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How well are the links between education and other sustainable development goals covered in UN flagship reports? A contribution to the study of the science-policy interface on education in the UN system

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ABSTRACT

In 2015, a set of Sustainable Development Goals (SDGs) will succeed the Millennium Development Goals as reference goals for international development for the period 2015-2030. Education was identified as a standalone goal (SDG4). Epistemic communities have documented a number of links between education and other SDG areas, and policy makers have long recognized many of them. Based on an exhaustive content analysis of 40 global reports, this paper examines how well such links are represented in flagship publications of the United Nations system. Taken together, the reports identify links between education and all the SDGs, with the notable exception of SDG 14 on oceans. For most of the SDGs, causal links are identified in both directions, from education to other goal areas and vice-versa. The most emphasized connections are those between education and growth (SDG8) and gender (SDG5). By contrast, links with energy (SDG7), water (SDG 6), cities (SDG 11), sustainable consumption and production (SDG 12) and climate change (SDG 13) receive much less attention in the sum of UN flagship publications. While some causal links are identified and highlighted as important, relevant constraints are sometimes not extensively discussed, and few concrete policy options to act on those links are provided. Going forward, it would be important to assess whether the messages contained in UN flagship reports adequately reflect the state of scientific knowledge and the lessons learnt from development programs that focus on education in relation to specific SDGs. The systematic analysis provided here can offer a basis for an integrated analysis of policy priorities for education as a whole.

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1 Introduction

UN Member States are soon to adopt a set of Sustainable Development Goals (United Nations, 2014). The SDGs will succeed the Millennium Development Goals (MDGs) as reference goals for the international community for the period of 2015-2030. The seventeen goals cover a much broader range of issues than their predecessors. They aim to be universal – that is, applicable to all countries and not only developing countries, and to serve as guideposts for a global transition to sustainable development. Education was identified as a standalone goal (SDG 4). This reflects a continuing high priority given to education in the development agenda, as education was already prominent in the MDGs.

The recognition of interdependencies, trade-offs and synergies among the various goals, and their integration into policy design, is recognized as critical for going forward towards sustainable development. Education is relevant to the work of many UN organizations, even though they address it from different perspectives. Education has a well-recognized role of enabler for many areas under the SDGs, e.g. growth, gender equality, and many others. Conversely, progress in other areas may affect education in many ways.

Some of these links have been studied intensively, especially since the adoption of MDGs in 2000. However, given the extended scope of the SDGs, it is important for policy to reflect links between education and other goals. The science-policy interface has a crucial role to play in this regard. One of the critical roles of the UN system is to provide a platform for science-policy interface at the international

level. Through their activities, specialized UN agencies, as well as UNDP and the World Bank provide a conduit for conveying evidence from science to decision-makers.

The question we investigate here is: How well does the UN system as a whole cover (or recognize) the links between education and other SDGs? In order to do this, we extract messages on education in the content of a large sample of flagship reports produced by UN organizations, including the World Bank. We analyze the way in which these publications identify specific causal links among education and other SDG areas; constraints and challenges that they emphasize in relation to these links; and policy recommendations that they put forward. For our purposes, flagship reports are a good approximation of the “downstream” part of the science-policy interface in the UN system, i.e. the one connecting UN organizations to international policy-making. Arguably, most of the policy messages conveyed by these organizations to the policy world are based on their flagship reports, to which they tend to devote large resources and usually publicize comprehensively.

We show that taken together, UN flagship reports identify links between education and all the other SDGs, with the notable exception of SDG14 on oceans. However, the emphasis on different links differs markedly. Our analysis also highlights apparent gaps. At the outset, let us clarify that this paper does not attempt a detailed analysis of the policy content of the reports in our sample. Rather, we provide an overview of the landscape of education in the context of the SDGs as reflected by UN system publications. We suggest that a more detailed

examination of policies for education in the SDG context would be a logical step to follow on this initial, scene-setting work.

The remainder of this paper is built as follows. Section 2 describes the methodology used for our analysis. In section 3, we document the coverage of links between education and other SDG areas in our sample of reports. Section 4 contains the main discussion of our findings. Section 5 concludes.

2 Methodology

In order to cover as much ground as possible, we selected 37 flagship reports from the UN system (including the World Bank) covering a wide range of primary topics (see Box 1). We look only at global reports; region-specific reports are not included. Reports by non-UN organizations (e.g. OECD) are not covered either. Our sample offers a relatively balanced mix of perspectives, with some reports written by UN organizations that tend to examine issues starting from a strong social tradition (UNESCO, UNDP, UNICEF, WHO, FAO, ILO, UNFPA, UN-Women, UN-Habitat); others written by organizations whose perspectives tend to be more economic in nature (World Bank, UNIDO, WTO, UNCTAD), and yet others coming from organizations that emphasize environmental elements (UNEP, CBD). Our sample contains several reports from UNESCO, the UN organization with the clearest mandate on education, as well as several issues of both the Human Development Report from UNDP and the World Development Report from the World Bank. These two flagship reports are known to systematically consider education as part of their basic framework. These reports offer an additional advantage of covering different topics each year, which ensures that links between education and a number of SDGs are covered more thoroughly.

In addition to our sample, we also analyzed three reports that are globally known references for the areas of energy and climate change, but are not produced by the UN system. This exercise provided a benchmark for two SDG areas that do not have a “home”

in the form of a specialized UN organization. For energy, we selected the Global Energy Assessment, produced by the International Institute for Applied Systems Analysis (IIASA, 2014) arguably the most comprehensive assessment effort in the energy area, as well as the World Energy Outlook 2014 produced by the International Energy Agency. For climate change, we looked at the fifth assessment report of the intergovernmental panel on climate change (IPCC), specifically at the technical summary of the working group II on adaptation and vulnerability (IPCC, 2014).

First, through primary content analysis, we identified all the ideas in the reports that referred to education. We complemented basic automated keyword search procedure with manual individual analysis of each occurrence to ensure relevance of messages and in-depth coverage. We then extracted the messages that contained analytical statements and conclusions, in verbatim form. We did not include region-specific examples and opinion quotes.

Second, once the list of all the messages was compiled, each of them was connected to one or several of the seventeen thematic areas of the SDGs. For the purpose of this paper, which focuses on links between education and other SDGs, statements referring only to education were not considered further. Thus, only messages linking education to the sixteen other goal areas are part of the list. Some messages fit into one thematic area (e.g. “education helps eradicate poverty” would be placed under SDG 1 on poverty eradication). Other messages fit into several areas (e.g. “access to clean water and electricity is especially important for girls’ education” would be reflected in SDG 5 on gender equality and in both SDG 6 on water and SDG 7 on energy). Some messages relate to crosscutting subjects that do not have their own SDGs, such as youth or disaster risk reduction. In the case of disaster risk reduction, messages were allocated to two of the goal areas that contain targets related to it, SDG 1 (poverty) and SDG 11 (cities). The context for each specific message determined its allocation.

BOX 1

Reports included in the analysis

UN organizations:

CBD: Global Biodiversity Outlook No. 2, 2006

CBD: Global Biodiversity Outlook No. 3, 2010

CBD: Global Biodiversity Outlook No. 4, 2014

FAO: The State of Food and Agriculture 2014

FAO: The State of Food Insecurity in the World 2014

ILO: World of Work Report 2014

ILO: Global Employment Trends 2014

ILO: World Social Protection Report: Building Economic Recovery, Inclusive development and Social Justice 2014/15

UNCTAD: Trade and Investment Report: Investing in SDGs 2014

UNDP: Human Development Report: Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience 2014

UNDP: Human Development Report: The Rise of the South: Human Progress in a Diverse World 2013

UNDP: Human Development Report: Sustainability and Equity: A Better Future for All 2011

UNDP: Human Development Report: The real Wealth of Nations: Pathways to Human Development 2010

UNEP: GEO5: Environment for the Future We Want 2012

UNEP: Global Outlook on Sustainable Consumption and Production Practices 2014

UNESCO: Education for Sustainable Development Report 2009

UNESCO: Science Report 2010

UNESCO: Education for Sustainable Development Report 2012

UNESCO: World Social Sciences Report: Changing Global Environments 2013

UNESCO: Education for All GMR: Teaching and learning: Achieving quality for all 2013/14

UNESCO: Education for Sustainable Development Report 2014

UNESCO: Education for All GMR: Teaching and learning: Achieving quality for all 2015

UNESCO: World Water Development Report 2015

UNESCO-UNICEF: Fixing the Broken Promise of Education for All 2015

UNFPA: State of World Population: Adolescents, Youth and the Transformation of the Future 2014

UN-Habitat: Global Report on Human Settlements 2013

UNICEF: The State of the World's Children 2015^a

UNIDO: Industrial Development Report: Sustaining Employment Growth: The Role of Manufacturing and Structural Change 2013

UNISDR: Global Assessment Report 2015

UN Women: Progress of the World's Women 2011/12

WHO: World Health Report: Research for Universal Health Coverage 2013

WTO: World Trade Report 2014

World Bank:

World Development Report: Development and the Next Generation 2007

World Development Report: Development and Climate Change 2010

World Development Report: Jobs 2013

Global Monitoring Report: Ending Poverty and Sharing Prosperity 2014/15

World Development Report: Mind Society and Behavior 2015

^a The State of the World's Children report by UNICEF (2015) contains a few general statement related to education. However, the bulk of references to education is in the form of opinion quotes of specific experts. Because opinion quotes do not represent the view of the agency that publishes the report, they are excluded from our selection.

Third, messages grouped under each goal were broken down into four analytical categories: general statements; links; constraints and challenges; and policy messages, and further separated according to the causal direction of the link. By “causal direction”, we mean a logical connection captured in the message, which indicates whether education affects certain SDG area, or vice versa. For example, messages under SDG 6 indicate links from education to water (e.g. “higher education positively influences water management”), as well as links in the other direction (e.g. “access to sanitation improves education outcomes”). Messages that describe trends or focus purely on numbers (without an analytical component) were discarded at this stage. Lastly, whenever possible, we tried to allocate messages to one SDG area only, in order to avoid lengthy repetitions in section 3. It is not always obvious to do so, as many statements in the reports tend to mention several sectors in tandem, for example, health and education or energy and water.^a

Given our selection of reports and messages, it is important to keep in mind that graphs and tables presented in this article are, to use a mathematical analogy, conditional on education. We do not explore links between all the SDGs, only those which involve education.

3 Links between education and SDGs put forward by UN flagship reports

This section concerns the content of reports analyzed and focuses on the links between education and other SDGs. Table 1 provides an overview of the findings. It shows the number of reports in our sample that cover each link (third column); the number of different causal links emphasized by the reports (fourth column); the coverage of challenges and constraints relative to the link in question (fifth column); and

the comprehensiveness of broad policy axes considered in relation to the link (sixth column).

From table 1, a few stylized facts emerge. First, the coverage of links varies significantly across the seventeen SDGs. Second, for some SDGs, no links to education are put forward by the reports in our sample. Third, the emphasis on constraints and challenges tends to be very limited or non-existent for many of the links. Fourth, the depth of treatment of policy issues in relation to the different links varies greatly. We come back to these features below in more detail.

SDG 1: End poverty in all its forms everywhere

The reports identify a number of connections between education and poverty, in both directions. Education reduces poverty by increasing people’s income (World Bank, 2014/15, UNESCO, 2015). Expanded access to education has typically benefited worse off groups (UNDP, 2010). People are vulnerable to poverty if they are below or at risk of falling below a certain minimally acceptable threshold of critical choices across several dimensions, such as education (UNDP, 2014). Education increases resilience to adverse shocks (UNDP, 2010, 2014; UNISDR, 2015). Girls’ education prevents an inter-generational transmission of poverty by breaking the cycle of early marriage and childbearing and health and other risks associated with these events (UN Women, 2011/12; UNDP, 2014; World Bank, 2007, 2014/15).

Constraints and challenges include raising educational requirements to access the labor market in low- and middle-income countries (World Bank, 2014/15), and limited access to education for disabled people (World Bank, 2007; UNISDR, 2015).

Policy recommendations center on the need to build expanded educational opportunities as part of multi-dimensional approaches that combine income support and job creation with expanded health care, education and social protection, energy access and other interventions for community development (UNDP, 2014, ILO, 2014a; ILO, 2014/15, World Bank, 2007). Also emphasized are:

^a As pointed out by a referee, it is not always obvious to separate statements referring to links from those referring to constraints and challenges. While we agree, we think this does not impact our conclusions.

Table 1
Coverage of links between education and other SDGs in the sample of reports (n=37)

SDG area	Direction*	Number of reports covering this area**	Number of causal links put forward	Coverage of constraints and challenges***	Comprehensiveness of policy discussion****
1	SDG 4 →SDG 1	13	4	Limited	Limited
	SDG 1 →SDG 4		2	Limited	Comprehensive
2	SDG 4 →SDG 2	8	3	Limited	Limited
	SDG 2 →SDG 4		1	Very limited	Very limited
3	SDG 4 →SDG 3	18	4	Limited	Comprehensive
	SDG 3 →SDG 4		None	None	None
5	SDG 4 →SDG 5	19	7	Comprehensive	Very limited
	SDG 5 →SDG 4		3	Comprehensive	Limited
6	SDG 4 →SDG 6	8	1	None	Very limited
	SDG 6 →SDG 4		4	Limited	None
7	SDG 4 →SDG 7	6	5	Limited	Limited
	SDG 7 →SDG 4		7	Very limited	Very limited
8	SDG 4 →SDG 8	21	>10	Comprehensive	Comprehensive
	SDG 8 →SDG 4		4	Comprehensive	Limited
9	SDG 4 →SDG 9	10	3	None	Limited
	SDG 9 →SDG 4		2	None	Very limited
10	SDG 4 →SDG 10	11	7	Limited	Limited
	SDG 10 →SDG 4		4	Comprehensive	Limited
11	SDG 4 →SDG 11	6	1	Very limited	Very limited
	SDG 11 →SDG 4		2	Limited	Very limited
12	SDG 4 →SDG 12	9	5	Very limited	Comprehensive
	SDG 12 →SDG 4		2	Very limited	Very limited
13	SDG 4 →SDG 13	9	6	Very limited	Limited
	SDG 13 →SDG 4		1	None	None
14	SDG 4 →SDG 14	0	None	None	None
	SDG 14 →SDG 4		None	None	None
15	SDG 4 →SDG 15	10	3	Limited	Comprehensive
	SDG 15 →SDG 4		3	Very limited	None
16	SDG 4 →SDG 16	19	6	Limited	Limited
	SDG 16 →SDG 4		4	Very limited	Very limited
17	SDG 4 →SDG 17	19	None	None	None
	SDG 17 →SDG 4		4	Comprehensive	Limited

Source: Authors' elaboration.

Note:

*: The arrow indicates causal links from a goal area to another. For example, "SDG 4→SDG 1" refers to links from SDG 4 (education) to SDG 1 (poverty).

** Based on the full content of reports, before selection and groupings of similar ideas.

*** The coverage of constraints and challenges is assessed based on comprehensiveness and depth of treatment in the whole set of reports. None: no significant elaboration on constraints and challenges in relation to a specific link was found in the entire set of reports. Very limited: presence of few ideas, with no elaborate treatment. Limited: the messages included in the reports provide a general idea of constraints and challenges, but depth of treatment is limited. Comprehensive: messages included in the set of reports build up to a comprehensive treatment of constraints and challenges.

**** The coverage of policy options is based on comprehensiveness and depth of treatment in the whole set of reports. None: no policy statements in relation to a specific link were found in the entire set of reports. Very limited: presence of few distinct policy areas. Limited: messages included in the report cover various policy axes in relation to this link, but depth of treatment is limited. Comprehensive: ideas included in the set of reports builds up to a comprehensive, in-depth treatment of policy in this area.

the need to establish a minimum universal level of basic education and social security to ensure that all citizens have secure access to the basic requirements of human development (UNDP, 2013); the need to present investments in education, and particularly in female education, as a core strategic investment in disaster risk reduction (UNISDR, 2015); and the need to promote the engagement of the media in order to stimulate a culture of disaster resilience and strong community involvement in sustained public education campaigns and public consultations at all levels of society (UNISDR, 2015).

Looking at links from poverty to education, the reports mention that the quality of services that poor people can afford or are publicly provided is worse than that available for people who are better off (UNDP, 2010). They also point to the fact that millions of women face ‘time poverty’ due to multiple work burden (in particular, the time spent collecting water and fuel). This curtails their opportunities for education and paid employment (UN Women, 2011/12). Challenges mentioned include the fact that children of the worse-off groups are still more likely to have less education and less access to basic services (UNDP, 2010). Indigenous peoples tend to have poor educational attainment, unequal opportunities and unequal access to land and other productive assets (UNDP, 2010, 2014). Regarding policy recommendations, strengthening income security, in the form of cash transfers among others, is mentioned as a key element of policies that aim to reduce and prevent child poverty, at breaking the intergenerational transmission of poverty, and at facilitating children’s access to nutrition, care, education and health care (ILO, 2014). In this context, cash transfers for children and families, both conditional and non-conditional, have contributed to significant increases in children’s enrolment and attendance at school in different parts of the world, less child labour, and improvements in education outcomes (ILO, 2014/15). Lastly, a report holds that investment in disaster risk reduction could make the crucial difference in improving education outcomes (UNISDR, 2015).

SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Links between SDG 2 and education are covered by few reports in our sample. Most of the references to detailed links from education to agriculture and food systems come from a report of FAO. In general, education is an essential element of efforts to reduce malnutrition and hunger. (UNESCO, 2013/14; FAO 2014a). The FAO report stresses the importance of basic education for improving agricultural productivity and farm incomes and highlights that agricultural education and training raises agricultural productivity by developing producers’ capacities, fostering the development of people’s skills and competencies for innovation, and generating human capital for research and advisory services. It also mentions that farmers need to attain more advanced levels of education to make use of new ICT-based information sources and technical advice and to respond to new market opportunities and environmental change (FAO, 2014). The World Bank points out that as education levels for rural youth improve they can enter a broader range of nonagricultural occupations (World Bank, 2007).

The FAO reports summarizes the major challenges in agricultural education and training facing developing countries as: inadequate institutional capacity; relatively low levels of public and private support to agricultural education; and limited resources and experience to cope with new areas of training in agriculture: environment and natural resources management, biotechnology, farming systems management and agribusiness (FAO, 2014). Many training courses for advisory service practitioners are too general, theoretical and supply-driven, and the quality of trainers and training delivery is often poor. Training courses also tend to be treated as single events, with inadequate follow-up (FAO, 2014). Barriers to getting agricultural education are more acute for women than for men (UNFPA, 2014).

Policy recommendations put forward include the need to upgrade skills and capacities of individuals involved in all aspects of agricultural innovation

system – farmers, extension service providers, researchers, etc. through education and training at all levels, which requires sustained political support for investments in agricultural education and training to develop a network of core institutions (FAO, 2014). Groups in need of special focus include farmers' and local community groups, women and girls, and the youth (FAO, 2014). The FAO report also addresses issues relating to the content of education and extension and the need to refocus it to cover new technical areas such as farm management, agribusiness development, value addition and marketing (FAO, 2014). Lastly, a report mentions that in order to achieve target 7 of the UN Convention on Biological Diversity, which concerns sustainable management of areas under agriculture, aquaculture and forestry, it is necessary to support customary sustainable use, for example through education (CBD, 2014).

Links from SDG 2 to education are much less emphasized in our sample. A report mentions the detrimental impacts of undernutrition on educational outcomes (UNDP, 2014). New populations entering the school system are more likely to come from marginalized groups and be affected by malnutrition and poverty (UNESCO, 2015). An ILO report concludes that social protection programs including cash transfers, the supply of free tuition and materials, and school feeding programs have been shown to lead to higher school enrolment rates, fewer school dropouts and less child labour (ILO, 2014/15).

SDG 3: Ensure healthy lives and promote well-being for all at all ages

Many reports emphasized that education affects health and well-being, reflecting a shared understanding that education is a powerful lever for improving people's health. Educated people are better informed about diseases, take preventative measures, recognize signs of illness early and tend to use health care services more often (UNESCO, 2013/14; WHO, 2013, UNFPA, 2014). Basic education supports universal health coverage by enabling healthy lifestyle choices and informing health-care decisions (WHO, 2013). Better education for women tends to

result in better health outcomes for them and for their children and accelerates their countries' transition to stable population growth (World Bank, 2007; UNESCO, 2013/14, UNDP, 2011, 2013; UNFPA, 2014). More educated youth are more willing to control family size and invest in the health and well-being of their offspring. The impacts are particularly strong for women. (World Bank, 2007). Education is considered a way to protect young people from engaging in risky behaviors (World Bank, 2007).

Among the challenges identified, evidence of the efficacy of school-based health education programs is mixed, with variations in effectiveness depending partly on the outcome evaluated (World Bank 2007). Access to quality comprehensive sexuality education remains elusive for most adolescents. Although many countries have a comprehensive sexuality education policy and programs, most do not implement it widely or in a way that adheres to international standards (UNFPA 2014). Experience with health education, particularly in the context of HIV prevention, shows changing knowledge alone may not change behavior (World Bank, 2007).

The following policy recommendations emerge from the reports. Education programs should provide students with the values and skills that not only translate into success in the labor market but also enable them to live healthier and more fulfilling lives (World Bank, 2014/15). Schools can be major centers for the provision of basic health care as well as sources of medical information and education (World Bank, 2010). School-based reproductive health education programs can be effective in increasing knowledge and the adoption of safe sexual behavior (World Bank, 2007). A central element of health promotion is providing health education to change youth behavior and encourage adoption of healthy behaviors (World Bank, 2007). One report mentions that research confirms significant positive effects of aid targeted to health and education (UNDP, 2010).

By contrast, the reverse causal links (how health affects education) were not addressed in depth by any of the selected reports, including reports by WHO.

A significant number of messages in the reports, in addition to pointing to causal links between education and health, also tend to link both of them to a third issue (e.g. “long-term unemployment is a serious threat to health (physical and mental) and to the quality of life (including children’s education)”). This reflects that health and education are often treated as closely connected development challenges.^b

SDG 5: Achieve gender equality and empower all women and girls

Many reports cover links between gender and education, in both directions. Indeed, SDG 5 is, after SDG 8, the area that received the most attention in the sum of the analyzed reports.

Reports put forward several links describing how education affects gender equality and women empowerment. Education expands opportunities for girls and young women and raises their aspirations for work outside the home (UNFPA, 2014; World Bank, 2007). As women acquire more education, they increasingly move out of traditional household or agricultural production activities and enter wage work (World Bank, 2007). Policies to ensure that women and girls can access services including health and education have contributed to significant advances in women’s standard of living (UN Women, 2011/12). Greater educational attainment shapes attitudes of both girls and boys to gender equality, with greater education leading to more positive attitudes towards gender equality among both males and females (UNFPA, 2014; UNESCO, 2013/14). Education can empower women to overcome discrimination and claim their rights and overcome barriers that prevent them from getting a fair share of the fruits of overall progress (UNESCO 2013/14; UNFPA, 2014; UNDP, 2010). In particular, secondary education is critical for women to be able to claim rights and participate in decision-making, as

well as being a route to decent work (UN Women, 2011/12). Higher educational attainment expands women’s freedoms by strengthening their capacity to question, reflect and act on their condition and by increasing their access to information (UNDP, 2010; UN Women, 2011/12). Evidence suggests that rights-based and gender-sensitive comprehensive sexuality education programs can lead to greater gender equality (UNFPA, 2014). Education enhances girls’ social status, increases their bargaining power within marriage (UNFPA, 2014). Investments in education can help accelerate demographic transition (UNESCO, 2013/14; UNDP, 2010, 2011, 2013; UNFPA, 2014; World Bank, 2007). Gender-based patterns of vulnerability are shaped by the value of and entitlement to assets, access to financial services, education level, social networks, and participation in local organizations (World Bank, 2010). Countries that focused on female education suffered far fewer losses from extreme weather events than less progressive countries with equivalent income and weather conditions (UNDP, 2011).

The following challenges are identified. Social and cultural norms in many countries exclude some groups from education, primarily girls and young women, although ethnicity, caste, and disability are also dimensions of exclusion (World Bank, 2007, 2013). Gender norms and discrimination leave more girls out of school than boys—particularly the poorest girls in rural areas and the child labour that undermines learning and often leads to drop-out (UNESCO-UNICEF, 2015). While enrolment is rising, many girls will not complete their primary education. In almost every region, young women are significantly more likely to be ‘education poor’ (to have four years or less of primary education) than young men (UN Women, 2011/12). Overall secondary school attendance rates are very low in many countries, with significant levels of inequality between urban rich and rural poor girls (UN Women, 2011/12). Barriers to getting agricultural education are more acute for women than for men, with fewer women-graduates of agricultural programmes (FAO, 2014). Technical and vocational training for

^b It is not the purpose of the paper to assess whether the tendency to bunch health and education in policy messages is grounded in evidence. However, given how frequently this is done in our sample of reports, this would merit an analysis on its own.

sustainable development lacks gender perspective (UNESCO, 2014).

Beyond a general call for countries to adopt ambitious policies that expand women's education and have crosscutting benefits for human development (UNDP, 2013), reports in our sample contain few concrete policy recommendations. One of them emphasizes the role of affirmative action to increase school attendance by girls (UNFPA, 2014; FAO, 2014). Another suggests that recruitment of female teachers at all levels of education, textbook and curriculum reform, and training in gender-sensitive teaching are critical to improving gender equality in schools (UNESCO, 2015). The same report affirms that the realization of gender equality in education requires moving beyond counting the numbers of boys and girls in school to exploring the quality of girls' and boys' experiences in the classroom and school community, their achievements in education institutions and their aspirations for the future (UNESCO, 2015).

Three links reflecting how gender equality and empowerment of women impact education were put forward. First, women are often "time poor" and this impairs their access to education (UN Women, 2011/12). Second, early marriage curtails girls' opportunities for education (UN Women, 2011/12). Increasing women's ability to plan their births is also associated with substantial improvements in their children's education and socio-economic success and eventual wages (UNFPA, 2014). Children are affected if their mothers are poor or have low levels of education (UNDP, 2014). Third, an increase in the share of household income contributed by women often results in improvements in children's educational attainment. Women tend to allocate their incomes more to food and education than men (World Bank, 2013, 2014/2015; UNIDO, 2013).

A number of challenges were identified. Data show that poor girls from rural areas and from ethnic minority or indigenous groups often have the lowest education and literacy levels (UN Women, 2011/12). Almost universally, women have more restricted

access to education than men (FAO, 2014). Women are often discriminated against in health, education and the labour market, including discrimination in national political participation (UNDP, 2010, 2013, 2014). Girls often leave school unprepared for work, or cannot translate educational accomplishments into remunerative jobs (UNFPA, 2014). Education, experience, or sector of work do not fully explain the fact that women continue to earn less than men – but social norms and institutions could be a reason (World Bank, 2007, 2013). Today one in three girls in developing countries is married before the age of 18, threatening her health, education and future prospects (UNFPA, 2014). In addition, young women and girls may experience harmful practices that lead to blocked access to sexual and reproductive health information and education (UNFPA, 2014).

Policy recommendations in the sample of reports touched on several areas. First, to achieve universal primary education, greater attention should be paid to excluded children (especially poor girls from rural areas) who have been left behind (UN Women, 2011/12). Second, targeted voucher programs have traditionally been used to make education more equitable by targeting underserved groups like women, youth and low-income students (UNFPA, 2014; UNIDO, 2013). Third, cleaner energy options, especially in rural areas, can free up time for girls to study and improve their academic performance (UNEP, 2014). Fourth, ensuring young women's access to voluntary family planning has the greatest impact on educational attainment and lifetime earnings (UNFPA, 2014).

SDG 6: Ensure availability and sustainable management of water and sanitation for all

Connections between SDG6 and education were not primary focus area of any of the selected reports. Only one report (UNEP, 2012) emphasized ways in which education affects availability and sustainable management of water and sanitation. Thus, education and information programs are viewed as enabling conditions to promote integrated water

resource management. Among water users, there is need for a cultural change through education and economic incentives. (UNEP, 2012). Constraints and obstacles relevant to this link were not emphasized in detail. Possible policy levers to improve access to safe drinking water and reduce water stress include investing in education to raise awareness of the need to save water and the link between unsafe drinking water and disease (UNEP, 2012).

Regarding the reverse impact that water and sanitation have on education, improvements in global water and energy infrastructure can directly affect the education opportunities of the poorest (UNESCO, 2015). The time people spend carrying water or fuels has an opportunity cost and could otherwise be spent on more economically productive or socially beneficial activities such as pursuit of education (UNESCO, 2015). Many children go to school in conditions that are not conducive to learning – lacking potable water, handwashing facilities and safe, clean toilets (UNESCO, 2015). Access to clean water and improved sanitation is also especially important for girls' education; it influences their education decisions and generates health gains, time savings and privacy (UNDP, 2011; UNESCO, 2015). It was noted that school water and sanitation provision in many developing countries has improved over the past decade, but progress has been slow (UNESCO, 2015). No specific policy recommendation was put forward in relation to this link.

SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all

SDG 7 is the one of the goal areas whose connections with education are the least developed in our sample of reports. Only a few reports (World Bank, 2010; UNEP, 2014; UNESCO, 2015) mentioned any links at all. Looking at the reports produced outside the UN system, the IEA's World Energy Outlook 2014 contains no references to education. By contrast, the Global Energy Assessment published by IASA offers a detailed analysis of many links.

Looking at the links from education to energy reports agree that changing behaviors and lifestyles to achieve low-carbon societies will take a concerted educational effort (including technical training) over many years (World Bank, 2010; IASA, 2014). The Global Energy Assessment sees education as part of a package in order to achieve this effort, along with feedback, information, and advice (IASA, 2014). It emphasizes the importance of targeting youth to provide the knowledge and skills about energy use that will allow them to make informed choices as energy users (IASA, 2014). It also takes stock of the importance of education and training in programs focused on clean energy provision in developing countries. The report notes limitations of current education systems and curricula with respect to both the inclusion of energy in environmental programs around the world, and the lack of flexibility showed by standard discipline-based educational and training programs (IASA, 2014). Among other things, the report emphasizes the important role that universities could play to support managing and sustaining energy transitions (IASA, 2014). The World Bank notes that many energy-efficiency measures are financially viable for investors but are not fully realized, and that realizing these low-cost savings requires consumer education (World Bank, 2010).

In the other direction, access to energy services can improve the quality and availability of educational services and increase the likelihood that children will attend and complete school (IASA, 2014; UNESCO, 2015). In particular, electrification is vital for education (UNEP, 2014). Electricity can facilitate access to educational media and communications in schools and in homes. It can increase use of distance-learning modules and provide the opportunity to use more sophisticated equipment for teaching, which allows wider access to more-specialized teaching materials and courses (IASA, 2014). Cleaner energy options can free up time for women and girls to study and improve their academic performance (UNEP, 2014). For example, cleaner and affordable energy can enhance access to clean water, sanitation, lighting, space heating/cooling, and energy for cooking meals (IASA 2014). Finally, rural electrification

helps retain good teachers in rural areas – a key lever for enhancing the quality of rural education (IIASA 2014). Constraints relating to this area include lack of access to clean energy and in particular electricity; and the consequent widespread “time poverty”, especially among women. Many of the links put forth in the Global Energy Assessment can be seen as policy options.

SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

The links between education and economic growth and jobs, the main topics included in SDG8, are by far the most reflected in our sample of report, both in terms of number of reports referring to them and in terms of depth of elaboration.

Many reports state the importance of education for employment and growth in general. Channels emphasized include the impact of education, particularly at secondary and tertiary levels, on workers’ productivity and productive capabilities (World Bank, 2013; UNFPA, 2014; UNDP, 2013; ILO, 2014, 2014/15; UNESCO, 2013/14) and higher earnings (UNESCO, 2013/14; UNIDO, 2013; World Bank, 2013); the importance of education as a determinant of knowledge spillovers and entrepreneurship (World Bank, 2013), both in the wage and non-wage sector (World Bank, 2007). A skilled labour force in manufacturing is expected to boost international competitiveness. For example, investing in education has a positive effect on the growth of exports (UNIDO, 2013). Current foreign direct investment is positively associated with achievements in health and education in previous years (UNDP, 2013; World Bank, 2007, 2014/15). Where enrolment in post-primary education is high, skill shortages are lower (World Bank, 2007). Rising educational attainment has had a particularly important effect on the labor supply choices for women. As women acquire more education, they increasingly move out of traditional household or agricultural production activities and enter wage work (World Bank, 2007). Educating girls and women boosts their chances of

getting jobs, staying healthy and participating fully in society (UNESCO, 2013/14). As education levels for rural youth improve, they can enter a broader range of non-agricultural occupations (World Bank, 2007). The reports also point to today’s emphasis on marketable skills, specialized high-level training meeting the demand from firms (UNIDO, 2013), for example in “green” sectors (UNESCO, 2012), and to the importance of financial education (UNFPA, 2014).

Two main groups of constraints and challenges are identified by the reports. The first range of ideas concerns the gap between supply and demand for skills, with several reports pointing to a growing gap between the skills acquired in education and the nature of jobs available (ILO, 2014; World Bank, 2007, 2014/15; UNDP, 2014; UNFPA, 2014; UNIDO, 2013). One report notes that in some countries, labor market returns to those who completed primary or secondary education have declined sharply, while the returns to those with tertiary education have increased (World Bank, 2007). The second group of constraints focuses on gender aspects. Girls often leave school unprepared for work, or cannot translate educational accomplishments into remunerative jobs (UNFPA, 2014). In some regions, rising female education levels have not translated into dramatic increases in labor force participation rates for young women. Social institutions and norms could be a reason (World Bank, 2007).

As to policy recommendations, many reports advocate for higher investment in education in order to stimulate growth and foster innovation (World Bank, 2007; UNFPA, 2014; FAO, 2014). Recommendations range from general advice to invest to increase preschool enrolment among economically and socially deprived households, raise educational attainment up to at least lower-secondary level, and adopt education policies, to improving low-performing schools and classrooms by offering a quality learning experience for the most disadvantaged (World Bank, 2014/15). Some reports also suggest to focus on strengthening informal apprenticeship (World Bank, 2013) and placing greater emphasis on high-level, specialized training, with more

formalized on-the-job training and vocational education, featuring closer interaction between educational institutions and industry (UNIDO, 2013), ensuring continuous training (World Bank, 2007, 2014/15). It is noted that the balance and sequencing of education policies across the three dimensions—post-primary education opportunities, tools to enhance education decision making, and second-chance education options—as well as prioritization among them (basic skills rather than post-basic skills) depends on the state of a country's education system, its level of development, its overall development priorities, and the priorities of its young people (World Bank, 2007). Several reports highlight the importance of adapting education content to life and job market requirements in terms of skills (World Bank, 2007, 2013; UNCTAD, 2014) and focusing on easing the school-to-work transition and to prevent labour market mismatches (UNFPA, 2014).

Looking at the links from growth and jobs to education, a first connection that is made is at the macroeconomic level. A report by WTO notes that economic growth is a necessary condition for development – which explains why many countries with strong economic growth are also making strides in improved health, educational attainment, living standards and poverty reduction (WTO 2014). UNDP reports, while acknowledging this relationship, tend to emphasize that economic growth may not be indispensable to achievements in health and education (UNDP 2010, 2013). In terms of causal links, one explanation of growing educational levels emphasizes economic changes—such as the shift from agriculture to industrial and service production—that increase demand for higher skilled workers and raise the returns to education and thus boost demand (World Bank, 2007; UNIDO, 2013; UNDP, 2010). Competition has also driven up the demand for skill-intensive technological innovation (World Bank 2007). Economic changes have driven changes in educational approaches and content. Companies are driving a demand for 'green skills' and 'green jobs' (UNESCO, 2012). Business interests have also increased the importance of work-based learning in addition to the formal education system (UNESCO, 2014).

The reports note other connections that play out at the household level. Incidence of child labour, for example in agriculture, can limit children's access to basic education (FAO, 2014). Combining paid employment and household chores leaves children (and especially girls) doubly disadvantaged and at greater risk of repeating grades or dropping out of school (UNESCO, 2015). Economic downturns can disrupt children's education development—especially when their parents lose their jobs. Long-term unemployment is a serious threat to children's education (UNDP, 2014). Jobs for women can change the way households spend money and invest in the education and health of children. An increase in the share of household income contributed by women often results in improvements in children's educational attainment (World Bank, 2013). Access to finance has facilitated women's education and health, and promoted investments in microenterprises (World Bank, 2013). Lastly, migration and remittances can promote human capital accumulation. Migration expands options for education, especially in higher education (World Bank, 2007). The possibility to migrate may motivate greater investments in education, and remittances may finance them (World Bank, 2013).

Here too, a number of constraints and challenges are identified. High unemployment (ILO, 2014a; World Bank, 2013) and skills mismatch are pointed out by several reports, in relation to market distortions (World Bank, 2013, UNDP, 2010). While there has been good overall progress on girls' education, progress on women's employment and representation has been much slower (UN Women, 2011/12). Women continue to earn significantly less than men. And these differences are not fully explained by education, experience, or sector of work (World Bank, 2013). Millions of women face 'time poverty' due to the double work burden of providing for families in addition to shouldering a large share of unpaid and time-intensive domestic labour. This curtails their opportunities for education and paid employment (UN Women 2011/12).

Policy recommendations that relate to these links are few in the reports – even though many of the links

presented above can be translated into policy recommendations quite straightforwardly. The World Bank points to the role of policy as being to ensure that signals are adequately transmitted, providing incentives to continue skill accumulation by the young and those of working age alike (World Bank, 2013). UNFPA advocates programs that help girls manage or overcome prevalent gender expectations, negotiate the school-to-work transition, and play a role in the identification and promotion of safer and more accommodating workplaces than currently exist (UNFPA, 2014).

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Links between industrialization, infrastructure and education are explored in several reports. Given the closeness of the targets contained in SDG 9 to those of SDG 8, separating the two is not always straightforward.

The role of education in supporting industrial development and economic transformation, along with other factors, is recognized in several reports (UNIDO, 2013; ILO, 2014; WTO, 2014; World Bank, 2010). Special emphasis is made on the role of education as influencing innovation capacity (World Bank, 2010; FAO, 2014; UNIDO, 2013) and providing the foundation for technology absorption processes (World Bank, 2010) and diversification (UNIDO, 2013). Specialized knowledge and experience in science and engineering may matter more than general managerial capabilities and intermediate-level technical skills in explaining innovation excellence by high-tech firms (UNIDO, 2013). It is noted that the development of wireless telecommunications and wireless education has enabled countries lagging behind to leapfrog over the expensive investment in infrastructure that mobilized the finances of developed countries in the 20th century (UNESCO, 2010).

No constraints or challenges are explicitly put forward by the reports. In terms of policy recommendations, it is noted that through government policy targeting key drivers, such as education and skills, appropriability and/or international trade, governments can set in motion a virtuous circle involving

structural change (UNIDO, 2013). Individual innovation capacity must be developed through investment in education and training (FAO, 2014). Specialized training by semi-public technical and vocational education and training institutions can help firms co-share training costs while guaranteeing the applicability of skills in the workplace (UNIDO, 2013).

The links from industrialization to education receive less attention in our sample. UNIDO notes that as countries further develop their industries, the motivation to increase value added drives a greater application of science, technology and innovation, encourages more investment in skills and education and provides the resources to meet broader development outcomes (UNIDO, 2013). Competition has driven up the demand for skill-intensive technological innovation (World Bank, 2007). In addition, many innovations have allowed countries to improve health and education at low cost (UNDP, 2010). No constraints or challenges are explicitly put forward by the reports. A general policy recommendation is for industrial policy instruments that provide explicit incentives for human capital investments by firms and households, beyond the government's required investments in education (UNIDO, 2013).

SDG 10: Reduce inequality within and among countries

Links between education and inequality are explored by several reports. Education is seen as both a factor that conditions inequalities later in life, for example access to formal jobs (World Bank, 2013), and a powerful instrument for advancing equity (UNDP, 2013). Inequality of opportunity in education for children is seen as having a negative impact on per capita income (World Bank, 2007, 2014/15). Other reports point to the role of education as a tool for people's empowerment (UNESCO, 2013). Finally, basic education provides the foundation of any technology absorption process and reduces economic inequity (World Bank, 2010).

The main challenge mentioned is lack of correlation between rising average levels of education and narrowing inequality. Messages are not fully consistent across reports in this regard, with one report pointing

to this happening “generally, but not always” (UNDP, 2011), while other UNDP reports mention that most regions show rising inequality in income and declining inequality in health and education (UNDP, 2013, 2014). Additionally, according to UNESCO, the failure over the past decade to assess progress in education goals by various population subgroups has concealed wide inequality (UNESCO, 2013/14).

Policy recommendations in this area emphasize that raising educational attainment up to at least lower-secondary level is likely to reduce income inequality (World Bank, 2014/15). Intergenerational transmission of capabilities such as education within families can perpetuate the benefits in the long run (UNDP, 2014). Education policies need to improve low-performing schools and classrooms by offering quality learning experience for the most disadvantaged (World Bank, 2014/15). Innovators should consider education or training that can help foster children’s creativity or critical thinking and include the poorest and most marginalized children into such opportunities (UNICEF, 2015).

In the other direction, - equitable access to education is seen as key to unlock the wider benefits of education (UNESCO, 2013/14). Inequality in quality of education between poor and rich is also pointed as a key driver of inequalities of opportunity (UNDP, 2013; World Bank, 2007). In terms of challenges, reports note that despite progress, major inequalities in education outcomes persist between groups within countries (World Bank, 2014/15). Social and cultural norms in many countries exclude some groups from education, primarily girls and young women, although ethnicity, caste, and disability are also dimensions of exclusion (UNESCO, 2010; World Bank, 2007). Rising income inequality is accompanied by greater polarization in educational outcomes, which triggers a vicious circle of exclusion and inequality (World Bank, 2014/15). UNDP mentions that disparities in income have risen in several regions, and inequality in education has remained broadly constant (UNDP, 2014). Policy recommendations emphasize that universal, high-quality public education can mitigate the gaps in education

of children from rich and poor households (UNDP, 2010, 2014), and the need to prioritize investments in young children that reach the most disadvantaged groups (including girls) (World Bank, 2014/15).

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable

The connection between urban development and education is practically absent from our sample. Links from education to cities focus on disaster risk reduction and management. Building disaster preparedness requires significant long-term investments in education (UNDP, 2014). Greater levels of literacy and primary education will strengthen people’s understanding of warnings and disaster preparedness plans (UNISDR, 2015). On the other hand, urbanization is seen as having “emerged as a key positive influence on changes in education, confirming an established finding on the vital role of cities in transmitting ideas and mobilizing political action” (UNDP, 2010). An urban child is almost 5 times more likely to complete secondary education than a rural child (World Bank, 2014/15). Other beneficial effects of urbanization mentioned include growing labor earnings that increase the opportunity cost of raising children, which may raise women’s age of marriage, educational attainment and labor market participation (World Bank, 2013). Few specific policy recommendations emerge from our sample of reports.

SDG 12: Ensure sustainable consumption and production patterns

Education is a central theme in global efforts to promote a paradigm shift on SCP patterns, to change behaviors and lifestyles and achieve low-carbon societies (UNESCO, 2009, 2012, 2014; UNEP, 2012, 2014; World Bank, 2010). Consumer education can promote lifestyle changes and more informed choices (World Bank, 2010; UNEP, 2014). Consumers must be guided in choosing green energy options, housing options, household goods and environmentally and socially responsible services in order to advance greener economies globally (UNESCO, 2014). Many

governments, NGOs, UN agencies and companies are increasingly emphasizing the importance of learning and capacity-building as they search for solutions to sustainability challenges including climate change, disaster risk management, biodiversity loss and sustainable production and consumption (UNESCO, 2012). Civil society organizations (CSOs) have promoted SCP through a wide variety of activities, including research, advocacy, training, awareness-raising, education, networking and catalyzing multi-stakeholder partnerships. (UNEP, 2014).

Among challenges identified, lack of education and training limits appropriate management of chemicals and wastes in many developing countries (UNEP 2012). Reports also stress an ambiguous role of the media (e.g. television, radio, magazines, newspapers and the internet), which can at the same time promote sustainability awareness and encourage consumption (UNESCO, 2012).

Policy recommendations focus on the need to promote education for sustainable consumption in developed countries (UNESCO, 2013), in particular through enhancing media literacy in the public (UNESCO, 2012) and providing consumer education (UNESCO, 2014). Increasing public awareness of, and education on, the importance of biodiversity, the impacts of unsustainable consumption and production patterns, and the health benefits of a moderate and diverse diet, are seen as the main tools to moderate increases in overall demand for food by reducing excessive consumption, especially of meat, by more affluent sectors of society (CBD, 2006). A longer-term task, common to all countries, is to improve and reorient education systems to foster the knowledge, skills and dispositions needed to deal with current and future challenges (UNESCO, 2013). This necessitates improving the amount and quality of training for teaching 'green' skills and education for sustainable development (ESD) pedagogies across education systems, including specific skills in such sectors as sustainable design, green building, renewable energy and other low carbon priority areas (UNESCO, 2014). A World Bank report points to education as one of the levers for

governments in their role of providing an economic environment that facilitates informed decisions (e.g. long-term weather forecasts, agricultural extension services) (World Bank, 2010). UNESCO emphasizes the role of "coherent multi-level skills development responses" that address both consumption through raising environmental awareness and production by moving to more environmentally conscious practices through training programs (UNESCO, 2014).

While a number of reports address the connections from education to SCP, the reverse ones are almost exclusively found in a single report in our sample, the UNESCO report on Education for Sustainable Development (UNESCO, 2014). The report notes that global drivers for advancing education for sustainable development include changes in the physical environment; changing international guidelines and government regulations; and changes in consumer demand for greener products and services. Public understanding and demand for sustainability-related goods and services have resulted in pressure for educational facilities to implement sustainability policies. The report notes that low awareness of households regarding their power and water consumption is an obstacle to changing behaviours, which can be overcome through adequate information. In terms of policy areas, the report suggests that the education sector should work in alignment and collaboration with long-standing sustainable development partnerships and networks in different areas such as climate change, biodiversity, water, poverty alleviation and sustainable consumption and production. It also provides details on policies and management systems needed to improve sustainability in campus operations (UNESCO, 2014).

SDG 13: Take urgent action to combat climate change and its impacts

The importance of education in relation to climate change is emphasized by many reports in our sample. In general, it is noted that education has a vital role in limiting the causes and effects of climate change (UNESCO, 2013/2014). The impacts of climate change and extreme events depend on education,

among other factors (UNEP, 2012). Education and investment, especially for the very young, can equip people to adapt when a natural disaster takes away their livelihood (UNDP, 2014). Education is critical for helping people adapt to the consequences of climate change, especially in poorer countries, where farmers dependent on rain-fed agriculture feel the threats most strongly (UNESCO, 2013/14). Education can help drive behavioral change needed to combat climate change (World Bank, 2010). Basic education provides the foundation of [carbon-friendly] technology absorption process, but a large enough pool of qualified engineers and researchers is also crucial (World Bank, 2010).

In terms of constraints, research shows that students and the general public hold onto misunderstandings about various aspects of climate change, the greenhouse effects, and ozone layer depletion (World Bank, 2010). In addition, information, education, and awareness raising, as carried out so far, are at best not enough to spur people to action and at worst counterproductive (World Bank, 2010).

Beyond the recommendations regarding education for sustainable development (UNESCO, 2009, 2013), which addresses climate change among other issues, few specific recommendations are provided in this area. UNESCO underscores the need for a common framework to enhance climate responses through education, and to advocate education as a largely untapped strategic resource for building resilient and sustainable societies (UNESCO, 2013). The World Bank notes that “incorporating climate change education in school curricula is a first step. Developing a new cadre of professionals to tackle the complex problems posed by climate change is equally important. Finally, an educated citizenry is essential to facilitate change” (World Bank, 2010). The report further notes the need for a different approach to providing information about climate change (World Bank, 2010).

The links from climate change to education are scarcely explored in our sample. Only two links are put forth. First, the quest for solutions to climate

change spurs demand for adapted learning and capacity-building on this area, from governments, NGOs and indeed, companies (UNESCO, 2012). Second, climate shocks can permanently affect people’s health and education (World Bank, 2010). No constraints are mentioned, and no policy recommendations are provided beyond advocacy for education for sustainable development.

SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

There is no explicit reference to oceans in any report of our sample.

SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

As with climate change and SCP, various reports emphasize the importance of education for raising awareness and changing beliefs, attitudes and behaviors towards environmental issues (e.g. UNESCO, 2013/14; CBD, 2010). Education is seen as a key component of efforts to promote more effective environmental governance, including for protected areas (UNEP, 2012). Reports note various challenges in this area. They concern insufficient educational efforts to engage key actors and stakeholders to integrate biodiversity concerns into sectors outside the environment (CBD, 2006, 2010); the weak relationship between higher levels of education and greater concern for the environment (UNDP, 2011); and insufficient use of traditional knowledge in environmental policies and programs (UNEP 2012).

In addition to recommendations pertaining to ESD in general, the reports highlighted the following areas. Understanding of biodiversity and its relation to human well-being needs to be included in basic educational programs and promoted through the general media (CBD, 2006). A much wider section of the public and decision-makers could be made aware of the role and value of biodiversity and the

steps needed to conserve it through education and more effective dissemination of scientific knowledge (CBD, 2010). It is important to support the development of new research and educational competences and professional careers for young students, so that they can deal with global environmental challenges and sustainability (UNESCO, 2013). UNESCO also advocates fostering new forms of transnational collaboration in science and education, organized around common needs and practices related to environmental change and sustainability (UNESCO, 2013). National environmental management information systems need to be strengthened, as well as the skill sets of associated staff (UNEP, 2012). Education can be used to support sustainable customary use of areas under agriculture, aquaculture and forestry in order to achieve target 7 of the Convention on Biological Diversity (CBD, 2014).

Links from the environment to education are not much explored in our sample. Environmental degradation stunts people's capabilities in many ways, going beyond incomes and livelihoods to include impacts on health, education and other dimensions of well-being. It impedes education advances for disadvantaged children, especially girls (UNESCO, 2013; UNDP, 2011). The WTO proposes that "growing dependence on natural resources is associated with declining levels of health and education" (WTO, 2014). Continued loss of biodiversity has major implications for current and future human well-being. Cultural services such as spiritual and religious values, opportunities for knowledge and education, as well as educational and aesthetic values, are also declining. (CBD, 2010). No specific policy recommendations are provided.

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Connections between education and inclusive societies are covered by many reports in our sample, often in some detail. Education is widely perceived as a

tool to promote peace, justice and equality for sustainable development. Higher capabilities, particularly in education, advance human agency—people's capacity to make choices (UNDP, 2014). Education has a significant role to play in shaping the values of future generations, redirecting societal preferences and inclinations, and instilling the empowering skills to enact them. It helps people understand democracy and deepens its foundations, promotes the tolerance and trust that underpin it, and motivates people to participate in politics (UNESCO 2013, 2013/14; World Bank, 2007, 2013; UNDP, 2010, 2013). Educating girls and women, in particular, has unmatched transformative power by boosting their own chances of getting jobs, staying healthy and participating fully in society (UNESCO, 2013/14). More specific links include the following. Building resilience requires boosting the capacity of individuals, societies and countries to respond to setbacks. Juvenile crime is positively associated with local unemployment and poverty, and decreases with family income and education (World Bank, 2007). Homicide and armed violence occur most frequently in poverty-stricken urban areas characterized by lack of employment, poor standards of housing, overcrowding and low standards of education and social amenities (UNDP, 2014). Studies show a greater prevalence of physical violence by parents toward children in countries with lower education, literacy, and income (World Bank, 2013).

In terms of challenges and constraints, UNDP notes that individual achievements in health, education and income, while essential, do not guarantee progress in human development if social conditions constrain individual achievements and if perceptions about progress differ (UNDP, 2013, 2014). Social and cultural norms in many countries exclude some groups from education, primarily girls and young women, although ethnicity, caste, and disability are also dimensions of exclusion (World Bank, 2007).

In terms of policy recommendations, UNESCO notes a need to advocate education as a largely untapped strategic resource for building resilient and sustainable societies (UNESCO, 2013). The links

between education and access to justice for all and peaceful societies need to be further explored and education programs and approaches need to be transformed to achieve these objectives (UNESCO, 2015). The World Bank points to civic education and programs of youth development and youth action to promote youth capabilities in citizenship, and highlights the potential of peace education programs promote tolerance and conflict resolution skills among youth living in areas of potential conflict, whether among rival gangs or rival ethnic or religious groups (World Bank, 2007). The World Bank notes the importance of increasing literacy among voters (World Bank, 2013)

In the opposite direction, the reports note that democratic governments are in general best able to advance human development goals such as raising education levels. However, material prosperity and good achievements in health and education can co-exist with nondemocratic practices (UNDP, 2010). The same report proposes that “democratization may have the strongest effects on primary education; decentralization can have stronger effects on higher levels of schooling” (UNDP, 2010). Conflicts disrupt essential public services such as education, doing permanent harm to people throughout their lives (UNDP, 2014). States suffering (or emerging) from pervasive armed conflict have some of the world’s worst indicators for education (UNESCO, 2011). Children in conflict affected countries represent one-half of the world’s out-of-school children (UNESCO-UNICEF, 2015).

SDG 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

Messages on means of implementation for education were spread across different reports. Substantial public investment in social infrastructure such as education is seen as a prerequisite for effective sustainable development, and therefore an important component of the SDGs. (UNCTAD, 2014; UNDP, 2013). Investments in learning need to

happen during childhood and adolescence; failures to invest at this stage are very costly to remedy later (World Bank, 2007). Countries with high spending on health and education were more resilient in the face of financial crises (UNDP, 2014). The encouragement of responsible financial behaviour through prior saving and affordable loans has made valuable contributions to consumption, health and education (UNCTAD, 2014). UNCTAD further states that “the corporate contribution in both developed and developing countries in education is small to negligible and likely to remain that way” (UNCTAD, 2014).

Obstacles and constraints are investigated in detail. UNESCO notes that insufficient financing is one of the main obstacles to achieving Education for All (UNESCO, 2013/14). Insufficient investment, funding or incentives are also deplored in specific areas, such as: ESD (UNESCO, 2009) and agricultural training and education ((FAO, 2014). Challenges associated with the role of the private sector in delivering education are discussed in some detail by several reports (UNCTAD, 2014; UNIDO, 2013; FAO, 2014).

Policy recommendations focus on several areas. Many reports advocate increased resources going to the education sector and suggest different ways in which this could be achieved. For countries at lower levels of per capita GDP, focus should be on public investments that will yield long-term productive dividends, including improvements in the quality of the educational system and the share of children completing primary and secondary education (ILO, 2014). The gap could be filled by raising more domestic revenue, devoting an adequate share of existing and projected government resources to education and sharpening the focus of external assistance (UNESCO, 2013/14). Many educational systems can expand and improve by diversifying their funding sources (families, fees, public-private partnerships, income-generating activities and donor support) (World Bank 2007). Governments, donors and international organizations must prioritize the places and the children with the greatest needs (UNESCO-UNICEF, 2015).

UNESCO recommends that the post-2015 framework include explicit financing targets for education (UNESCO, 2013/14).

Reports focus on different priority groups requiring enhanced access, including the most vulnerable children who often go uncounted or unsupported: children with disabilities, in conflict zones or those facing barriers to education due to language, gender or poverty (UNESCO-UNICEF, 2015); agricultural education and training (FAO, 2014); and unemployed workers in crisis sectors (ILO, 2014a). Targeted voucher programs and individual learning accounts can be used to make education more equitable by targeting underserved groups like women and youth (World Bank 2007, UNIDO 2013). Conditional transfer payments are also put forth (UNDP, 2014; ILO, 2014).

A third policy area concerns how to mobilize the private sector for the delivery of education. Public-private partnerships can expand and improve post-primary education (World Bank, 2007). The involvement of the private sector in technical and vocational training is crucial for its success because its involvement is the most efficient way to link skills to the labor market (UNIDO, 2013, World Bank, 2007). Specific proposals are made for the agricultural sector (FAO, 2014) and urban transport (UN-Habitat, 2013). UNCTAD points to the need for engagement with stakeholders and buy-in from local communities in case of private investments in education (UNCTAD, 2014).

4 Discussion

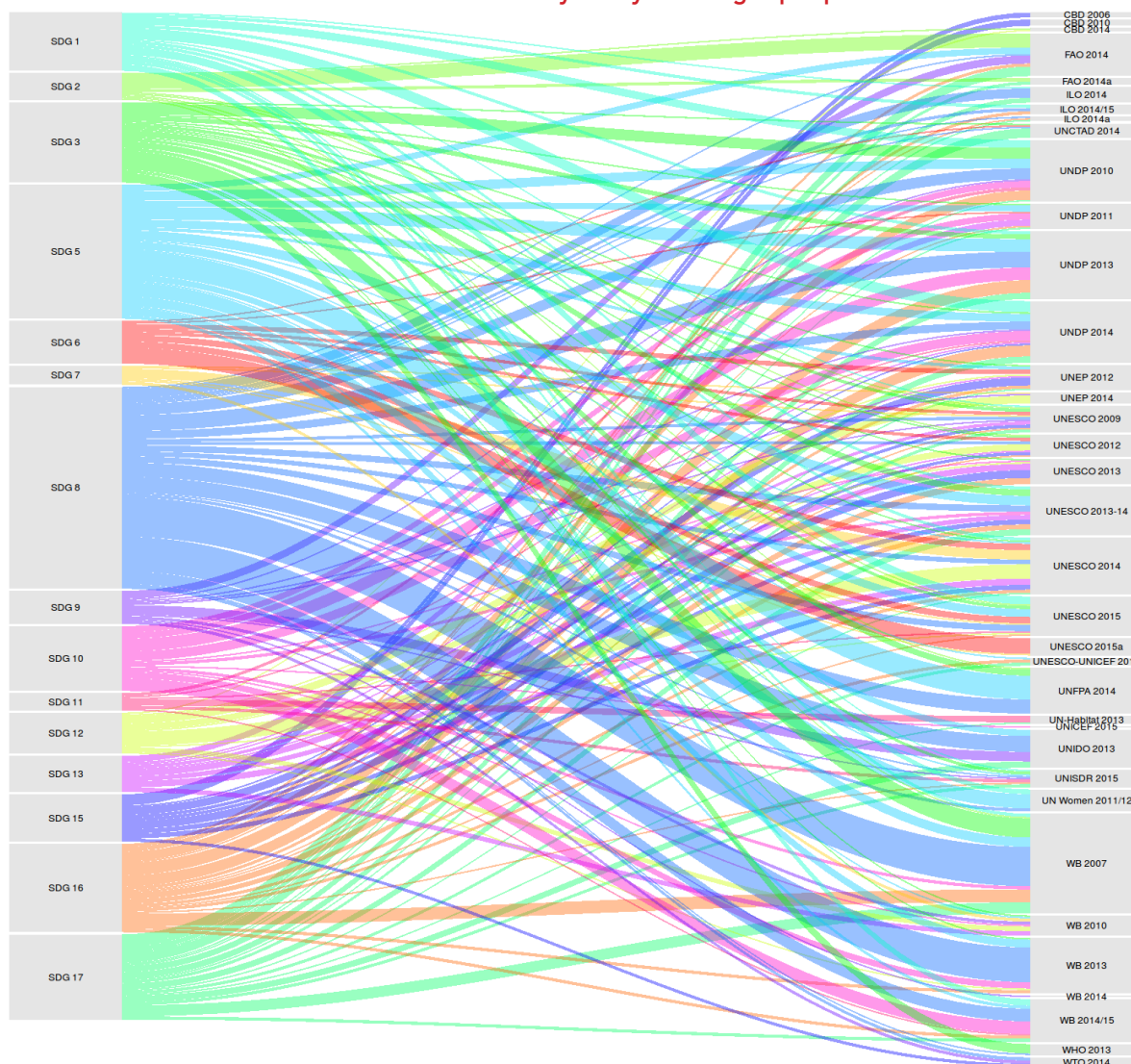
The first conclusion from an overview of the key messages presented above is that the scientific and policy communities have not waited for the adoption of the SDGs to investigate connections between education and a broad range of other development areas. Taken together, flagship reports produced by the UN system identify links between education and all the other SDGs, with the notable exception of SDG14 on oceans. For most of the SDGs, links

are identified in both directions, from education to other goal areas and vice-versa.

However, the emphasis on different links differs markedly. Links between education and economic growth and employment (SDG 8), gender (SDG 5), economic equality (SDG 10), health (SDG 3), peaceful societies (SDG 16), and means of implementation (SDG 17) are the most covered overall in our sample. This reflects a long tradition of stressing the importance of education as a catalyst for other development areas, often in conjunction with health – connections that have been strongly emphasized in the Human Development Reports of UNDP and the World Development Reports of the World Bank. By contrast, in addition to oceans, links between education and agriculture (SDG 2), cities (SDG 11), infrastructure (SDG 9), as well as water (SDG 6) and energy (SDG 7) are little reflected in the sum of UN flagship publications. Lastly, there is relatively weak coverage of linkages between education and SDGs 12 to 15, which address sustainable consumption and production, climate change, oceans and marine resources and terrestrial ecosystems. We come back to this point below.

Different UN agencies tend to focus on different areas that match their focus and mandates. While reports of UNESCO, the UN specialized agency for education, offer the most comprehensive account of education in relation to other development areas, other organizations emphasize important connections as well. For example, FAO focuses on education in the agricultural sector; and UNISDR covers education in relation to disaster risk reduction, a cross-cutting issue with links to several of the SDGs. These areas are not the main focus of UNESCO reports analyzed here. Considered together, the messages from UN flagship reports provide a rich picture, which is very comprehensive in terms of linkages covered. Figure 1 below illustrates this comprehensiveness and diversity. The figure maps each of the reports in our sample with the SDG areas that are linked with education in these reports.

Figure 1
Links between education and other SDGs made by UN system flagship reports



Source: Author's elaboration. Graph credit: Michael Dayan.

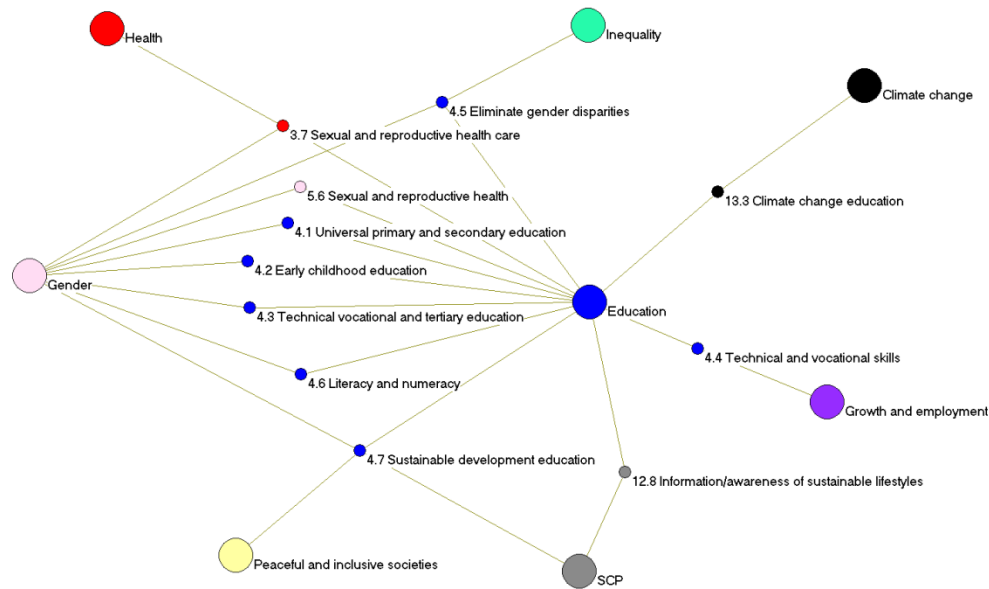
Note: The left column represents SDGs, 1-17 and with exception of SDG 4 (education) and SDG 14 (oceans). The width of each segment is proportional to the number of messages in the whole sample that address them in connection with education. The right column features the analyzed reports. The width of each segment reflects the number of references to education contained in each report. Links from left to right represent ideas linking education and other SDGs, allocated to each report. The width of the links is proportional to the number of related messages in each report.

In order to better understand the richness of messages contained in our sample, it is useful to compare it to external benchmarks. One obvious benchmark is the set of SDGs itself. Le Blanc (2015) has analyzed the links among goals that are present in the SDGs through targets that refer to multiple goal areas. The SDG targets closely link education with gender,

with other links to SDG 3 (health), SDG 8 (growth and employment), SDG 10 (inequality), SDG 12 (sustainable consumption and production or SCP), SDG 13 (climate change), and SDG 16 (peaceful and inclusive societies).^c This is represented in Figure

^c SDG 17 on means of implementation is not included in the analysis by Le Blanc (2015).

Figure 2
 Links between education and other SDGs through the SDG targets



Source: Author’s elaboration, from Le Blanc (2015).

Note: The SDGs are represented as broader circles of differing colors, while targets are figured by smaller circles and have the color of the goal under which they figure. Targets are reflected as linking two or more goals if their wording explicitly refers to those goals.

2. A look at figure 2 is enough to see that many more links are reflected in the sum of UN reports than those explicitly reflected in the SDGs as the result of a political process.

Another benchmark is a recent paper which aims to examine the SDGs from a scientific perspective (ICSU and ISSC, 2015). The International Council for Science and International Social Science Council asked small groups of expert scientists on each SDG are to, inter alia, identify links between the goal being considered and targets under all the other goals. As such, links between education and other goals are identified in the chapter that focuses on SDG4, as well as in each of the other chapters. Many of these links are not specified in detail. In addition, the focus is clearly on links from education to other goals, and much less on links in the other direction.^d As

^d Indeed, the tables in the report explicitly recognizes only links to education from access to sanitation (SDG 6), basic energy services (SDG 7), economic growth (SDG 8) and inequalities (SDG 10).

evident from the discussion in section 3 above, the set of UN reports analyzed here is more balanced in this regard, and highlights many links from other goals to education.

The material collected for this paper allows us to go beyond the recognition of mere links between education and other SDG areas and produce “conceptual maps” of these links across the whole SDG system. In order to illustrate this, we aggregate the conceptual links found in all the reports into a simple systems map. Given that we found no blatant contradictions among the ways different reports view the different links in the system, aggregating those links seems a valid way of producing what could be called an (implicit) conceptual map underlying the messages on education put forward by the UN system.

Figure 3 shows a simplified version of the map, as it emerges from our content analysis. Putting education at the center of the map, we selected only one link from and to each SDG. We show direct

links between education and other SDGs, as well as important intermediary links that the reports emphasize. Such links include, for example, the impacts of increased access to water and clean energy on reducing time poverty, which in turn improves access to education and educational outcomes. More complete maps would have to consider other indirect links as well. These links are important, as they often constitute the basis for advocacy of education policies.^e

Gathering the links into a single maps highlights that the links from education to other SDG areas operate through five main “channels” (in light green on the map). Labor productivity and innovation capacity and entrepreneurship are two of the channels that are emphasized in relation to incomes, economic growth and poverty. General education also creates awareness, which may impact behaviors and society demands relevant to several SDGs (e.g. SCP, ecosystem conservation, climate change). Education and training create the specialized skills for ecosystem management, climate adaptation, changing production patterns. Lastly, education transmits values, changes social norms and enables empowerment. In the other direction, the links between other SDGs areas are of two generic types. First, progress on some of the SDGs (especially industrial transformation or shift to sustainable production patterns) translates into changed demands on the education system in terms of educational content. Second, for many SDG areas, lack of progress in this area creates barriers to access to education or to educational outcomes. Such barriers can be clustered in four categories: conflicts, economic shocks, environmental degradation, and time poverty, which is caused in particular by lack of access to drinking water and energy.

A clear insight from the particular map we have produced here is that education can act as a catalyzer for

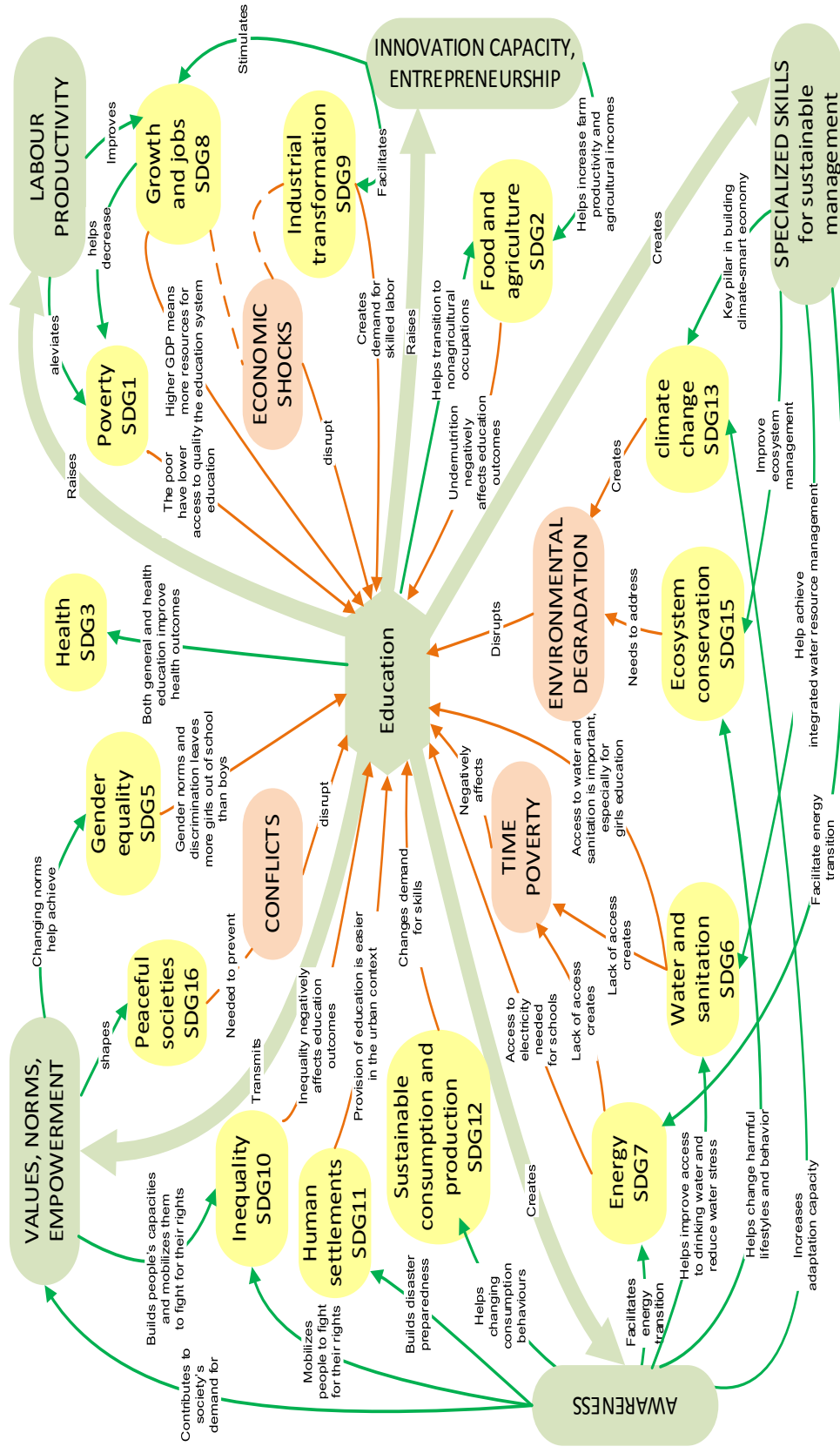
many of the other goals. In turn, progress on most of the other goals (and the removal of associated barriers) has critical synergies with progress on education. While the former has been consistently advocated, the latter seems newer and yet worthy of consideration for policy purposes.

Of course, this map does not represent a coherent and unified “world view” of the UN system vis-à-vis the connections between education and other areas of sustainable development. Indeed, as shown above, no report or UN agency in our sample covers links with all the SDGs. In addition, each report emphasizes different links, even within the same SDG area. Therefore, it is clear that there is no one “correct map”. Indeed, contrasting a simplified map such as the one above with the multiple links that are described in section 3 highlights the importance of considering a multiplicity of reports with different perspectives. Nonetheless, because it represents more than each of the reports in our sample, a map such as this can be a useful starting point for discussion of the UN science-policy interface on education (see below).^f

^e For example, women’s empowerment is generally assumed to be a factor affecting inequality (SDG10) and economic growth (SDG 8). Thus, education efforts geared to women, through contributing to women empowerment, may ultimately contribute to decreasing inequality and benefit growth.

^f Also, it is important to keep in mind that this is not a complete map of the SDG system, which would record all the important links among the SDG areas; for this, an analysis similar to the one we do for education would be necessary.

Figure 3
A simplified map of the links between education and other SDG areas, built from the messages contained in UN flagship reports



Source: Authors' elaboration.

Note: The figure represents links between education and the other SDGs that are made in our sample of UN reports. Yellow round boxes indicate SDGs other than education. Green boxes indicate critical channels through which education affects other SDGs. Orange boxes indicate channels through which other SDG areas affect education. SDG 14 (oceans) is not represented, as no link between it and education was put forward in our sample. SDG 17 is not represented either.

In spite of the richness highlighted above, our analysis reveals gaps, both in terms of linkages that have been explored by science and are not covered in the reports we analyzed, and in terms of consistency between the linkages that are emphasized by reports and the policy implications that the reports draw. Ultimately, these raise questions regarding the effectiveness of the science-policy interface on education in the UN system.

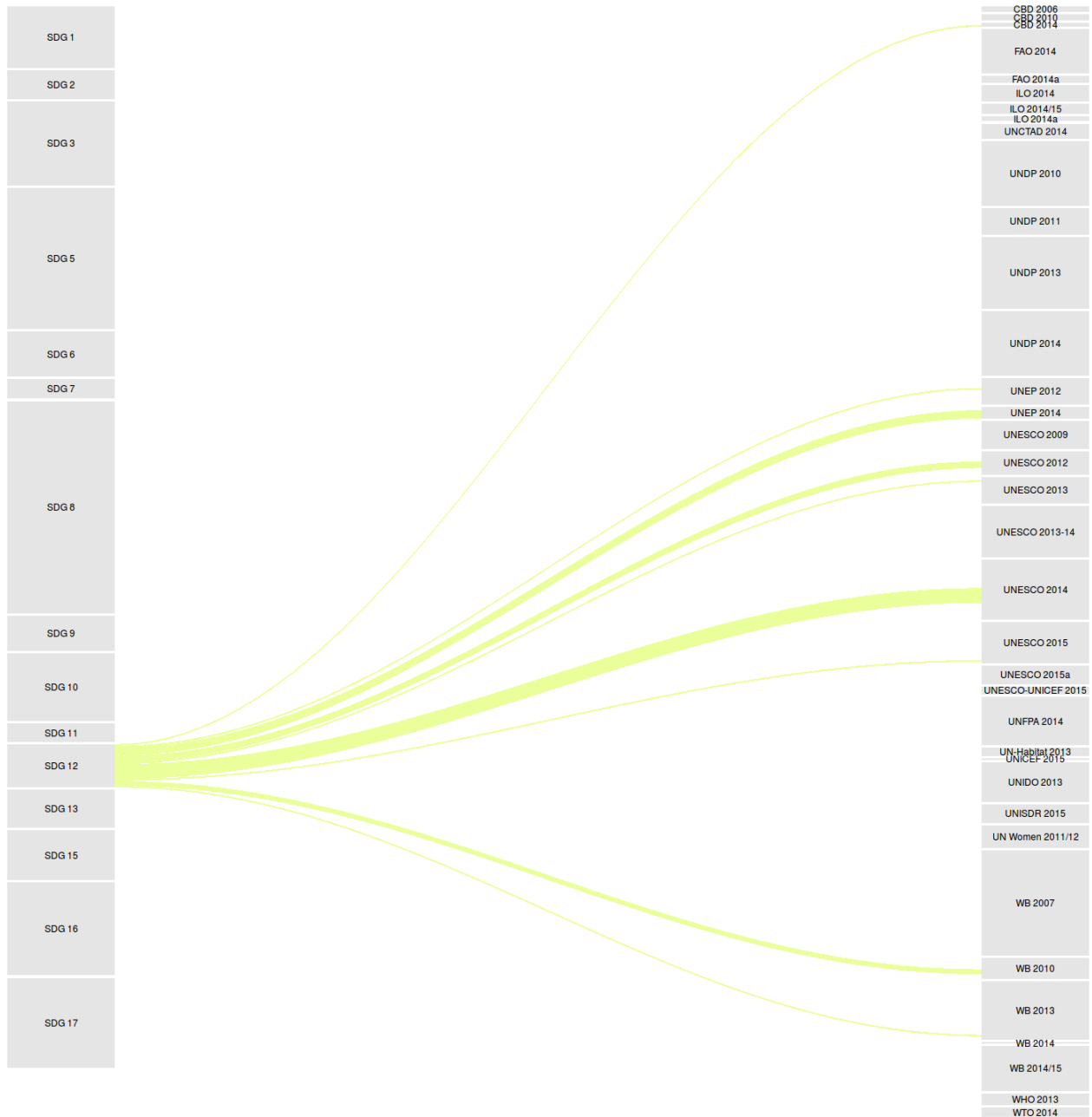
The first gap concerns the very low coverage of the links between education and energy. In order to find a comprehensive elaboration of these links, one has to turn to the Global Energy Assessment, a publication coming from outside the UN system. Focus on this area in flagship UN system publications seems to be lacking. This does not mean that expertise does not exist in some parts of the UN system, however (for example, in UNEP). Rather, the available knowledge does not seem to easily percolate to other parts of the system that are not directly concerned with energy or sustainable consumption and production. If education for sustainable energy is really an important component of energy transitions, and in turn energy transitions are identified as a critical element of future paths to sustainable development, then these issues should be covered in more reports than is the case. This may point to a lack of clear institutional “home” for these issues in the UN system.

Another surprising gap is the absence of reference in our sample of reports on the links from health to education. The evidence on such links seems strong, and indeed they are routinely presented as one of the social co-benefits of providing access to drinking water and sanitation. It could well be that these links are considered so obvious and already incorporated

in development practices that further emphasis on them is not needed. The links may be reflected in the parts of the reports that present case studies and good practices, which were not part of our investigation (see above section 2). However, from a science-policy perspective, it is important to consider these links in order to examine questions such as desirable allocation of resources among competing sectors having an impact on education outcomes.

Another area of concern – and for improvement – is the low number of connections made between education and SDGs 12 to 15. These are areas that were not covered by the MDGs. Connections between SDG 12 (ensure sustainable consumption and production patterns) and education were most elaborated in reports by UNESCO (reports on education for sustainable development), UNEP, and the World Bank. Connections between education and climate change are picked up by only a few organizations (UNESCO, UNEP, UNDP and the World Bank) and are missing in other reports. As mentioned in section 2, we also analyzed the IPCC Working Group II report from 2014 (IPCC, 2014). The report contains very few links to education. Hence, in this particular case, it cannot be said that the IPCC reports are filling gaps not addressed by the UN system. The strongest messages in relation to links to goal 15 on terrestrial ecosystems come from UNESCO, UNEP and CBD. In general, links between education and the “new” SDGs can only be found in recent reports that specialize on sustainability-related topics (e.g. for SDG 12 – UNEP report on sustainable consumption and production or UNESCO reports on education for sustainable development). Consideration of these links is yet to be integrated into a wider system perspective of education.

Figure 4
Links between education and sustainable consumption and production (SDG 12) made by UN system flagship reports



Source: Author's elaboration. Graph credit: Michael Dayan.

Note: See note for figure 1.

Lack of any reference to education in relation to oceans and seas is also an area that deserves attention. While there certainly is a need to raise awareness about anthropogenic influence on oceans, for example pollution that threatens marine biodiversity and overfishing, no report in our sample covered this topic. Connections between education and biodiversity loss or unsustainable consumption and production patterns made in various reports may implicitly cover these issues to some extent. However, to date, there does not seem to exist an assessment that would address education in relation to policies to conserve and sustainably use oceans, seas and marine resources in a comprehensive manner – and this is a major gap, which would need to be addressed in coming years.

Weak coverage of goals 12 to 15 can come as a surprise, given the existence within the UN system of efforts to promote education for sustainable development. The United Nations Decade of Education for Sustainable Development (2005-14) aimed to integrate the values inherent in sustainable development into all aspects of learning to encourage changes in behavior that allow for a more sustainable and just society for all (UNEP, 2012, 2014; UNESCO, 2009, 2012, 2014). Its scope covered a wide range of areas, including: climate change, biodiversity, water, SCP and disaster risk reduction (UNESCO, 2014). Yet, while education for sustainable development is recognized and advocated as important in all these areas (UNESCO, 2012), so far this has not translated into systematic incorporation of lessons learned, challenges and policy recommendations from these efforts into UN flagship reports, including some from UNESCO. Efforts to bridge this gap and share the lessons learnt from these programs more broadly in the UN system could be an avenue for progress in coming years.

For some SDG areas, we find a relative simplicity of the messages and links that are put forward, to the point that it is sometimes difficult to separate advocacy from evidence-based messages. Taking SDG10 as an example, the messages regarding the links between education and inequality that are

emphasized in the set of reports analyzed here seem to sometimes reflect contradictory messages and imperfect understanding of the way in which these links operate. Going forward, it would be important to understand whether this lack of clarity reflects the state of scientific knowledge, or inadequate synthesis of that knowledge in UN flagship reports.

For many SDG areas, while causal links are identified and highlighted as important, the constraints that exist in relation to exploiting those links are not elaborated upon, or no concrete policy messages are provided. Taking energy as an example, while the set of publications analyzed here documents the importance of electricity access for educational facilities (with impacts on e.g. quality of education, access to IT-based content, etc.), no corresponding policy recommendations are provided. This means that policies that would focus on access to electricity of educational facilities on a priority basis compared to other electricity uses (e.g. in a context of low general access) are not contemplated. For some SDG areas, this may not be a concern. However, for others, one may wonder if further policy analysis may not be warranted.

In some SDG areas, “aspirational” links and synergies are strongly put forward by reports, but the same reports give little exposure to evidence that points to obstacles or limitations to making them work. For example, many reports in our sample emphasize the importance of education for raising awareness on environmental issues and for sustainable consumption. Yet, scientific literature has documented the gaps between awareness raising and education on those issues, changes in beliefs and values, and changes in behavior that such education aims to trigger (e.g. Heberlein, 2012; Moser & Dilling, 2010; etc.). The nuances from the literature, while acknowledged by some of the reports, do not come across strongly as a whole.

Similarly, while some reports lament insufficient resources being devoted to specific topics, few seem to acknowledge that this merely reflects the low priority given to them by governments. Hence, policy

recommendations provided by the reports in these areas may be perceived as shaky, naïve or too optimistic. In some areas, very little is provided in terms of concrete recommendations for implementing and scaling up education on these topics. From a science-policy perspective, this can seem surprising, given the UN initiatives mentioned above that focus on education for sustainable development in general, as well as on narrower areas of education. Reflecting lessons learned from these programs more systematically in UN flagship reports focusing on education would seem to be an avenue for progress in coming years.

At a more general level, while our sample of reports draws a comprehensive picture of interconnectedness between education and other SDGs, the perspective in most reports has a strong focus on developing countries, and relatively little on developed countries. If the SDGs offer a universal set of goal applicable to all countries, the perspective of UN flagship reports will have to integrate different regions and contexts more consistently.

Finally, even though their sum provides a good bird's eye view of the links between education and the other SDGs, because of the specialized focus of many reports, questions regarding the desirable allocation of resources to different sub-components of the educational system across the various SDG areas are hard to answer. A generic policy issue in this regard might be, in which area of education is it worth putting a government's marginal dollar, given current circumstances and national priorities for the future? This is an immediate question facing policy-makers in the face of a multi-dimensional development agenda; yet, lack of an integrated, cross-sectoral look at education in relation to the rest of the system prevents answering it.

5 Conclusion

In this paper, we examine the links between education and the other SDGs, as reflected in recent major global reports from the UN system. We focus on the way these publications, taken as a whole, identify

specific conceptual (causal) links among education and other SDG areas; the constraints and challenges that they emphasize in relation to these links; and the policy recommendation that they put forward.

Our analysis shows that the UN system has not waited for the adoption of the SDGs to investigate links between education and multiple areas of sustainable development. Taken together, global reports produced in recent years capture a rich network of linkages between education and other SDG areas. While some connections might seem intuitive and obvious, others are not. Indeed, our analysis shows that no single UN report has considered all the potentially relevant links, so that a comprehensive overview can be obtained only by looking at many reports together. Different UN organizations tend to emphasize different links, in general the ones that relate directly to their mandates, which contribute to an aggregate picture that is much more complete than any of its components.

In spite of this comprehensiveness of the aggregate picture, we identify several gaps in terms of links that are not well covered by the sum of reports produced by the UN system. Those include links between education and energy, water, urbanization, terrestrial ecosystems and oceans. We also point to unequal focus across areas on translating evidence on linkages into policy implications. In both cases, there would be a need to investigate whether the gaps are due to little exploration of these links in the literature, or to the fact that available evidence and insights are not adequately reflected in the reports. In the former case, this would call for scientific research covering those links; in the latter, for stronger connections between UN flagship reports and the available knowledge base, inside and outside the UN system. In some areas, both may be necessary. Doing so would be an important undertaking going forward, as it would allow for a full assessment of the UN science-policy interface on education.

This paper is not policy prescriptive. We do not attempt a detailed analysis of the policy recommendations contained in the reports we looked at. Our

recommendations instead focus on possible ways in which the UN system could improve its coverage of the links between education and other SDG areas. Yet, we think that the systematic analysis undertaken here can provide an initial basis for an integrated analysis of policy priorities for education in the context of the SDGs. Versions of the “conceptual map” of the links between education and other SDGs and other results presented in this paper could be used as a basis for dialogue between the policy community and scientists. Specifically, an examination of this map by education experts from both sides could help assess whether all the links that matter in practice are considered; whether the policies that are put forward in UN reports appropriately reflect empirical evidence; and whether the explicit and implicit policy priorities that emerge from the messages of the UN system do indeed suggest the most efficient use of resources to promote education-related goals in the broader context of the SDGs. We think that this next step would be quite a valuable undertaking. Doing it seriously would, in our opinion, require a team of education experts from different sub-fields, and several months of work – typically the work involved in a UN or World Bank flagship report.

The material collected for this study could be utilized in a number of other ways. An avenue for research would be to focus on the role of education in clusters or “nexuses” of SDG areas. The literature on sector

clusters often offers greater depth of examination of the interlinkages among sectors, in a greater variety of contexts (for example, at different geographic scales and in locations at different levels of development), and correlatively more complex and nuanced policy perspectives. Focusing on specific clusters would be a good way to further investigate whether messages from UN flagship publications adequately reflect this complexity.

In a modeling perspective, the map that we derived for education could be used as a benchmark to assess how existing scenario models address the links between education and other SDG areas. If combined with similar maps for other SDG areas, the map could also be a building block for a reference map of the whole SDG system that comprehensively reflects feedbacks and interdependences among sectors, supporting efforts towards modelling of the SDGs in the context of an integrated biophysical and economic system – a research agenda that is rapidly developing (UN, 2015).

Finally, the methodology developed for this paper has potential application for areas other than education. It could help organizations whose work focuses on other SDG areas to map linkages between those and other SDGs, and assess how well these linkages are reflected in their work.

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