword, deleted two of these
Scholarship*	Deleted	Part of the curriculum of an educational system and too broad on its own, deleted to prevent a variety of results to be included in the document results
{formal learning]	Deleted	This keyword generates a large number of hits on articles in the fields of neurobiology, IT, etc, even while combining it with keywords such as 'access'. Deleted as it is assumed that articles brought up by this keyword are also brought up by other keywords in the query (related to education, schools, learning opportunities, etc)
{informal learning}	Deleted	This keyword generates a large number of hits on articles in the fields of neurobiology, IT, etc, even while combining it with keywords such as 'access'. Deleted as it is assumed that articles brought up by this keyword are also brought up by other keywords in the query (related to education, schools, learning opportunities, etc)
{formal training}	Deleted	This keyword generates a large number of hits on articles in the fields of neurobiology, IT, etc, even while combining it with keywords such as 'access'. Deleted as it is assumed that articles brought up by this keyword are also brought up by other keywords in the query (related to education, schools, learning opportunities, etc)
{informal training}	Deleted	This keyword generates a large number of hits on articles in the fields of neurobiology, IT, etc, even while combining it with keywords such as 'access'. Deleted as it is assumed that articles brought up by this keyword are also brought up by other keywords in the query (related to education, schools, learning opportunities, etc)
{practical learning}	Deleted	This keyword primarily generates articles on machine learning and related IT fields. Deleted.

internship*	Deleted	Part of the curriculum of an educational system and too broad on its own, deleted to prevent a variety of results to be included in the document results
apprenticeship*	Deleted	Part of the curriculum of an educational system and too broad on its own, deleted to prevent a variety of results to be included in the document results
{educational resource}	Deleted	Resulted in hits in healthcare
{educational resources}	Deleted	Resulted in hits in healthcare
teacher*	Changed to {development aid) AND {teacher training}	Teacher* is too broad, changed it to narrow down the query term and to bring in articles that specifically relate to the target on training teachers with the help of development aid
{relevance of education}	Deleted	Not related to any of the targets, deleted to clean up the query
{education relevance}	Deleted	Not related to any of the targets, deleted to clean up the query
{primary school} OR {secondary school} OR {high school} OR {primary schools} OR {secondary schools} OR {high schools}	Deleted	Too specific keywords, part of education
{school fee}	Changed to {affordable education}	Changed as {school fee} is somewhat to narrow, changed to {affordable education} to include a more broad but specific keyword
{school fees}	Changed to {educational financial aid}	Changed as {school fee} is somewhat to narrow, changed to {educational financial aid} to include a more broad but specific keyword, also related to aid
{learning material}	Deleted	This is not the focus of this SDG
{learning materials}	Deleted	This is not the focus of this SDG
classroom*	Deleted	Does not relate to any of the targets and will bring up all types of results on educational improvements such as the use of IT, etc.
{distance to school}	Deleted	Part of the query term (school* AND access) OR (school* AND access AND (primary OR secondary OR high) OR (education AND access) OR (education AND access AND (nursery OR primary OR secondary OR tertiary OR higher)
{school distance}	Deleted	Part of the query term (school* AND access) OR (school* AND access AND (primary OR secondary OR high) OR (education AND access) OR (education AND access AND (nursery OR primary OR secondary OR tertiary OR higher)
books	Deleted	This is not the focus of this SDG and brings up all types of articles that are not relevant for this SDG as some matches were noticed on document form.

{e-learning}	Deleted	Deleted all forms of learning, as these do not necessarily relate to the SDG targets and result in hits in other areas in the educational field
{digital learning}	Deleted	Deleted all forms of learning, as these do not necessarily relate to the SDG targets and result in hits in other areas in the educational field
{m-learning}	Deleted	Deleted all forms of learning, as these do not necessarily relate to the SDG targets and result in hits in other areas in the educational field
{class-based learning}	Deleted	Deleted all forms of learning, as these do not necessarily relate to the SDG targets and result in hits in other areas in the educational field
{hybrid learning}	Deleted	Deleted all forms of learning, as these do not necessarily relate to the SDG targets and result in hits in other areas in the educational field
learning opportunities}	Changed to {Learning opportunity} AND {gender disparities OR empowerment}	Added keywords to the query term to narrow it down and to generate results that relate to the targets of the SDG
{learning opportunity}	Changed to {Learning opportunity} AND {gender disparities OR empowerment}	Added keywords to the query term to narrow it down and to generate results that relate to the targets of the SDG
{educational inequality}	Added	Complementary to {inclusive education}
{youth empowerment}	Added	Complementary to {inclusive education}
{women empowerment}	Added	Complementary to {inclusive education}
{equal opportunities}	Added	Complementary to {inclusive education}
{equal employment opportunities}	Added	Complementary to {inclusive education}
{discriminatory}	Added	Complementary to {inclusive education}
{child labour}	Added	Added as a proxy for poverty (in addition to changes to 'scholar fees' into 'affordable education'. 'Poverty' is not added as it led to many article hits in other fields
{child labor}	Added	Added as a proxy for poverty (in addition to changes to 'scholar fees' into 'affordable education'. 'Poverty' is not adeed as it led to many article hits in other fields

Updated search string (first update): 12,591 document results

TITLE-ABS-KEY ((school OR education OR educational) AND ({school attendance} OR {school enrollment} OR {school enrolment} OR {inclusive education} OR {educational inequality} OR {education quality} OR {educational enrolment} OR {educational enrollment} OR {adult literacy} OR {numeracy} OR {educational environment} OR {educational access} OR ({development aid} AND {teacher training}) OR {early childhood education} OR {basic education} OR {affordable education} OR {educational financial aid} OR {school safety} OR {safety in school} OR ({learning opportunities} AND ({gender disparities} OR empowerment)) OR ({learning opportunity} AND ({gender disparities} OR empowerment)) OR {youth empowerment} OR {women empowerment} OR {equal opportunities} OR {child labour} OR {child labor} OR {discriminatory})) AND PUBYEAR < 2018 AND PUBYEAR > 2012

The results of the updated search were reviewed to check whether they aligned closely with the SDG theme.

The updated search returned 12,591 document results, compared to 577,990 document results for the original search.

The top 20 most cited articles were reviewed. 8 out of 20 articles do not closely reflect the theme of the SDG. One article does not relate to education at all, the other 7 were related to education as these covered topics on IT developments in education, effects of disease on school attendance or the development of new educational methods.

Top 20 most cited articles listed in Scopus from search string version 1:

*red text shows articles which do not closely match the theme of the SDG

Title	Year	Source title	Cited by	EID
The silent majority: Suburban politics in the Sunbelt South	2013	The Silent Majority: Suburban Politics in the Sunbelt South	387	2-s2.0-84924693657
Psychological, physical, and academic correlates of cyberbullying and traditional bullying	2013	Journal of Adolescent Health	330	2-s2.0-84879302082
Nutrition therapy recommendations for the management of adults with diabetes	2013	Diabetes Care	277	2-s2.0-84891490194
Data mining in education	2013	Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery	273	2-s2.0-84879515897
Fairness, responsibility, and welfare	2015	Fairness, Responsibility, and Welfare	233	2-s2.0-84938317317
Clinical Practice Guideline: Allergic Rhinitis	2015	Otolaryngology-Head and Neck Surgery	197	2-s2.0-84947491709
Impacts of a prekindergarten program on children's mathematics, language, literacy, executive function, and emotional skills	2013	Child Development	194	2-s2.0-84887392023
Benefits of strict rest after acute concussion: A randomized controlled trial	2015	Pediatrics	192	2-s2.0-84922641444
The WHO Health Promoting School framework for improving the health and well-being of students and their academic achievement	2014	Cochrane Database of Systematic Reviews	188	2-s2.0-84926435131
Predictors of public climate change awareness and risk perception around the world	2015	Nature Climate Change	175	2-s2.0-84945284771
Putting Education in “Educational” Apps: Lessons From the Science of Learning	2015	Psychological Science in the Public Interest, Supplement	169	2-s2.0-84943622829
Dis/ability studies: Theorising disablism and ableism	2014	Dis/ability Studies: Theorising Disablism and Ableism	160	2-s2.0-84954313676

National cluster-randomized trial of duty-hour flexibility in surgical training	2016	New England Journal of Medicine	152	2-s2.0-84959378432
Poverty and child health in the United States	2016	Pediatrics	144	2-s2.0-85063652732
Structural racism and health inequities in the USA: evidence and interventions	2017	The Lancet	136	2-s2.0-85017213314
Young students using iPads: App design and content influences on their learning pathways	2013	Computers and Education	131	2-s2.0-84880339590
'Catalyst data': Perverse systemic effects of audit and accountability in Australian schooling	2013	Journal of Education Policy	126	2-s2.0-84883654972
Labor market returns to an early childhood stimulation intervention in Jamaica	2014	Science	123	2-s2.0-84901593815
Development and Testing of an Abbreviated Numeracy Scale: A Rasch Analysis Approach	2013	Journal of Behavioral Decision Making	121	2-s2.0-84875055759
Web usage mining for predicting final marks of students that use Moodle courses	2013	Computer Applications in Engineering Education	115	2-s2.0-84872707825

In addition, a randomised sample of 20 articles was reviewed. Four of the 20 articles do not closely reflect the theme of the SDG. Two studies relate to other fields, namely cybersecurity and IT. Two other studies relate to the field of education, however in relation to economic growth and visual arts learning at a preschool stage.

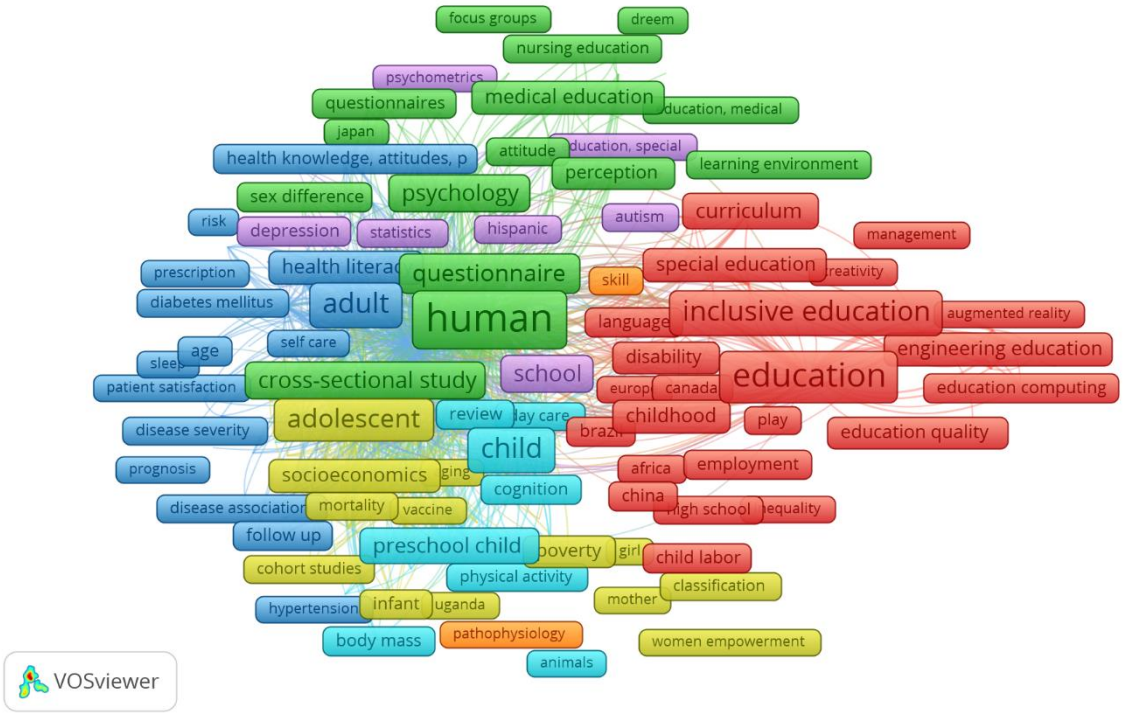
Randomised sample of 20 articles listed in Scopus from search string version 1:

*red text shows articles which do not closely match the theme of the SDG

Title	Year	Source title	Cited by	EID
The Gerrymandering of School Attendance Zones and the Segregation of Public Schools: A Geospatial Analysis	2014	American Educational Research Journal	18	2-s2.0-84911386342
Inclusive education: From targeting groups and schools to achieving quality education as the core of EFA	2014	The SAGE Handbook of Special Education: Two Volume Set, Second Edition	15	2-s2.0-84949800077
Special educational needs in mainstream secondary school physical education: learning support assistants have their say	2016	Sport, Education and Society	9	2-s2.0-84954026549
Impacts of educational factors on economic growth in regions of China: a spatial econometric approach	2017	Technological and Economic Development of Economy	5	2-s2.0-84945208025
The unintended consequences of education policies on South African participation and unemployment	2015	South African Journal of Economics	3	2-s2.0-84925428038
Early childhood education in Botswana: A case of fragmented "Fits"	2014	International Education Studies	3	2-s2.0-84899126498
The reliability and discriminant validity of the social participation questionnaire in Flemish education [De betrouwbaarheid en discriminante validiteit van de social	2013	Pedagogische Studien	3	2-s2.0-84879497621

participation questionnaire in het Vlaamse onderwijs]				
Children as playing citizens	2017	European Early Childhood Education Research Journal	2	2-s2.0-85020751867
Braille teaching electronic prototype	2017	2016 IEEE International Autumn Meeting on Power, Electronics and Computing, ROPEC 2016	2	2-s2.0-85013746538
From know that to know how – providing new learning strategies for information literacy instruction	2014	Communications in Computer and Information Science	2	2-s2.0-84921958806
An approach of clustering features for ranked nations of E-government 2012	2014	Acta Polytechnica Hungarica	2	2-s2.0-84905187034
RETRACTED ARTICLE: Educational reforms and internationalization of universities: Evidence from major regions of the world	2014	Scientometrics	2	2-s2.0-84897572091
Cybersecurity training in control systems using real equipment	2017	IFAC-PapersOnLine	1	2-s2.0-85044846962
Process mediates structure: The relation between preschool teacher education and preschool teachers' knowledge	2017	Journal of Educational Psychology	1	2-s2.0-85017143454
The regulatory context in private higher education in South Africa	2014	Mediterranean Journal of Social Sciences	1	2-s2.0-84907299120
7#x2018;You feel like youre an artist. Like Leonardo da Vinci': Capturing young children's voices and attitudes towards visual arts	2017	International Journal of Education Through Art	0	2-s2.0-85032708991
Analysis of the importance of assessment criteria and the academic recognition of university professors as indicators of education quality in Spain [Análisis de la importancia de los criterios de evaluación y el reconocimiento académico docente universitario como indicadores de la calidad educativa en España]	2017	Revista de la Educacion Superior	0	2-s2.0-85013381986
Southward migration season: new Arab teachers from north move to southern Israel1	2016	Intercultural Education	0	2-s2.0-84976286512
Economic and financial profiles of disability support programs in Spanish universities [Patrones económico-financieros de los programas universitarios de atención a la discapacidad en España]	2014	Aula Abierta	0	2-s2.0-84964911615
Latent structure of the curriculum for primary teacher education in Serbia	2013	New Educational Review	0	2-s2.0-84877316438

Graphical summary of co-occurrence of terms from 2000 randomly selected results:



The new search results were compared to the original search results to check if the updated search was primarily removing irrelevant results.

The original and updated searches were combined using AND NOT function in Scopus. This returned 566,447 document results – i.e. the publications that were excluded from the first search in the second search.

20 of the top 20 cited articles in this new search were found to be irrelevant for the SDG.

Top 20 cited articles included in the original search results but not in the updated search results:

*red text shows articles which do not closely match the theme of the SDG

Title	Year	Source title	Cited by	Eid
Cancer statistics, 2016	2016	CA Cancer Journal for Clinicians	14582	2-s2.0-84954400636
Cancer statistics, 2013	2013	CA Cancer Journal for Clinicians	10099	2-s2.0-84872967522
Cancer statistics, 2014	2014	CA Cancer Journal for Clinicians	9294	2-s2.0-84892805731
Cancer statistics, 2015	2015	CA Cancer Journal for Clinicians	9088	2-s2.0-84920837701
The Theory of Island biogeography (MPB-1)	2015	The Theory of Island Biogeography (MPB-1)	7962	2-s2.0-84957970989

Convection in porous media	2013	Convection in Porous Media	4842	2-s2.0-84949463627
Nutritional Epidemiology	2013	Nutritional Epidemiology	4655	2-s2.0-84921763923
Trigonometric series	2015	Trigonometric Series	4014	2-s2.0-84953751498
Computer simulation of liquids: Second edition	2017	Computer Simulation of Liquids: Second Edition	3969	2-s2.0-85052507481
Review of particle physics	2016	Chinese Physics C	3394	2-s2.0-85049178969
The global city: New York, London, Tokyo	2013	The Global City: New York, London, Tokyo	3382	2-s2.0-84890760536
Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013	2015	The Lancet	3197	2-s2.0-84920703518
Solvent engineering for high-performance inorganic-organic hybrid perovskite solar cells	2014	Nature Materials	3163	2-s2.0-84928951451
Laboratory life: The construction of scientific facts	2013	Laboratory Life: The Construction of Scientific Facts	3073	2-s2.0-84923806250
Multivariate analysis of ecological data using Canoco 5	2014	Multivariate Analysis of Ecological Data Using CANOCO 5	2881	2-s2.0-84923171042
Flows in networks	2015	Flows in Networks	2841	2-s2.0-84957946170
The emergence of perovskite solar cells	2014	Nature Photonics	2577	2-s2.0-84903544471
Stimuli-responsive nanocarriers for drug delivery	2013	Nature Materials	2454	2-s2.0-84886292840
Progress, challenges, and opportunities in two-dimensional materials beyond graphene	2013	ACS Nano	2269	2-s2.0-84876539655
STRING v9.1: Protein-protein interaction networks, with increased coverage and integration	2013	Nucleic Acids Research	2266	2-s2.0-84876515907

The analyses show that the updated query retrieves more relevant articles than the original query, which retrieved documents articles from a large variety of fields. Filtering out keywords to merely include the most important query terms has been an important first step towards a search query that is able to retrieve document results that are closely related to the theme of the SDG. The analyses show that improvements have been made, but (regarding irrelevant fields) document results in the field of medicine have a small share in the document results. This is also confirmed by the inclusion of medical keywords in the cloud of co-occurring terms. Additionally, documents are retrieved that are cover studies in the field of education, but which do not necessarily match the theme of the SDG. For example, because it covers technological improvements, or an in-depth study on classroom methodologies.

It is assumed that a search query will always provide hits on several documents that do not relate to the SDG. The next step will be to build upon this updated query by adding more relevant keywords, adding keywords on targets that are not covered yet and by narrowing down existing keywords.

Update 2) A second update was made to the search string to add additional keywords on missing targets and on targets that are not completely covered

The following query terms were added to the search string:

Target	Keywords to be added (*or narrowed down*)
By 2030, ensure that all girls and boys complete **free, equitable and quality primary and secondary education** leading to relevant and effective learning outcomes	{educational inequality} {educational gap}
By 2030, ensure that all girls and boys have **access to quality early childhood development, care and pre-primary education** so that they are ready for primary education	
By 2030, **ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university**	
By 2030, substantially increase the number of youth and adults who have **relevant skills, including technical and vocational skills, for employment**, decent jobs and entrepreneurship	{poverty trap{ AND {schooling}
By 2030, **eliminate gender disparities in education** and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations	{special education needs} {inclusive education system} ({schooling} AND ({gender disparities} OR {ethnic disparities} OR {racial disparities})) {education exclusion}
By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve **literacy and numeracy**	{education dropouts} Changed: {numeracy} to {numeracy rate} to exclude articles on medical studies that mention numeracy as one of their demographic factors
By 2030, ensure that all learners acquire the knowledge and skills needed to **promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles**, human rights, gender equality, promotion of a culture of peace and non-violence, **global citizenship** and appreciation of cultural diversity and of culture's contribution to sustainable development	{global citizenship} {sustainable development education} {environmental education} {education policy} {educational policies} {international education}
Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, **non-violent, inclusive and effective learning environments for all**	{education reform} {educational reform} AND {developing countries} {educational governance} ({developing countries} AND {school effects})
By 2020, **substantially expand globally the number of scholarships available to developing countries**, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and	{education expenditure}

information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries	
By 2030, **substantially increase the supply of qualified teachers**, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States	{foreign aid} ({teacher training} AND {developing countries}) {teacher attrition}

Added: AND NOT {health literacy} as education, schooling and literacy were often linked to health literacy and medical studies, it has been decided to add a query term to exclude this keyword.

Second update search query: 21,747 document results

TITLE-ABS-KEY ((*school* OR *education* OR *educational*) AND (*{school attendance}* OR *{school enrollment}* OR *{school enrolment}* OR *{inclusive education}* OR *{educational inequality}* OR *{education quality}* OR *{educational enrolment}* OR *{educational enrollment}* OR *{adult literacy}* OR *{numeracy rate}* OR *{educational environment}* OR *{educational access}* OR (*{development aid}* AND *{teacher training}*) OR *{early childhood education}* OR *{basic education}* OR *{affordable education}* OR *{educational financial aid}* OR *{school safety}* OR *{safety in school}* OR (*{learning opportunities}* AND (*{gender disparities}* OR *empowerment*)) OR (*{learning opportunity}* AND (*{gender disparities}* OR *empowerment*)) OR *{youth empowerment}* OR *{women empowerment}* OR *{equal opportunities}* OR *{child labour}* OR *{child labor}* OR *{discriminatory}* OR *{educational inequality}* OR *{educational gap}* OR (*{poverty trap}* AND *{schooling}*) OR *{special education needs}* OR *{inclusive education system}* OR (*{schooling}* AND (*{gender disparities}* OR *{ethnic disparities}* OR *{racial disparities}*)) OR *{education exclusion}* OR *{education dropouts}* OR *{global citizenship}* OR *{sustainable development education}* OR *{environmental education}* OR *{education policy}* OR *{educational policies}* OR *{international education}* OR *{education reform}* OR (*{educational reform}* AND *{developing countries}*) OR *{educational governance}* OR (*{developing countries}* AND *{school effects}*) OR *{education expenditure}* OR *{foreign aid}* OR (*{teacher training}* AND *{developing countries}*) OR *{teacher attrition}*) AND NOT *{health literacy}*) AND PUBYEAR < *2018* AND PUBYEAR > *2012*

The results of the updated search were reviewed to check whether they aligned closely with the SDG theme.

The updated search query returned 21,747 document results, compared to 12,591 document results for the original search.

The top 20 most cited articles were reviewed. Nine of the 20 articles do not closely reflect the theme of the SDG. Six of these relate to the field of education, either regarding advancements in educational methodologies, training or research on education systems. One article covers an extent of sustainable and environmental education, however it only indicates that such education forms are needed to solve societal issues and education is not covered as a topic per se. Two articles relate to the field of medicine.

Compared to the top 20 cited retrieved with search query 1, this query added several relevant article documents but also document results that relate to the field of education but which are not directly to the targets of the SDG. Removal of documents, except for hits on 'health literacy', was not the purpose of this update and the top 20 most cited shows that further narrowing down of new keywords is required and a solution is still needed for disregarding articles on IT developments in education.

Top 20 most cited articles listed in Scopus from search string version 2:

*red text shows articles which do not closely match the theme of the SDG

Title	Year	Source title	Cited by	EID
The silent majority: Suburban politics in the Sunbelt South	2013	The Silent Majority: Suburban Politics in the Sunbelt South	387	2-s2.0-84924693657
Psychological, physical, and academic correlates of cyberbullying and traditional bullying	2013	Journal of Adolescent Health	330	2-s2.0-84879302082
Data mining in education	2013	Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery	275	2-s2.0-84879515897
Physical and virtual laboratories in science and engineering education	2013	Science	257	2-s2.0-84876338763
Fairness, responsibility, and welfare	2015	Fairness, Responsibility, and Welfare	233	2-s2.0-84938317317
Clinical Practice Guideline: Allergic Rhinitis	2015	Otolaryngology-Head and Neck Surgery	198	2-s2.0-84947491709
Benefits of strict rest after acute concussion: A randomized controlled trial	2015	Pediatrics	192	2-s2.0-84922641444
Everything for sale?: The marketisation of UK higher education	2013	Everything for Sale?: The Marketisation of UK Higher Education	189	2-s2.0-84904949199
Mind-Set Interventions Are a Scalable Treatment for Academic Underachievement	2015	Psychological Science	188	2-s2.0-84929259663
The WHO Health Promoting School framework for improving the health and well-being of students and their academic achievement	2014	Cochrane Database of Systematic Reviews	188	2-s2.0-84926435131
Facts Are More Important Than Novelty: Replication in the Education Sciences	2014	Educational Researcher	187	2-s2.0-84906731467
Predictors of public climate change awareness and risk perception around the world	2015	Nature Climate Change	175	2-s2.0-84945284771
Extinction of experience: The loss of human-nature interactions	2016	Frontiers in Ecology and the Environment	172	2-s2.0-84959306940
Putting Education in “Educational” Apps: Lessons From the Science of Learning	2015	Psychological Science in the Public Interest, Supplement	171	2-s2.0-84943622829
Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students	2013	Journal of Cleaner Production	166	2-s2.0-84879901899
Dis/ability studies: Theorising disablism and ableism	2014	Dis/ability Studies:	161	2-s2.0-84954313676

		Theorising Disablism and Ableism		
EcoMOBILE: Integrating augmented reality and probeware with environmental education field trips	2013	Computers and Education	159	2-s2.0-84884907498
National cluster-randomized trial of duty-hour flexibility in surgical training	2016	New England Journal of Medicine	152	2-s2.0-84959378432
A framework for institutional adoption and implementation of blended learning in higher education	2013	Internet and Higher Education	147	2-s2.0-84868695445
Poverty and child health in the United States	2016	Pediatrics	144	2-s2.0-85063652732

In addition, a randomised sample of 20 articles was reviewed. Four of these 20 articles were not directly related to the theme of the SDG. However, progress seems to be made towards including articles that have a relation to education one way or another. One article relates to historical perspectives on the development of an education system. Two articles relate to improvements of practical education / training methods of either students or employees. One relates to healthcare but mentions study elements on the effect of children's health and school attendance.

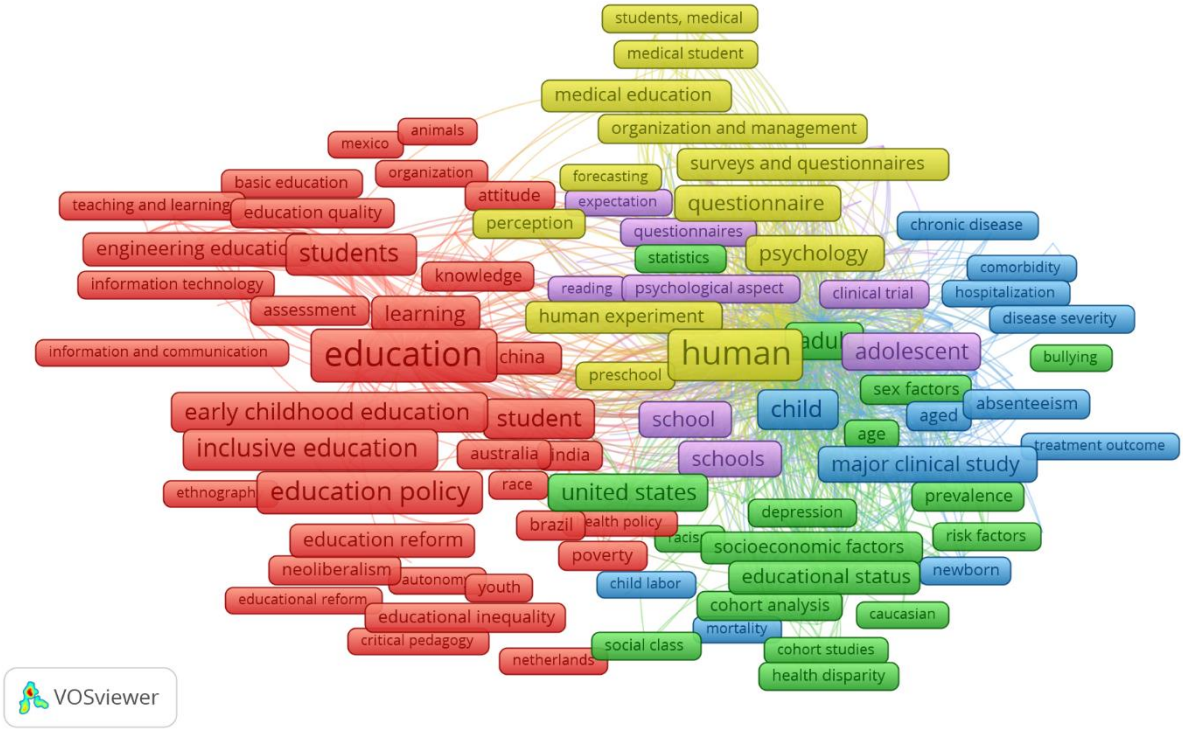
Randomised sample of 20 articles listed in Scopus from search string version 2:

*red text shows articles which do not closely match the theme of the SDG

Title	Year	Source title	Cited by	EID
The Burnout Spiral: The Emotion Labor of Five Rural U.S. Foreign Language Teachers	2016	Modern Language Journal	14	2-s2.0-84965163048
Childhood wellbeing: What role for education?	2016	British Educational Research Journal	11	2-s2.0-84946018271
Does the language of instruction in primary school affect later labour market outcomes? Evidence from South Africa	2014	Economic History of Developing Regions	8	2-s2.0-84996976170
Scaling as a literacy activity: Mobility and educational inequality in an age of global connectivity	2016	Research in the Teaching of English	7	2-s2.0-84958949104
Bridges to global citizenship: Ecologically sustainable futures utilising children's literature in teacher education	2013	Australian Journal of Environmental Education	6	2-s2.0-84902087249
I failed the edTPA	2017	Teacher Education and Special Education	4	2-s2.0-85049185052
Modelling Dialectical Processes in Environmental Learning: An Elaboration of Roy Bhaskar's Onto-axiological Chain	2017	Journal of Critical Realism	4	2-s2.0-85012904510
Parental Choice of School, Class Strategies, and Educational Inequality: An Essay Review of School Choice in China—A Different Tale? (X. Wu, New York, NY: Routledge, 2014, 168 pp. ISBN 978-0-415-81769-1)	2016	Educational Policy	3	2-s2.0-84982892970
Costo Alto de Política Anti-imigrante Sobre la Familia y Educación 1: The Adverse Consequences of Anti-Latino Immigration Laws	2013	Theory into Practice	3	2-s2.0-84880952987
Economic loss due to traumatic injury in Uganda: The patient's perspective	2016	Injury	2	2-s2.0-84951817966

Exploring the work and learning stories of para-teachers in a college for further education in England	2014	Support for Learning	2	2-s2.0-84925234753
The expanding gender and racial gap in American Higher Education	2014	Journal of Negro Education	2	2-s2.0-84923964676
Shortening innovation cycles by employee training based on the integration of virtual validation into worker information systems	2015	Procedia CIRP	1	2-s2.0-84966670350
The diagnostics' methods of students' readiness for professional pedagogical activity within information educational environment	2015	Smart Innovation, Systems and Technologies	1	2-s2.0-84947938924
Supporting creative design processes for the support of creative mathematical thinking: Capitalising on cultivating synergies between math education and environmental education	2014	CSEDU 2014 - Proceedings of the 6th International Conference on Computer Supported Education	1	2-s2.0-84902357544
Exploring the future of lifelong learning: Advocacy, research and footprinting	2013	International Review of Education	1	2-s2.0-84884418265
Towards effective socially critical environmental education: Stories from primary classrooms	2013	Environmental Education Research	1	2-s2.0-84877247418
Gender machineries vs. feminist movements? Collective political subjectivity in the time of passive revolution	2016	Gender and Education	0	2-s2.0-84963865171
Research of network on physical education teaching reform	2013	Lecture Notes in Electrical Engineering	0	2-s2.0-84886577623
The role of the state and the church in the development of early childhood education in Spain (1874-1975)	2015	The Development of Early Childhood Education in Europe and North America: Historical and Comparative Perspectives	0	2-s2.0-84960276677

Graphical summary of co-occurrence of terms from 2000 randomly selected results:



The different analyses and the co-occurrence of the keywords show that the second update has made improvements regarding the addition of articles on targets that were not (fully) covered yet. But these also show that this also led to the inclusion of articles that relate to education, but not to the targets of the SDG specifically. This will need to be addressed in further updates.