

Cultivating the Future: Sustainability Education and the International Baccalaureate Programme

Anmar Kamalaldin

Caroline Michel

Kelly Sweet



Blekinge Institute of Technology
Karlskrona, Sweden
2016

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Thesis submitted for completion of Master of Strategic Leadership towards Sustainability,
Blekinge Institute of Technology, Karlskrona, Sweden.

Abstract: With an introduction to the Sustainability Challenge and Sustainable Development this paper discusses the role of education as an important strategy in the transition towards sustainability. It argues that Sustainability Education (SE) should be infused into the curricula, especially at the adolescence stage. The research uses the Framework for Strategic Sustainable Development as an approach for backcasting from the envisioned future: the ideal secondary school graduate equipped to meet the Sustainability Challenge.

By conducting a meta-analysis of literature, the research develops the Criteria for Analysing Sustainability Education (CASE). In terms of Knowledge, it advises developing awareness of Sustainable Development, Economy, Environment and Society. With regard to Skills, it includes Cognitive Thinking Skills, Practical and Functional Skills, and Interpersonal Skills. In relation to Attitudes, it comprises Attitudes about Self and Attitudes about People and Planet.

The paper then evaluates the International Baccalaureate (IB) Programme, using the CASE and interviews with practitioners, with focus on curriculum design of the Middle Years Programme, Diploma Programme, and Learner Profile. It concludes that the IB generally aligns with the criteria for quality SE, but some gaps exist. The paper suggests recommendations that can further improve the IB with regard to SE.

Keywords: Sustainability Education, Curriculum, International Baccalaureate, Strategic Sustainable Development, Secondary Education

Statement of Contribution

*“The strength of the team is each individual member.
The strength of each member is the team.”*

~ Phil Jackson

The thesis journey began in December 2015 when ‘**Team CAKE**’ was formed, representing the first letters of the researchers’ names and the topic; **C**aro, **A**nmar, **K**elly, and **E**ducation. In the beginning, the team discussed their goals, strengths, weaknesses, hopes and fears, and agreed on a common purpose to produce an outstanding research paper, but also to enjoy the process and have fun, because *“if it’s not fun, it’s not sustainable!”*. The synergy this team cultivated was amazing. All members were linear and organised in their thinking which made working together efficient and smooth. The team was a perfect combination and each person’s strengths complemented the whole. This paper is a result of equal efforts and hard work by all team members who supported and motivated each other all the way through the process.

Overall, everyone contributed to the literature review, as the scholarly articles and whitepapers were divided amongst the team members to read and summarise them into research memos, which acted as an excellent reference for writing the results. The evaluation of the International Baccalaureate Programme’s documents was also conducted collaboratively by the team members, as well as the analysis and coding of the interviews’ transcripts. Furthermore, each member took part in the writing process of the different chapters of the thesis.

Anmar Kamalaldin: Anmar’s outstanding writing skills helped ensure that the thesis followed an academic writing style. He helped in combining the team’s thoughts into structured paragraphs, and kept track of consistency and professionalism in writing. Anmar joined Kelly in the research trip to Bangkok, Thailand, to conduct interviews with practitioners at NIST International School. He helped during the interviews by harvesting, asking supplementary questions and transcribing. With regard to logistics, Anmar was the main contact with the thesis advisor, and he took care of updating the team’s schedule.

Caro Michel: Caro’s meticulous attention to detail was incredibly helpful. She was in charge of all the referencing, ensuring that everything was accurately cited. She also formatted the entire report. Caro did a great job with organising the data in a very efficient way, and created the tables and spreadsheets needed. Although Caro could not join the research trip to Bangkok, she transcribed half of the interviews and was able to view them from a different perspective.

Kelly Sweet: Kelly’s experience as a former IB teacher significantly enriched the research. She facilitated all of the interviews in a professional manner. Kelly’s exceptional organisational skills made the research process very organised and well planned, and she capably managed the daily and weekly agendas. Moreover, as a native English speaker with excellent writing skills, Kelly helped out with writing and expressing the team’s thoughts and ideas. Regarding logistics, she was the main contact with the IB Organization and NIST International School.



Anmar Kamalaldin



Caroline Michel



Kelly Sweet

Karlskrona, Sweden - 25 May 2016

Acknowledgements

“Feeling gratitude and not expressing it is like wrapping a present and not giving it.”

~ William Arthur War

We are extremely grateful to our primary advisor, Pia Lindahl, for sharing her time, knowledge and patience with us. We truly appreciate Pia’s unflagging positivity and encouragement. To our secondary advisor, Merlina Missimer, thank you for your expertise and critical eye for SSD.

Throughout this thesis journey, we have carried with us a vision of the ideal graduate, a student who will truly make a difference in the world. ‘Sustainable Sally’ is our dream for the next generation. We would like to thank our imaginary friend for acting as a guidepost and touchstone during this adventure.

NIST International School in Bangkok opened their doors to us and invited us to see how a sustainability focused IB institution can thrive. We are grateful to the teachers, staff, administrators and students who volunteered their time to speak with us, especially Teresa Tung who organised our trip and made us feel so welcome.

We are thankful for the cooperation of the International Baccalaureate Organization. Angela Riviere, a Senior Curriculum Strand Manager, lent her knowledge and expertise in all things related to the IB, and gave us insight into the inner working of the organisation. We are grateful she agreed to share her time with us.

Our team had the good fortune to be invited to attend a workshop with Compass Education designed to help educators integrate sustainability and systems thinking into their teaching. This was an invaluable experience to understand the challenges and opportunities teachers have on the front lines in the classroom. We are so grateful to have been afforded that opportunity.

A big thank you goes to the MSLS 2016 class and staff. They have created a safe bubble for us to explore and grow over the past 10 months and have encouraged us during the thesis journey. Extra thanks goes to our peer feedback group for their time and support.

Finally, we send our warmest appreciation and gratitude to our families and friends. We are indebted to them for their unwavering support and unconditional love.

Executive Summary

Introduction

The Sustainability Challenge has risen out of the rapid global changes in the last few decades. Increasing global attention is being given to Sustainable Development (SD) because of growing ecological and social problems that humanity is facing. While education is an objective in itself for Strategic Sustainable Development (SSD), it is also an important means to achieve other SSD goals. Raising awareness and educating the next generation about the Sustainability Challenge is an important strategy in moving towards a sustainable society. Therefore, Sustainability Education (SE) should be infused into curricula. The scholarly literature suggests a multidisciplinary approach that integrates SD. SE should be included in all levels of education, but specific attention should be given to the adolescence stage, as influences in this time period have a great impact on adult life. Curriculum is an important building block of education, and represents the knowledge, skills and attitudes to be acquired. This paper suggests how SE should be infused into curricula, and how curriculum should be evaluated against the desired outcomes in order to identify and eliminate gaps.

This paper also evaluates the International Baccalaureate (IB) Programme in terms of SE. The IB is a worldwide programme aiming to develop internationally minded people who contribute to creating a better world. The research focuses on the curriculum design of the IB Middle Years Programme (MYP), Diploma Programme (DP) and the Learner Profile (LP). With more than 1,250,000 students across 147 countries, the IB could be a remarkable platform for developing the next generation of sustainability leaders and global citizens. In light of this, the research primarily focuses on the following questions:

***Research Question 1:** What are the literature based criteria for quality Sustainability Education in terms of the knowledge, skills, and attitudes necessary for a successful secondary school graduate?*

***Research Question 2:** How does the International Baccalaureate Programme curricula currently align with the criteria for quality Sustainability Education?*

Methods

The Framework for Strategic Sustainable Development served as an overarching approach for this research, as it facilitates backcasting from the envisioned future. This research defines the vision of success as graduating students with the necessary knowledge, skills, and attitudes needed for meeting the Sustainability Challenge. Actions can be taken to align the IB curriculum with the aims of quality SE as a strategic move toward sustainability.

Phase 1: Building the Criteria for Analysing Sustainability Education

A meta-analysis of literature was conducted to identify aspects of quality SE. Keywords were categorised into Knowledge, Skills and Attitudes, then clustered into Groups and Subgroups.

Phase 2: Evaluating the International Baccalaureate

The IB MYP, DP and LP were evaluated using the Criteria for Analysing Sustainability Education (CASE). Interviews with practitioners were conducted to bridge theory and practice. Based on the evaluation and interviews, actions for improvement were recommended.

Results of Phase 1: Building the Criteria for Analysing Sustainability Education

Based on the literature review, this research has developed a comprehensive framework, the CASE, which highlights the Knowledge, Skills, and Attitudes required for quality SE.

| Knowledge | | | |
|----------------------------------|--|---------------------------------|-----------------------------|
| Sustainable Development | Economy | Environment | Society |
| Sustainability Challenge | Economic Development & Policy | Natural Science | Social Science & Humanities |
| Sustainable Development Concepts | Corporate Responsibility | Climate Change | Human Rights |
| | | Natural Heritage & Resources | Human Security |
| | | Land & Water Management | Health |
| | | Environmentally friendly Living | Governance |
| Skills | | | |
| Cognitive Thinking Skills | Practical & Functional Skills | Interpersonal Skills | |
| | Technical & Quantitative Skills | Communication Skills | |
| | Process Skills | Managing Self | |
| | | Managing Others | |
| | | Managing Situations | |
| Attitudes | | | |
| Self | | People and Planet | |

Knowledge

In terms of SD, the Sustainability Challenge must be part of students' learning and they should be aware of the problems that are threatening the planet.

In terms of Economy, students must recognise that economic concerns are a contributing factor rather than a primary goal. Students should understand issues of Economic Development and Policy. They should also be aware of corporations' responsibilities toward society and environment, often called Corporate Social Responsibility.

With regard to Environment, Natural Science is considered as a carrier subject for many important issues within environmental sustainability. Climate Change has been established as a separate topic to give it more emphasis as a vital concern. In addition, graduates must be aware of the importance of Natural Heritage and Resources and how to preserve them. Furthermore, students must know how to live out the principles they are learning.

Regarding Society, graduates need fundamental proficiency in Social Sciences and Humanities. Additionally, understanding Human Rights allows students to view sustainability from social and cultural perspectives. Human Security should be an important part of students learning as well, including Human Settlement, and Peace and Conflict, as students need to be committed to building a culture of tolerance and nonviolence. Students should also understand

the importance of preserving and promoting human health as one of the tenets of sustainability. Moreover, students should understand governance structures and systems, and how individuals and organisations can engage in them in order to face global challenges.

Skills

Cognitive Thinking Skills include Strategic Thinking, Systems Thinking, Critical Thinking, Independent Thinking, Creative Thinking, Interdisciplinary Thinking, Future Thinking, Inquiry and Investigation, Understanding Interdependence and Interconnectedness of Issues, and Viewing Issues from Multiple Perspectives including Local and Global Perspectives. These are all essential for SE.

Practical and Functional Skills include Technical and Quantitative Skills, as students should have the ability to select and utilise appropriate technology while considering social, environmental and economic contexts, as well as the ability to understand and interpret data. They also include Process Skills, which enable active participation in a sustainable society.

In terms of Interpersonal Skills, effective Communication Skills are essential for communicating sustainability related matters and for functioning effectively with others. Also, students need the skills to manage themselves when they are alone or working in group environments. Moreover, the ideal graduate would have learned to manage transition processes in reaction to a rapidly changing world.

Attitudes

Attitudes include outlooks on personal life and ways of viewing the world. The ideal graduate, ready to face the Sustainability Challenge, must look inward at themselves before they are able to look outward to the world. Students need to be internationally minded and aware of the wider world which means that they have to develop a feeling of their own identity, but also a respect for other people and an appreciation of cultural diversity. It is also essential to act responsibly toward nature and the environment.

Results of Phase 2: Evaluating the International Baccalaureate

By examining the IB Learner Profile, as well as the Subject Guides of the Middle Years Programme and Diploma Programme, the research has established which Elements of the CASE are covered in the curricula.

Knowledge

The concepts involved in SD are firmly embedded in the IB curriculum, both implicitly and explicitly. Concerning Economy, the idea of balancing human, planet, and economic interests is present throughout the curriculum in a more holistic manner and specifically in some areas of the DP. In relation to Environment, as science is a mandatory component in both MYP and DP, IB graduates have a strong foundation in the sciences. The Causes and Effects of Climate Change are not specifically addressed in the MYP curriculum materials, but are present in most of the DP Sciences. The DP course, Environmental Systems and Societies, is essentially a comprehensive environmental and social sustainability course, however; not all students opt to take this class.

With respect to the Society category, all Elements of the Social Sciences and Humanities are addressed throughout the MYP curriculum documents, with the exception of Epistemology, which is addressed within the Theory of Knowledge course at the DP level. Most of the other Elements in this Group are covered within the MYP Global Contexts or Key and Related Concepts, and in individual DP Syllabi. The major omissions in the IB curricula involve HIV/AIDS and Disease Control and Prevention.

Skills

All Elements of Cognitive Thinking Skills are acknowledged in the IB curricula. They are covered through Approaches to Learning (ATL) connections and the Aims of most MYP and DP subjects, and the LP attributes. The concept of Systems Thinking is indirectly embedded throughout the curricula, however the term is only explicitly mentioned in one subject, DP Environmental Systems and Societies. Also, there are a few references to Future Thinking in some aspects in the curricula, but it is not adequately covered in the MYP.

In terms of the Practical and Functional Skills Group, Technical and Quantitative Skills are well covered in both MYP and DP especially in Mathematics and Sciences. The ATL, which apply to both MYP and DP, acknowledge all Elements of Process Skills. The required projects in both MYP and DP also foster Process Skills.

With regard to Interpersonal Skills, the IB strongly emphasises Communication Skills. However, Negotiation skills are not often touched upon. In relation to Managing Self skills, they are well addressed throughout the curricula and largely driven by the projects and the core of MYP and DP, as well as by ATL. Regarding the skills in Managing Others, there is significant focus on learning to work in teams during a student's IB study. However, Elements that are linked to facilitation capabilities, have limited presence in the subjects. Concerning Managing Situations, the skill of Managing Uncertainty is comprehensively acknowledged across the LP, MYP and DP. On the other hand, Managing Complexity and Managing Change skills are only adequately covered in some areas.

Attitudes

The IB lends itself to fostering Attitudes in alignment with the CASE, particularly through the LP. With regard to Attitudes about Self, all Elements are covered either by the LP, ATL or MYP Global Contexts. In the DP, these attitudes are particularly addressed in the Aims of Theory of Knowledge and Creativity, Action and Service. Regarding Attitudes about People and Planet, the IB covers all Elements. A special emphasis lays on International Mindedness, and Tolerance and Respect for Diversity. However, Intergenerational Responsibility is only adequately touched upon in the IB curricula.

Recommendations

Based on the evaluation that was undertaken, the following recommendations are suggested to further improve the IB curricula with regard to SE and SSD:

1. Integrating more SE Elements into the programme curricula;
2. Sustainability oversight;
3. Support and resources for teachers.

Discussion

It is important to highlight the difference between SD and SSD. The literature review did not support the inclusion of SSD in curriculum, as the Knowledge, Skills and Attitudes are SD related. While Strategic Thinking is included as a skill, it is applied in a general sense. However, the literature does suggest using strategic methods to develop changes in curriculum to include sustainability elements, so SSD concepts can be applied. Education itself can be a strategic move towards sustainability, as can the implementation of SD concepts in a curriculum. The CASE can be used as a tool for this strategy. Although the CASE may be used as a checklist to enable simple comparison, ideally it should be looked at from a holistic viewpoint. It is a thinking tool rather than a prescription.

The main strengths of the IB curricula lie in the LP, the core elements, and the interdisciplinary approach. The LP covers the majority of the Skills and Attitudes vital to the ideal graduate. In the core elements, students learn skills and concepts that will help them understand and contextualise knowledge. The interdisciplinary approach put forth in the IB curricula allows for a holistic and interconnected view of the world. While the IB Organization is an independent body, it faces external pressures, such as differing educational perspectives of local communities, schools, and universities. This is particularly apparent in the DP, where university requirements demand a prescriptive and sometimes rigid treatment of knowledge. While Leadership Skills seem to be a weak point in the IB curricula, this depends on the chosen definition of leadership. The traditional mentality of a leader directing the actions of others is not apparent in the curricula, yet a more modern view of a leader as a facilitator is apparent.

It should be noted that although curriculum development is a fundamental part of the education system, it is only one part of the larger equation. How a teacher unpacks and presents the material in the classroom is of vital importance, and a curriculum should support the teachers rather than restrict them. It is observed that the IB does not only provide the curricula, but also a community of practice, including workshops and conferences. This is especially important given the international nature of the programme.

Conclusion

In conclusion, education plays a major strategic role in moving society towards sustainability. While several SE frameworks exist, they generally address SD rather than SSD. In order to ensure that curricula provide quality SE, they should include particular aspects that foster sustainability literacy. The CASE, developed by this paper, provides a list of the required Knowledge, Skills and Attitudes that can be viewed as important stepping stones in strategically moving society towards sustainability. The CASE can be used throughout the world to develop, evaluate, or align curricula, fostering widespread improvements in SE.

By analysing the IB curricula, including the LP, MYP and DP, in comparison to the CASE, it can be concluded that the IB generally aligns with the criteria for quality SE. Although the IB was not solely designed as an SE model, the Aim of its LP and the interdisciplinary approach of the IB naturally lend themselves to SE. However, some gaps have been identified; and recommendations have been suggested to further improve the IB curricula in relation to SE. The popularity and prevalence of IB across the globe provides a platform for widespread change. If IB adopts a recommendation based on the CASE and moves toward a more comprehensive coverage of SE, students and communities in 147 countries can benefit from a generation of young adults equipped to tackle the Sustainability Challenge.

Abbreviations

| | |
|--------|---|
| ATL | Approaches to Learning |
| CAS | Creativity, Action, Service |
| CASE | Criteria for Analysing Sustainability Education |
| CSR | Corporate Social Responsibility |
| DESD | Decade of Education for Sustainable Development |
| DP | Diploma Programme |
| EE | Extended Essay |
| EfS | Education for Sustainability |
| ESD | Education for Sustainable Development |
| FSSD | Framework for Strategic Sustainable Development |
| IB | International Baccalaureate |
| IBO | International Baccalaureate Organization |
| IPCC | Intergovernmental Panel on Climate Change |
| K-12 | Kindergarten through grade 12 |
| LP | Learner Profile |
| MDGs | Millennium Development Goals |
| MYP | Middle Years Programme |
| NGO | Non-Governmental Organisation |
| OECD | Organisation for Economic Cooperation and Development |
| SD | Sustainable Development |
| SDGs | Sustainable Development Goals |
| SE | Sustainability Education |
| SPs | Sustainability Principles |
| SSD | Strategic Sustainable Development |
| TOK | Theory of Knowledge |
| UN | United Nations |
| UNCED | United Nations Conference on Environment and Development |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| USPESD | United States Partnership for Education for Sustainable Development |
| WCED | World Commission on Environment and Development |

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1 Introduction

1.1 The Sustainability Challenge

“The human race is challenged more than ever before to demonstrate our mastery, not over nature but of ourselves.”

~ Rachel Carson (1962)

The world is facing critical problems and the fate of humanity depends on the decisions and actions of this generation. Recent changes in many aspects of human activity bring about new opportunities and challenges (de Leo 2012). Arising from these changes is the Sustainability Challenge, stressed by the growing ecological and social problems that humanity is facing, such as climate change and poverty. What makes the Sustainability Challenge even more difficult is the continuous increase in the world’s population. It has already reached 7 billion people, and it is estimated to grow to 9 billion by the year 2050 (UN 2014). This makes the demand for the limited natural resources even higher, which could increase both ecological and social issues. Humanity is already equal to or surpassing the carrying capacity of the planet and the implications have a global reach (Steffen et al. 2004; Rockström et al. 2009).

The Industrial Revolution of the 18th to 19th centuries was a turning point in Earth’s ecological and social systems. While it has led to positive improvements, such as advancing technologies, health and life longevity, it has also led to severe negative impacts both environmental and social. These include pollution and climate change caused by a number of factors such as the high dependence on fossil fuel energy (McLamb 2011). Climate change is unequivocal, with unprecedented warming of the atmosphere and oceans. Researchers are observing rising sea levels, diminished snow and ice, and an increase in the concentration of greenhouse gases (IPCC 2013). Industrialisation has created many social problems involving worker safety and rights.

In addition to the increase and prevalence of industry, humanity faces other social challenges as well. An example is the decreasing levels of trust in many societies as indicated by multiple studies such as the 2016 Edelman Trust Barometer (Edelman 2016). This is not only a critical social problem in itself, but it also suggests that society may be unable to unite to address the ecological issues as argued by Broman and Robèrt (2015). Furthermore, income gaps are widening. According to Dabla-Norris et al. (2015), the economic gap between the poor and the rich is higher than in the past several decades and there exist severe inequalities in access to basic needs such as education and healthcare. Additionally, in spite of the progress in poverty reduction over the past decades, the number of people living in extreme poverty is still disproportionately high. According the World Bank in 2012, more than 12% of the world population lived on less than \$1.90 a day, which is below the international poverty threshold (The World Bank Group 2015).

1.2 Sustainable Development

“Sustainable development? It means that everybody does something for the world.”

~ Six-year-old boy from Poland (UNESCO 2012a)

In light of the Sustainability Challenge that civilisation is confronting, increasing global attention is being given to Sustainable Development (SD). The classic definition of SD is the one suggested by the World Commission on Environment and Development (WCED) in 1987. It published a report titled ‘Our Common Future’ (also known as the Brundtland Report) which defined SD as *“development which meets the needs of the present without compromising the ability of future generations to meet their own needs”* (WCED 1987).

There is a serious need for a transition from the current unsustainable society to a one that is socially and ecologically sustainable. In other words, society must function and prosper without degrading the life supporting systems, in a way that maintains human well-being within ecological and social boundaries (Broman and Robèrt 2015). These boundaries have been represented in the form of eight Sustainability Principles (SPs), which are highlighted in the Framework for Strategic Sustainable Development (FSSD) (Robèrt, Broman, and Basile 2013; Missimer, Robèrt, and Broman 2016). The FSSD provides a clearer and more operational definition of sustainability that is grounded by scientific basis of ecological and social systems, allowing for defining the aim of sustainability without basing it only on current trends (Missimer, Robèrt, and Broman 2016). The SPs are as follows (Broman and Robèrt 2015):

“In a sustainable society, nature is not subject to systematically increasing ...

- 1. ... concentrations of substances extracted from the Earth’s crust;*
- 2. ... concentrations of substances produced by society;*
- 3. ... degradation by physical means;*

and people are not subject to structural obstacles to ...

- 4. ... health.*
- 5. ... influence.*
- 6. ... competence.*
- 7. ... impartiality.*
- 8. ... meaning-making”.*

Many other definitions of SD have emerged in the past decades. However, common themes include equity and fairness, the precautionary principle, and the complex interconnections between society, the environment, and the economy (UN 2010). These definitions and principles have been used to develop goals to meet the challenge. In an attempt to address the Sustainability Challenge, countries’ leaders gathered at the United Nations (UN) headquarters in 2000 and signed the Millennium Declaration, which targeted achieving a set of eight goals by 2015, the Millennium Development Goals (MDGs) (Sustainable Development Goals Fund 2015; *Appendix A*). As the MDGs were set to expire in 2015, a new set of Sustainable Development Goals (SDGs) have been adopted. In September 2015, the UN General Assembly approved a document containing 17 SDGs aiming to end poverty, protect the planet, and ensure prosperity for all as part of a new SD agenda across 15 years; from 2015 to 2030 (UN 2015; *Appendix B*).

1.3 Sustainability Education

“The world can’t achieve global sustainability without widespread sustainability education.”
~ Roberta Johnson (2012)

Education is an objective in itself for Strategic Sustainable Development (SSD), as highlighted in Goal 4 of the SDGs which promotes equity in access to education and life-long learning, as well as SP 6 of the FSSD stating that there should be no obstacles to competence (UN 2015; Broman and Robèrt 2015). However, education is also an important means to achieve other goals; as learning is the heart of transition toward sustainability (UNESCO 2005).

One of the major issues that need to be addressed for the transition towards a sustainable society is raising awareness and educating people about the Sustainability Challenge. In terms of SSD, educating the next generation is a strategy in moving towards a sustainable society. De Leo (2012, 1) argues that in times of change societies have always relied on education to develop knowledge, skills and values that are necessary for addressing new challenges, especially in times of transition and crisis. The American philosopher and psychologist John Dewey, who was also known as an educational reformer, held the view that education should be designed in accordance to the desired outcome. He stated that *“unless we know the end, the good, we shall have no criterion for rationally deciding what the possibilities are which should be promoted”* (Dewey 1916, 103). Dewey’s concept of ‘knowing the end’ is another strategy used in SSD called backcasting.

Therefore, the education sector plays a major role in SSD for preparing leaders who are willing and capable to be part of the solution. As Göran Broman and Karl-Henrik Robèrt stated *“The question of reaching sustainability is not about if we will have enough energy, enough food, or other tangible resources - those we have. The question is: will there be enough leaders in time?”* (Blekinge Tekniska Högskola 2015). In order to prepare future generations for the Sustainability Challenge, students must be taught the knowledge, skills and attitudes to become global citizens who are ready to accept that challenge. Hence, Sustainability Education (SE) should be infused into the design of school curricula, as schools act as the communities’ centres for learning (Compass Education 2014).

Various other terms have been used for this field of education, such as ‘Education for Sustainable Development’ (ESD) (Summers, Childs, and Corney 2005), ‘Education for Sustainability’ (EfS) (Littledyke, Taylor, and Eames 2009), and ‘Education for a Sustainable Future’ (Rowe 2007). The term SE will be used throughout this paper, as it is broadly seen as more inclusive than other terms (Sterling 2003).

There are several suggested definitions for SE. For example, The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines ESD as *“Education that allows learners to acquire the skills, capacities, values and knowledge required to ensure sustainable behaviour and lifestyles, inspired by creative and critical thinking, in order to encourage the resolution and management of problems that stand in the way of sustainable development”* (UNESCO 2005a). Alternatively, *“EfS is defined as a transformative learning process that equips students, teachers, and school systems with the new knowledge and ways of thinking we need to achieve economic prosperity and responsible citizenship while restoring the health of the living systems upon which our lives depend”* (The Cloud Institute for Sustainability Education 2015). While several definitions of SE exist, most stress a few key elements that need to be fostered; knowledge, skills and attitudes.

Dr. Joy M. de Leo (2012) has provided a brief history on the evolution of SE (a brief timeline is outlined in *Appendix C*). It has evolved from ‘Environmental Education’ which first began to emerge in the late 1960s, and has since expanded to include SD and socio-cultural issues (de Leo 2012). A key milestone for SE was publishing Agenda 21 by The UN Conference on Environment and Development (UNCED) in 1991 (Wals 2009). Chapter 36 of Agenda 21 discusses promoting education, public awareness and training with special emphasis on: “1. reorienting education towards sustainable development, 2. increasing public awareness, 3. and promoting training” (UN 1992).

Another landmark for SE was the declaration of the UN Decade of Education for Sustainable Development (DESD), 2005-2014, underscoring that education is crucial for accomplishing SD (DESD 2008). In view of that, the UNESCO World Conference on ESD was held in 2009 in Bonn, Germany, and published the ‘Bonn Declaration’ which highlighted progress and challenges in the field, and included a call for action at both policy and practice levels (Bonn Declaration 2009). During DESD, UNESCO identified five pillars central to ESD, highlighting the knowledge, skills and values needed by individuals to sustainably improve their quality of life. The five pillars are (Wals 2009):

1. Learning to know
2. Learning to be
3. Learning to live together
4. Learning to do
5. Learning to transform oneself and society”.

UNESCO has also stated fifteen strategic sub-themes that should inform SE, falling under socio-cultural, environmental and economic perspectives. They represent what are considered to be important concerns that should be addressed in the transition towards sustainability (see *Table 1.1*; UNESCO 2006).

Table 1.1 UNESCO's Strategic Perspectives of ESD.

| | |
|-----------------------------|---|
| Socio-cultural perspectives | <ul style="list-style-type: none"> • Human Rights • Peace and human security • Gender Equality • Cultural Diversity and intercultural understanding • Health • HIV/AIDS • Governance |
| Environmental Perspectives | <ul style="list-style-type: none"> • Natural Resources (water, energy, agriculture, biodiversity) • Climate Change • Rural development • Sustainable urbanisation • Disaster prevention and mitigation |
| Economic Perspectives | <ul style="list-style-type: none"> • Poverty reduction • Corporate responsibility and accountability • Market economy |

Motivated by the DESD, the United States Partnership for Education for Sustainable Development (USPESD), which consists of almost 100 individuals, organisations and institutions in the US dedicated to SE, has suggested 'EfS Standards'. The standards are an example of SE frameworks, and define the necessary elements for primary and secondary school students to be sustainability literate. They include three overarching student learning standards, each consisting of components that are connected to them (see *Table 1.2*; USPESD 2009).

Table 1.2 USPESD's EfS Standards.

| Components | Student Learning Standards (Essential Understandings) |
|---|---|
| 1.1 Intergenerational Responsibility | EfS Standard 1: Students understand and are able to apply the basic concepts and principles of sustainability [...]. |
| 2.1 Interconnectedness 2.2 Ecological Systems 2.3 Economic Systems 2.4 Social and Cultural Systems | EfS Standard 2: Students recognize the concept of sustainability as a dynamic condition characterized by the interdependency among ecological, economic, and social systems and how these interconnected systems affect individual and societal well-being. |
| 3.1 Personal Action 3.2 Collective Action | EfS Standard 3: Students develop a multidisciplinary approach to learning the knowledge, skills and attitudes necessary to continuously improve the health and well-being of present and future generations, via both personal and collective decisions and actions. |

Other SE frameworks have been titled with the term 'global citizenship'. The importance of global citizenship in SE has been highlighted in much of the literature, though there seems to be a lack of research on the pedagogy of global citizenship (Lineham 2013). A framework for education for global citizenship has been provided by Oxfam. It groups the key elements into three categories, knowledge and understanding, skills, and values and attitudes. Oxfam suggests that students should participate in global society in a way that creates a world that is more just and sustainable than the current reality. (see *Table 1.3*; Oxfam 2015).

Table 1.3 Oxfam's Key Elements of Education for Global Citizenship.

| Knowledge and understanding | Skills | Values and attitudes |
|-----------------------------------|--|---|
| Social justice and equity | Critical and creative thinking | Sense of identity and self-esteem |
| Identity and diversity | Empathy | Commitment to social justice and equity |
| Globalisation and interdependence | Self-awareness and reflection | Respect for people and human rights |
| Sustainable development | Communication | Value diversity |
| Peace and conflict | Cooperation and conflict resolution | Concern for the environment and commitment to sustainable development |
| Human rights | Ability to manage complexity and uncertainty | Commitment to participation and inclusion |
| Power and governance | Informed and reflective action | Belief that people can bring about change |

In general, the scholarly literature suggests reorienting education to integrate SD principles and viewpoints into the areas of economics, natural sciences and the environment, and social sciences (McKeown 2002). This multidisciplinary approach allows students to apply what they are learning in the classroom to the Sustainability Challenge, for example (McKeown 2002):

- *“Mathematics helps students understand extremely small numbers (e.g., parts per hundred, thousand, or million), which allows them to interpret pollution data.*
- *Language Arts, especially media literacy, creates knowledgeable consumers who can analyse the messages of corporate advertisers and see beyond 'green wash';*
- *History teaches the concept of global change, while helping students to recognize that change has occurred for centuries.*
- *Reading develops the ability to distinguish between fact and opinion and helps students become critical readers of political campaign literature.*
- *Social Studies helps students to understand ethnocentrism, racism, and gender inequity as well as to recognize how these are expressed in the surrounding community and nations worldwide”.*

1.4 Adolescent Education

“Adolescence is a new birth, for the higher and more completely human traits are now born.”
 ~ Granville Stanley Hall (1904)

The Bonn Declaration (2009) encourages the inclusion of SD issues in formal education at all levels, and specifically suggests involving youth in the process, as influences in this time period have a great impact on adult life. The formative years of adolescence, defined by the UN as

ages 11-19, occur in the stage of life that denotes the passage from child to adult. This period is characterised by physical changes, increases in mental capacity, and formation of identity (IAWGCP 2008). Adolescence is a crucial time for educators to provide scaffolding and structure for learning, as neuroplasticity at this phase of development allows for advancement in cognitive function. This gives a compelling argument to take advantage of newly forming neural systems to foster critical thinking skills including problem solving and differentiation (Dahl 2004). Educators should foster student awareness of the learning processes, methods and skills for learning, in addition to how this learning relates to the world around them (Demetriou, Spanoudis, and Mouyi 2011).

In ‘Educating the Developing Mind’ authors Demetriou, Spanoudis, and Mouyi (2011, 633) stress the importance of the time frame and methods of education used to develop certain skills in students; *“Educational priorities must capitalize on developmental milestones to make education feel relevant, appropriate, and useful for each phase of life”*. During adolescence, students can improve their understanding of metalogic. Educators must aim to cultivate student use, understanding and awareness of logic. At the adolescent stage of development, students are capable of a self-awareness that allows them to see the connection between their epistemological stance and their interpretation of knowledge (Chandler, Hallet, and Sokol 2002; Wildenger, Hofer, and Burr 2010). Problem solving becomes systematic and individuals have an understanding of their knowledge, strengths and weaknesses. This allows adolescents to evaluate mental models and compare them to reality, then develop a plan for their problem-solving efforts (Demetriou 2000; Demetriou and Kazi 2001, 2006).

These findings reinforce the importance of curriculum development during adolescence to fully realise the potential of students and capitalise on their abilities to meet the Sustainability Challenge as they become adults.

1.5 Role of Curriculum

“The aim of education should be to teach us how to think, rather than what to think.”

~ Bill Beattie

There are many interpretations for the term curriculum. The narrowest view consists of a list of what is to be taught to students or what knowledge and skills are presumed to be learned (Squires 1990; GSP 2015). A systematic approach to curriculum comes from the Terminology for Curriculum Analysis espoused by Toombs and Tierney (1993). In this model individual courses are the fundamental building blocks of the curriculum. The courses can be further divided into smaller units. Courses are arranged in sequence, in parallel, or associatively, in terms of technique, methodology or knowledge area. Curriculum developers design and organise courses to achieve common goals or objectives, careful to avoid gaps or redundancies. Often, successful completion of the curriculum leads to the opportunity for certification or credentials (Toombs and Tierney 1993). In a broader definition, curriculum generally refers to outcomes related to knowledge, skills, principles, and values (Levine 1981). Included in this view of curriculum are the learning objectives, educational outcomes, and evaluation processes proposed in the courses or subjects taught, the mission of the school, and the planned experiences provided for the students (Ebert, Ebert, and Bentley 2013; Taylor 1950).

Curriculum evaluation focuses on improving the quality of the curriculum by identifying and eliminating learning gaps in the academic programme. Sometimes called curriculum alignment

or curriculum mapping, the goal is to assess consistency and coherence with the desired outcome of the educational programme (GSP 2015). Additional dimensions of curriculum evaluation include investigating time, space, resources, organisation, purpose, content, outcomes, evaluation, and procedures (Taylor 1950).

1.6 The International Baccalaureate Programme

“The International Baccalaureate aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect.”

~ IBO (2016c)

The International Baccalaureate (IB) Programme began in 1968 as a progressive approach to education focusing on critical analysis, constructivism, and international perspectives (IBO 2015e). Today, IB strives to develop learners that think critically, inquire and ask challenging questions, and are active in their communities (IBO 2016d). In doing so, *“The aim of all IB programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world”* (IBO 2015a).

The IB is a continuum of programmes encompassing ages 3-19, beginning with the Primary Years Programme, continuing with the Middle Years Programme (MYP), and ending with the Diploma Programme (DP) or the Career-related Programme. This comprehensive curriculum is based on ‘best practice’, independent of regional or national curriculum frameworks. In addition to basic coursework, the IB Programme encourages students to investigate various Approaches to Learning (ATL) to discover how they learn best and be engaged in their own learning progress (IBO 2016d). Interdisciplinary projects required throughout the continuum allow students to move beyond classroom learning to investigate their local and international environments (IBO 2016d). *“The aim of curriculum development is: to produce excellent, internationally minded, research-based curriculums and support material that enable students to develop the attributes of the learner profile and the IB mission, thereby providing an excellent preparation for life in the 21st century”* (IBO 2014h).

1.6.1 Learner Profile

The IB Learner Profile (LP) is present throughout the entire IB continuum and embodies the capacities IB strives to develop in its students. The attributes included in the LP signify the commitment to the whole student and personal values. *“The profile aims to develop learners who are: Inquirers, Knowledgeable, Thinkers, Communicators, Principled, Open-minded, Caring, Risk-takers, Balanced, and Reflective.”* (IBO 2016d; detailed description in Appendix D).

1.6.2 Approaches to Learning

The IB commitment to fostering life-long learning is evident in the ATL. The ATL focus on developing the knowledge and skills, both general and discipline specific throughout the MYP and DP programmes. The ATL are: Communication, Social (including Collaboration), Self-Management (including Organization, Affective, and Reflection skills), Research (including

Information and Media Literacy,) and Thinking (including Critical Thinking, Creative Thinking, and Transfer) (IBO 2016e).

1.6.3 Middle Years Programme

The MYP curriculum is designed for early adolescents aged 11-16 with an interdisciplinary approach to learning and a focus on international mindedness. Schools have the option to offer all five years or less, depending on their school structure. During these years, teachers follow a framework to build the curriculum. The framework consists of eight subject groups. Below is the programme model showing the relationship between the aspects of the MYP (*Figure 1.1*; IBO 2016f).



Figure 1.1 MYP Model.

Each subject group has Aims, Objectives, and specific Concepts that must be covered. There are also six over-arching Global Contexts and sixteen Key Concepts shown below in *Table 1.4*. Throughout the MYP curriculum teachers are responsible for incorporating the Key Concepts and Global Contexts into their classroom teaching experiences. MYP provides subject specific Related Concepts to further enhance understanding. Students participate in at least one interdisciplinary unit each year and a personal or community project-based learning experience during their MYP education. The MYP framework is designed to assist students in making real world connections (IBO 2016d).

Table 1.4 MYP Key Concepts and Global Contexts.

| Key Concepts | | | |
|----------------------------------|-------------|-------------------------------------|------------------------|
| Aesthetics | Connections | Form | Perspective |
| Change | Creativity | Global Interaction | Relationships |
| Communication | Culture | Identity | Time, Place, and Space |
| Communities | Development | Logic | Systems |
| Global Contexts | | | |
| Identities and Relationships | | Scientific and Technical Innovation | |
| Orientations in Space and Time | | Globalization and Sustainability | |
| Personal and Cultural Expression | | Fairness and Development | |

1.6.4 Diploma Programme

The DP is the oldest programme in the IB continuum. Designed as a two-year programme for university bound students aged 16-19, the DP focuses on balancing the depth and breadth of knowledge (IBO 2016). Students take courses from six subject groups and participate in the DP core - Theory of Knowledge (TOK), an epistemology class, Creativity, Action, Service (CAS), a learning project, and the Extended Essay (EE), an independent research project (IBO 2016). The structure of the DP is shown in *Figure 1.2* below (IBO 2016b):



Figure 1.2 DP Model.

Within the six DP subject groups are 31 different courses, as listed in *Appendix E*. Students must choose a course from each group to enrol in as Standard Level (SL) or Higher Level (HL). Students sit for summative exams at the end of two years. Receipt of the IB Diploma is contingent on these scores and scores from the core requirements.

“IB education is rooted in the belief that people who are equipped to make a more just and peaceful world need an education that crosses disciplinary, cultural, national and

geographical boundaries” (IBO 2015f). As of February 2016, 4,335 schools offered 5,578 IB programmes in 147 countries worldwide. This represents a 46% increase in the last 5 years (IBO 2016a). With more than 1,250,000 students worldwide, this could be a remarkable platform for developing the next generation of sustainability leaders and global citizens (IBO 2015e).

1.7 Research Questions and Scope

With the conviction that young people must be equipped to meet the Sustainability Challenge, the research primarily focuses on the following questions:

Research Question 1: *What are the literature based criteria for quality Sustainability Education in terms of the knowledge, skills, and attitudes necessary for a successful secondary school graduate?*

Research Question 2: *How does the International Baccalaureate Programme curricula currently align with the criteria for quality Sustainability Education?*

This thesis focuses on the design of the IB MYP and DP in terms of curriculum, including the LP and IB Subject Guides. This research focuses only on curriculum, which is just one facet of quality education. The role of teacher training and curriculum implementation are not investigated. There are also schools that focus on whole-school sustainability including building facilities, transportation, and food sourcing. These topics fall outside the boundaries of this investigation.

2 Methods

2.1 The Framework for Strategic Sustainable Development

The FSSD served as an overarching approach for this research, as it is a model for planning where sustainability is the desired outcome. It consists of five levels to deal with the inter-related pieces of complex sustainability concerns (Broman and Robèrt 2015; detailed in *Appendix F*). Lagun Mesquita, Broman and Hallstedt (2016) have summarised the approach of the FSSD's five levels, stating *“This model suggests that it is of utmost importance to first agree upon the system (level 1) that is to be planned within, and only then to go on to define success (level 2) within that system. Once success is defined, strategic guidelines (level 3) can be determined for the selection and prioritization of actions (level 4); all four of these levels can be supported with various concepts, methods, and tools or other forms of support (level 5)”*.

The FSSD was designed for the purpose of facilitating backcasting from visions framed by a principled definition of sustainability (the eight SPs), as it is a practical and science-based approach to SD (Broman and Robèrt 2015). Backcasting is used for planning and decision making for long term goals in complex systems when compared to forecasting (Dreborg 1996; Robèrt 2000). Forecasting attempts to predict the future by projecting current trends, and therefore it can lead to ‘path dependencies’ (Robèrt 2000; Hukkinen 2003). Conversely, backcasting begins by building a vision of success and then asks: what do we need to do today in order to reach the envisioned future (Dreborg 1996; Robèrt 2000). This aligns with the Dewey's view of planning education models (Dewey 1916). In view of that, the method of backcasting from envisioned success is applied in this research.

The future depends on the preparedness of humans to meet the Sustainability Challenge. In this envisioned future, success can be defined by global citizens with the necessary knowledge, skills, and attitudes. How does society plan for and create this population? Education planning or curriculum mapping can employ the backcasting method to strategically develop a programme of study with the appropriate learning objectives, courses, assessments, and experiences. The IB MYP and DP curricula capitalise on the adolescent phase of development when students are most able to develop critical thinking skills and are forming their identities. The curricula act as a tool for fostering the attributes necessary to the secondary school graduates; therefore, actions can be taken to align the IB curriculum with the aims of quality SE as a strategic move toward sustainability. By using the FSSD, this research aimed to develop the Criteria for Analysing Sustainability Education (CASE), and apply it to evaluate the IB MYP and DP curricula. *Table 2.1* briefly describes the approach:

Table 2.1 The FSSD as applied to SE and the IB MYP and DP.

| | |
|------------------|--|
| System | The IB MYP and DP, within adolescent education in the education sector, within society within the biosphere. |
| Success | Quality SE that prepares secondary school graduates with Knowledge, Skills and Attitudes necessary to meet the Sustainability Challenge. |
| Strategic | Backcasting from success, developing and applying the Criteria for Analysing Sustainability Education (CASE) to the IB Learner Profile, MYP, and DP to identify gaps between current reality and quality SE in the IB curriculum. |
| Actions | Suggesting specific improvements to the IB Organization to bridge the gaps. |
| Tools | Using the FSSD and literature review as tools for developing the CASE, in order to be applied as a tool for evaluating curricula. Semi structured interviews are used as a tool for evaluating the curricula from practical point of view. |

2.2 Phases of Research

The research started with an introduction to the Sustainability Challenge and the role of education in SSD, and outlined the reasoning for choosing to focus on adolescents and the curriculum of the IB, citing the impact quality SE could have for this group. This was based on review of literature and conceptual frameworks. The introduction concluded by stating the research questions and scope. Research utilised a systematic method divided into two phases.

2.2.1 Phase 1: Building the Criteria for Analysing Sustainability Education

A meta-analysis of over 50 scholarly articles and whitepapers was conducted in order to identify aspects of quality SE and to determine what research had already been conducted in this area. It specifically focused on the Knowledge, Skills, and Attitudes cited in scholarly research, with particular preference to articles cited most often. A spreadsheet was devised in order to track, categorise and quantify the data found during the literature review, in order to prepare for the next phase of research. The research team used the databases ERIC (EBSCO), ISI Web of Science, Scopus, and Google Scholar for their literature review and searched for the following keywords: Education for Sustainability, Sustainability Education, Education for Sustainable Development, Curriculum/Curricula, Global Citizenship, Secondary, and High School.

More than 250 keywords were found as criteria for quality SE during the literature review. Keywords representing similar concepts were combined, resulting in 129 'Elements'. The Elements were then sorted into three categories: Knowledge, Skills, and Attitudes, using guiding questions: What does the ideal graduate know? (Knowledge); What can the ideal graduate do? (Skills); What does the ideal graduate embody and/or personify? (Attitudes). The Elements were further clustered by concept into 'Groups' and 'Subgroups' to create a more coherent working framework. The final framework, *The Criteria for Analysing Sustainability*

Education (CASE), stated which Knowledge, Skills and Attitudes should be included in curricula for quality SE. Keywords that were not prominently or frequently stated in the literature were not included in the CASE. The framework was further elaborated to include justifications and examples of the criteria. This phase answered **Research Question 1: What are the literature based criteria for quality Sustainability Education in terms of the knowledge, skills, and attitudes necessary for a successful secondary school graduate?**

2.2.2 Phase 2: Evaluating the International Baccalaureate

An evaluation tool was created as a spreadsheet to compare the CASE to the IB MYP and DP as well as the LP. The CASE evaluation tool provided a structure to categorise, code, and record the overall curricula and official individual Subject Guides of the IB MYP and DP, including the LP (as of Spring 2016). The LP is evaluated in terms of its ten attributes and the description of each one, as well as the overall Aim (*Appendix D*). The MYP is evaluated by examining the Aims, Objectives, and specific Key and Related Concepts of each Subject Guide, as well as the overarching Global Contexts and Projects. The DP Subject Guides are evaluated in a similar approach, considering the Aims, Objectives, Syllabi and Internal Assessments, in addition to the DP core, CAS, EE, and TOK. Both the MYP and DP use the ATL, so those were analysed, as well.

In order to combine the theoretical concepts put forth in written documents with practical experience in a school, the research team interviewed practitioners, including teachers, administrators, and students, at a sustainability focused IB school. NIST International School in Bangkok, Thailand, was selected for conducting interviews due to their commitment to sustainability and the inclusion of the full IB continuum. These qualitative, semi-structured interviews were used to bridge the gap between theory and practice. All interviews were transcribed and coded according to strengths and weaknesses of the IB curricula and recommendations for change. The interviews provided a more comprehensive view of SE and IB curricula than could have been obtained from documents alone, and allowed for a more interpretive, less mechanical process. This phase answered **Research Question 2: How does the International Baccalaureate Programme curricula currently align with the criteria for quality Sustainability Education?**

After completing the evaluation process, the CASE Elements that were not found within the current IB MYP and DP curricula were recorded. Based on the perceived misalignments between the CASE and the IB curricula, actions for improvement were recommended to the IB Organization.

2.3 Validity

2.3.1 Research Strengths

An extensive literature review yielded a broad, comprehensive view of prevailing opinions in the field of SE. The data from the literature review was assessed with both quantitative and qualitative methods. Findings were also validated through personal interactions and interviews with practitioners in the field.

2.3.2 Research Limitations

Although the researchers are from three continents (Asia, Europe, and North America), all have been educated in traditional Western institutions. It is likely that this led to a bias in our analysis. Incorporating a school in Thailand into the research was an attempt to counter this bias; however, the school is an international academy where the language of instruction is English. This may indicate that the school is operating as a Western educational institution within Asia.

Furthermore, ideally interviews are conducted with practitioners at more than one school, and perhaps in different countries in order to gain a wider perspective. However, this does not severely inhibit the findings, as the research focuses on the IB curriculum, which is the same in IB schools all over the world. In addition, only 16 practitioners were interviewed. Increasing the number of interviewees would have strengthened the validity of the research.

3 Results of Phase 1: Building the Criteria for Analysing Sustainability Education

“It is not education that will save us, but education of a certain kind.”

~ David Orr (2004)

To answer *Research Question 1*, scholarly articles and whitepapers were reviewed, and important criteria were identified to be included in curricula for quality SE, resulting in 129 Elements in total. The literature review revealed the necessity of formulating a method for clarifying and refining a list of criteria for quality SE as a tool for SSD. While there were several existing frameworks for SE, each provided only certain aspects of SE, and did not necessarily include other important aspects suggested by different models. This research developed a comprehensive framework, the CASE. The CASE highlights the necessary Knowledge, Skills, and Attitudes required for quality SE. It can be applied to develop a new curriculum, or analyse and evaluate an existing curriculum in terms of preparing students to be true global citizens and consider both environmental and social sustainability. The CASE can act as a reference point for analysis and identifying the disparity between quality SE and curricula in order to bridge the gap. While the Elements of the CASE are divided into categories for the sake of explanation and ease of use, in practice it would be used in a holistic manner, reflecting the interconnectedness of the Categories and Elements. The grouping of these Elements was based on conceptual frameworks found in the literature review and modified to suit the specific purposes of this research.

The following *Table 3.1* is an abbreviated list of Groups and Subgroups and provides references to ensure validity. A complete list of the criteria can be found in *Appendix G*.

Table 3.1 The CASE Groups and Subgroups based on literature review.

| | Baker 2008 | Barth et al. 2007 | Benedict 1999 | Berglund, Gericke, and Rundgren 2014 | Biasutti 2015 | Brunold-Conesa 2010 | Cabeza-Erikson, Edwards, and van Brabant 2008 | Christie et al. 2015 | Clarke 2009 | Dambudzo 2015 | de Haan 2006 | de Haan 2010 | Eco-Schools 2014 | Evitts, Seale, and Skybrook 2010 | Fancett, van Zaanen, and Várfi 2012 | Filho 2009 | Gottlieb et al. 2012 | Gu, Gomes, and Brizuela 2011 | Harris 2008 | Hicks 2012 | Hidalgo and Fuentes 2013 | Holdsworth and Thomas 2015 | Hopkinson and James 2010 | Jickling and Wals 2008 | Johannesson et al. 2011 | Kim, Aymeric, and Changkun 2012 | Lander 2015 | MacDonald 2015 |
|--|------------|-------------------|---------------|--------------------------------------|---------------|---------------------|---|----------------------|-------------|---------------|--------------|--------------|------------------|----------------------------------|-------------------------------------|------------|----------------------|------------------------------|-------------|------------|--------------------------|----------------------------|--------------------------|------------------------|-------------------------|---------------------------------|-------------|----------------|
| Knowledge | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainable Development | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainability Challenge | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainable Development Concepts | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Economy | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Economic Development & Policy | • | | | • | | | • | | | | • | | | | | • | • | | • | | • | | | | • | | • | |
| Corporate Responsibility | | | | | | | | | | | | | | | | • | | | | | | | | | | | | |
| Environment | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Natural Science | | | | | | | | | | • | | | | | • | | • | | | | • | | | • | • | | • | |
| Climate Change | | | | • | | | | | | • | • | | • | | | | | | | • | | | | | | | | |
| Natural Heritage & Resources | | | | • | | | | | | | | • | • | | | | | | • | • | | | • | | • | | | |
| Land & Water Management | | | | • | | | | | | | | | • | | | | | | • | | | | | | • | | | |
| Environmentally friendly Living | | | | | | | | | | | | • | • | | | | • | | • | • | | | | | | | | |
| Society | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Social Science & Humanities | | | | | | • | | | | | | • | | | | | | | | | • | | | | • | | | |
| Human Rights | • | | | • | | | | | | | • | • | | | | | • | | | • | | | | | • | | | |
| Human Security | • | | | • | | | | | | • | | | | | | | | | | • | | | | | • | | | |
| Health | | | | • | | | | | | • | | | • | | | | | | | | | | | | • | | | |
| Governance | • | | | • | • | | | | | | | • | | | | | | | | | | | | | • | | | |
| Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cognitive Thinking Skills | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Practical & Functional Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Technical & Quantitative Skills | • | | | | | | | | | • | | | | | | | | | | | | | | | | | | |
| Process Skills | • | • | | | • | | • | | | • | • | • | | | | • | • | | • | | • | • | | • | • | | • | |
| Interpersonal Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Communication Skills | • | | | | | • | | | | • | • | • | | | | • | • | | • | | | | | • | | | • | |
| Managing Self | • | • | | • | | • | | | | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Managing Others | • | • | | • | • | • | | | | • | • | • | | | | • | • | • | • | • | • | • | | | • | • | • | |
| Managing Situations | • | | | • | | • | | | | | | | • | | | | • | | | • | • | | • | | | • | • | |
| Attitudes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Self | • | • | | • | • | | • | | | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| People & Planet | • | • | | • | • | • | | | | • | • | • | • | • | | | • | • | • | • | • | • | • | • | • | • | • | • |

3.1 Knowledge

Knowledge is a complex and multifaceted concept which can be expressed in a variety of forms which interact with each other, and therefore teaching should not emphasise one aspect of knowledge at the cost of another (Skolverket 2016; USPESD 2009). Some researchers have differentiated between ‘knowing that’ and ‘knowing how’, however; for the purposes of this research, knowledge refers to facts, concepts, and definitions (Miller 1990; Baartman and de Bruijn 2011). The CASE categorises Knowledge Elements according to four main subject areas; Sustainable Development, Economy, Environment and Society as listed in *Table 3.2* below:

Table 3.2 The CASE Knowledge Groups and Subgroups.

| Knowledge | | | |
|----------------------------------|-------------------------------|---------------------------------|-----------------------------|
| Sustainable Development | Economy | Environment | Society |
| Sustainability Challenge | Economic Development & Policy | Natural Science | Social Science & Humanities |
| Sustainable Development Concepts | Corporate Responsibility | Climate Change | Human Rights |
| | | Natural Heritage & Resources | Human Security |
| | | Land & Water Management | Health |
| | | Environmentally friendly Living | Governance |

3.1.1 Sustainable Development

Sustainability Challenge

The Sustainability Challenge that humanity is facing must be part of students’ learning, and they should be aware of the problems that are threatening the planet. These problems are seen from two angles according to the Brundtland Report. First, there are those resulting from the failure of economic development processes, such as hunger, illiteracy, lack of shelter, and poverty. Second, there are issues resulting from mismanagement of the physical environment, including desertification, deforestation, pollution and global warming (WCED 1987). Students should understand both local and global challenges, and how they should link to SD policies and practices, as well as the moral, ethical, social, economic, and environmental implications of development (Oxfam 2015).

According to literature, a particular issue that needs to be emphasised is Population Growth. Students should investigate the carrying capacity of the environment, and how human Population Growth may affect sustainability, in addition to the contributing factors to unsustainable Population Growth, such as the lack of access to reproductive health care and the lack of education (USPESD 2009). For example, they may explore how educating females can have an effect on reducing fertility rates and therefore Population Growth, facilitating progress towards sustainability (McKeown 2002).

Sustainable Development Concepts

Graduates are expected to be able to define sustainability and SD, and it is therefore vital to learn about existing Definitions and Frameworks. For example, they should understand the classic Brundtland definition which considers SD as providing for the present generation without compromising the next generation (WCED 1987). Furthermore, they need to learn that sustainability is a holistic approach to living and problem solving, taking into consideration ecological health, social equity, and economic prosperity for both current and future generations, and being aware of the complexity of SD (USPESD 2009; Holdsworth and Thomas 2015). Examples of SD frameworks that can inform students' learning about sustainability are Oxfam's doughnut (Raworth 2012), the Planetary Boundaries (Rockström et al. 2009), the UN SDGs (UN 2015), and the FSSD including the eight SPs (Broman and Robèrt 2015).

3.1.2 Economy

Economic Development and Policy

Students must recognise that although economic concerns are essential for SD, they are a contributing factor rather than a primary goal, and that the current global market economy does not necessarily prioritise environmental protection nor social and economic equity (UNESCO 2006). Currently, national economic systems are integrated into the international economy through trade, foreign direct investment, capital movements, migration, and the widespread use of technology. This economic globalisation is leading to a wider transformation of local and regional phenomena into global ones, combining economic, social, technological, and political aspects (USPESD 2009). Therefore, students need an understanding of globalisation concepts, including advantages and disadvantages, and how globalisation can contribute positively or negatively to sustainability.

Poverty Reduction is a key area in SD and guides many international commitments and initiatives (UNESCO 2006). Students should understand the history, causes and effects of poverty in their own country and around the world (USPESD 2009). While Poverty Reduction may be the central concern of the economic aspect of SD, it still needs to be understood with respect to social, cultural and environmental dimensions (UNESCO 2006). In addition, students should realise the role of Financing SD as an important means of implementing SD strategies and plans (McKeown 2002). One of the issues related to this area that students may learn about is micro credit, which is a policy of providing small loans to poor people in order to empower them to start business projects, and students can analyse how this can contribute to a community's sustainability (USPESD 2009).

Students are also expected to differentiate between their own wants and needs. They should have an awareness of the factors that drive Consumption Patterns and Behaviours, such as culture and advertising, and that patterns should be adapted considering the environment, human rights and the well-being of communities (McKeown 2002). Having an awareness of the basic human needs, such as food, water and shelter, would make students understand the broader picture of consumption and consumer responsibility (USPESD 2009).

Corporate Responsibility

Graduating students should be aware of the significant role that corporations play in our current world, and that responsibility should extend beyond making profit to include their responsibilities toward society and environment, often called Corporate Social Responsibility (CSR). In other words, CSR addresses balancing and integrating corporate economic responsibilities with social and environmental responsibility (Stubbs and Schapper 2011). This can be referred to as the Triple Bottom Line principle which incorporates these responsibilities and perspectives, thus allowing a holistic understanding (Jones, Selby, and Sterling 2010; Littledyke and Manolas 2010). As corporations have impacts that extend beyond the local community to include the global and international scale, the significance of Multinational Corporations' role has increased. This issue is important in developing the understanding of sustainability, and it is also a key factor in international discussions concerning sustainability (McKeown 2002).

It is vital for students to explore the Design and Manufacturing of products, and the inclusion of sustainability initiatives in the process. Awareness of the environmental and social impacts of material selection and manufacturing techniques, at least at a cursory level, will aid students' ability to understand and demand Corporate Responsibility (Oxfam 2015; Ofsted 2008). An example of sustainable design concepts is 'Cradle-to-Cradle Design' which is a method that takes into consideration the entire life cycle of the product and its materials in order to recycle and reuse components (USPESD 2009).

3.1.3 Environment

Natural Science

Concern for the environment is built upon knowledge of environmental issues (Berglund, Gericke, and Rundgren 2014). Many of the core concepts of environmental sustainability are rooted in the sciences. Natural science, especially, is considered as a carrier subject for many of the important issues within sustainability (Dambudzo 2015). For example, topics such as Biodiversity in biology, Renewable Energy in physics, and environmental chemistry literacy should be part of every science curriculum (Zoller 2012; Ofsted 2008; Šorgo and Kamenšek 2012). Applying the scientific Laws of Nature to the real world is important as well, and can be taught through the topics of biotechnology and biomimicry, for instance (USPESD 2009; McKeown 2002).

Climate Change

Although climate science should be treated as an integrated science, which should include social, economic and technical aspects in order to recognise Climate Change and take action about it, it has been established as a separate topic to give it more emphasis as a vital concern (de Haan 2006). Understanding the Causes and Effects of this critical environmental issue must include greenhouse gases, desertification and acidification (UNESCO 2012).

Natural Heritage and Resources

Natural Heritage encompasses the biodiversity and geodiversity of a landscape. Graduates must be aware of the importance of local and global Natural Heritage and how to preserve it for current and future generations (Šorgo and Kamenšek 2012). In addition to Natural Heritage,

Ecosystem Protection and Restoration and Resource Conservation, are important inclusions in SE curricula, in relation to specific ecosystems. Students should be aware of the human impact on the atmosphere, land, oceans, and Fresh Water, especially in relation to Pollution and Deforestation (McKeown 2002). Natural Resource Conservation has a social justice component as well, as inadequate management can lead to inequitable distribution of resources (McKeown 2002).

Land and Water Management

It is also recommended to include assessing the impact of population dynamics on society and the biosphere. In addition, the effects of human activity such as energy extraction, production and use, infrastructure, manufacturing, transportation, and food production should be included in the curriculum (Filho 2009). This calls for a holistic approach to Land and Water Management. In addition, sustainability principles and considerations should be applied when planning urban and rural development, as well (Berglund, Gericke, and Rundgren 2014).

Environmentally Friendly Living

In addition to abstract and global understandings of the Sustainability Challenge, students must know how to live out the principles they are learning with an understanding of the personal ethics they hold with regard to decision making and sustainability (Hidalgo and Fuentes 2013). When interacting with their local environment, knowledge of personal Carbon Footprint, Energy Use, Composting, and Recycling is relevant to leading sustainable lives at home (McKeown 2002; Ofsted 2008). Furthermore, they should be encouraged to always ask themselves, ‘how do the choices I make affect the planet and the rest of humanity?’ (Hicks 2012).

3.1.4 Society

Social Science and Humanities

In order to learn about the principles of SD, graduates need fundamental proficiency not only in Natural Sciences, but also in Social Sciences and Humanities (UNESCO 2012). Students should gain knowledge and appreciation of global issues such as World History, Geography, language, cultures of other countries, and religions in the world to be able to live in a global society (Oxfam 2015; Jóhannesson et al. 2011; Shephard and Dulgar 2015; Zinser 2012; Brunold-Conesa 2010). Being aware of other countries supports students’ growth beyond individualistic and nationalistic attitudes. It demonstrates to students the existence of multiple ways of action, that opinions are not comprehensive, and that cultural diversity is an advantage to the world. Students should also understand that all humans have the same basic needs (Zinser 2012). Language awareness is also critical, as students can investigate worldwide issues while expanding their reading, writing and spoken language. Students need to explore the various national and regional backgrounds where languages are spoken, as well as developing awareness that languages are continually evolving and adapting (Oxfam 2015).

In addition, a graduate needs to be familiar with Ethics and Philosophy, as it is essential to making decisions in everyday life (Shephard and Dulgar 2015; McKenzie 2012). Ethics, or moral philosophy, is a field that consists of systematising, defending, and endorsing ideas of right and wrong behaviour (Internet Encyclopaedia of Philosophy 2016). Hence, students should understand that “*ethical beliefs shape the way we live – what we do, what we make and*

the world we create through our choices” (The Ethics Centre 2016). A branch of philosophy that is particularly important for students is Epistemology. As specific knowledge is an important part of SE, the study of knowledge itself allows students to explore and question what they are learning (McKenzie 2012). Having a constructivist Epistemology and a holistic education allows students to better understand the role of people in creating knowledge and history (Hidalgo and Fuentes 2013).

What is more, studying history allows students to explore the interconnectedness of people and places throughout space and time, and to view the similarities and differences of cultures (Oxfam 2015). It also allows them to identify that transitions have existed for centuries through the lens of global change (McKeown 2002). Historical Context supports the concept that sustainability issues have a past, present and future and this idea should be integrated into a curriculum (UNESCO 2011; McKeown 2002). In terms of Geography, besides providing students with a physical understanding of it, the study should also contain inquiry, exploration and critical participation with subjects affecting people’s lives all over the world (Oxfam 2015). Issues relating to SD should be at the core of Geography education (Ofsted 2008).

Human Rights

Adopted in 1948 by the UN, the Universal Declaration of Human Rights represents the core elements of Human Rights that can be seen as a comprehensive educational aim to be included in SE curriculum (OECD 2005; UN 1948). This understanding allows students to view sustainability from social and cultural perspectives (Berglund, Gericke, and Rundgren 2014). Specific Human Rights emphasised includes Justice, Equity, and Equality in the context of the socio-cultural system (Baker 2008; USPESD 2009). Students should be aware of the ramifications of inequity between the rich and the poor, and understand that Equality must include Disenfranchised and Underrepresented groups, such as immigrants and refugees, children and youth, and indigenous peoples (de Haan 2010; Jóhannesson et al. 2011; McKeown 2002).

Human Security

As there are many sustainability issues involved in Human Settlement, students should understand how this concept integrates shelter and infrastructure, as well as support services such as education, health, culture, and welfare (OECD 2016; USPESD 2009; McKeown 2002). Students need to be committed to building a local and global culture of tolerance, nonviolence, and peace (UNESCO 2006; Jóhannesson et al. 2011; Berglund, Gericke and Rundgren 2014). In order to work toward this, students need basic understanding of the issues involved in Peace and Conflict. This topic integrates causes and effects of conflict at all stages, how to fairly resolve conflicts, and the terms war, militarism, and nuclear disarmament (Oxfam 2015; McKeown 2002). Students can be educated about war theory, including the complexity of conflicts and that there are different approaches in solving them (Oxfam 2015; Hicks 2012). While understanding these matters at a global scale is essential, exploring them from local and national perspective is equally important. A related issue that is mentioned in Agenda 21 is Nationalism, which can be defined as a feeling that humans have of being faithful and patriotic of their country (McKeown 2002; Merriam-Webster 2015).

Another emerging strategic perspective that should be communicated when learning SD is Disaster Prevention and Mitigation, and the inherent risk management (UNESCO 2006; Dambudzo 2015; Berglund, Gericke, and Rundgren 2014).

Health

Students should understand the importance of preserving and promoting human Health as one of the tenets of sustainability (McKeown 2002; Jóhannesson et al. 2011). Health issues can be integrated into the curriculum through carrier subjects, for example, teaching HIV/AIDS awareness in biology (Dambudzo 2015). Graduates must be aware of the local and global strategies for prevention and treatment of diseases such as malaria (Oxfam 2016; USPESD 2009). A deep understanding of this topic would allow students to compare the “*economic and health efficacy of low cost preventative measures such as mosquito nets with more costly pharmaceutical research and treatment efforts*”, for instance (USPESD 2009). Quality of Life and Well-being are broad terms used to describe indicators of the human condition. Students should understand these concepts to apply them to their own lives and to others, on both local and global scales. Indicators include happiness and sense of fulfilment, education level, life expectancy, and suicide rates (Atkisson and Hatcher 2001; USPESD 2009). Throughout curricula, schools should be encouraged to promote the Health and Well-being of students and the wider community as well, and make environmental links to health and safety (Eco-Schools 2014).

Governance

Students should have an understanding about the basic national, regional and global governance structures and systems, and how individuals and organisations can engage in them in order to face global challenges such as the Sustainability Challenge (Oxfam 2015). They should realise that SD will best be supported where governance structures are transparent and allow for free expression of opinion and debate (UNESCO 2006). This also stresses the role that Civil Societies, including NGOs and trade unions, play in SD, and how strengthening this role can be critical in the transition towards sustainability (McKeown 2002). The issues of participation and engagement can be linked to learning the concept of Democracy and how democratic practices of a society can contribute to sustainability. Consequently, students are encouraged to actively participate in the democratic process in favour of sustainability and sustainable policies and actions (USPESD 2009).

Power and Governance should be taught with special consideration given to analysing unequal power relations and their causes and effects (Oxfam 2015). Particular attention can be given also to international collaboration on global challenges, as the transition towards sustainability requires International Cooperation efforts, and International Organisations, such as the UN, help work toward global goals (Oxfam 2015). Students may, for example, research and compare the goals and programmes of several International Organisations and Treaties with regard to sustainability (USPESD 2009). In addition, a general awareness of International Law as means of implementing SD can be useful (McKeown 2002).

3.2 Skills

A Skill is an ability acquired from experience or training. Having acquired Knowledge, Skills are needed to use this Knowledge effectively and readily in performance. A skilled performance can be defined as an organised sequence of activities (Fitts and Posner 1967). Skills in the CASE are categorised into three Groups; Cognitive Thinking Skills, Practical and Functional Skills, and Interpersonal Skills (*Table 3.3*). It should be noted that there are many overlaps between Elements grouped in Knowledge and Skills.

Table 3.3 The CASE Skills Groups and Subgroups.

| Skills | | |
|---------------------------|---------------------------------|----------------------|
| Cognitive Thinking Skills | Practical & Functional Skills | Interpersonal Skills |
| | Technical & Quantitative Skills | Communication Skills |
| | Process Skills | Managing Self |
| | | Managing Others |
| | | Managing Situations |

3.2.1 Cognitive Thinking Skills

SE prominently features Critical Thinking, Systems Thinking, Strategic Thinking, and Interdisciplinary Thinking. Critical Thinking is an inquiry tool encompassing the interpretation and analysis of evidence, concepts and methods (USPESD 2009). Systems Thinking is a problem solving approach that involves the analysis of a system of interconnected parts in a whole, considering patterns, causes and leverage points to effect change (USPESD 2009). It is the study of non-linear dynamics (Filho 2009). Strategic Thinking is an underlying framework for decision making and planning. Pepper and Wildy (2008) encourage its use to precede “*any attempt to influence others and implement change. It also involves an awareness of the whole situation rather than an individual or narrow perspective*”. The world is so interconnected and complex that quality SE requires problem-orientated interdisciplinarity, as many problems can only be dealt with by viewing them through different lenses with a variety of scientific methods and knowledge, from several areas such as politics, economics, and geography (de Haan 2006). Since sustainability is a complex and interdisciplinary subject, Creative Thinking allows for inspiration and optimism (Lander 2015). Meanwhile, Independent Thinking demonstrates autonomy in the performance of these Skills (de Haan 2010).

While many of the above Skills are common to all quality curricula, SE specifically requires Future Thinking and the ability to View Issues from Multiple Perspectives. Envisioning a better and more sustainable future motivates students to take action, but they should realise that there is a variety of alternative futures that are open to humanity (Tilbury and Wortman 2004; Hicks 2012). Visualising the future enables students to view problems and obstacles and imagine different perspectives of observation (Tilbury and Wortman 2004). These outcomes can be obtained by providing students with the opportunities to make links between personal, local, national and global issues and events (Hicks 2012).

3.2.2 Practical and Functional Skills

Technical and Quantitative Skills

An SE curriculum should include the Skills to select and utilise technology while considering social, environmental, and economic contexts (Baker 2008). Graduates should understand the appropriate use of technology and be able to use it to their advantage (ITEA 2002). Students should have the ability to determine how this technology impacts society and the environment (Zinser 2012). In addition to the Computational Skills all graduates must have, SE requires the further development of student ability to use mathematics in understanding and interpreting data (McKeown 2002). This is a critical thinking skill associated with mathematics allowing for using, presenting and manipulating data (Baker 2008). Often called Numeracy, this ability

to identify and understand the difference between numbers and quantities, and values and qualities, is an important Skill for students to understand the meaning numbers are conveying (McKeown 2002).

Process Skills

In a complex world, students must develop Problem Solving Skills to find solutions for a wide range of issues (de Haan 2010). “*Problem solving should be a systematic and disciplined process which typically follows a stepwise method such as analyze, design, develop, implement, and evaluate*” (Zinser 2012). In order to enable active participation in a sustainable society, students must possess the skills to plan, organise and implement actions (de Haan 2010). This includes the ability to forecast or backcast when planning and thinking ahead (McKeown 2002; Robinson 2003). This is described as looking forward to possible futures in order to change and shape those futures (de Haan and Harenberg 1999). In addition to developing Skills for rational Planning and Research, students must also evaluate the scope and impacts of actions to make decisions (de Haan 2010). They should be able to evaluate experiences, learning and feedback and use it to inform Decision Making (Oxfam 2015). In the real world, students should be able to make environmentally-related moral decisions and to rationalise possible solutions (Hidalgo and Fuentes 2013). Planning, Organisation, and Implementation Skills enable students to design action or Research. In terms of Research, the ideal graduate should be able to cite sources and to distinguish between facts, opinions stereotyping and bias, sometimes referred to as Media Literacy (McKeown 2002). Students should be encouraged to challenge and question during their research, in the form of Informational Analysis (Armstrong and Rutherford 1999).

3.2.3 Interpersonal Skills

Communication Skills

Effective Communication Skills, both oral and written, are essential for communicating sustainability related matters and for functioning effectively with others (UNESCO 2012). Given the complex nature of sustainability topics, students’ Communication Skills need to be developed. These include Active Listening, Debate and Negotiation (Zinser 2012). Students who engage in discussions and conversations with classmates and adults will learn more about others’ perspectives and ideas, and this will widen their knowledge and understanding (MacDonald 2015). Additionally, in order for students to be able to take responsibility and action for sustainability, they need a Shared Language, as a lack of common vocabulary may cause a struggle to discuss sustainability (McClaim and Diefenbacher 2015). The ideal graduate should be a future change-agent and communication is key to this endeavour (Wiek, Withycombe, and Redman 2011).

Managing Self

Students need the Skills to manage themselves when they are alone or working in group environments. Participatory Skills enable active, reflective and cooperative participation toward SD (de Haan 2006). This means participating in collective decision-making processes and being able to demonstrate how cooperative problem solving can occur in developing SD strategies, and constructively overcome conflict of opinions in related issues (de Haan et al. 2009). It is also important that students reflect upon their own principles and those of others, which enables them to learn about themselves and relate their experiences to the wider society

and environment (de Haan et al. 2009). The Sustainability Challenge necessitates a process of adaptive management that requires personal Flexibility and critical Reflection (Tilbury 2004). Furthermore, it is necessary that students are able to motivate themselves in order to participate and become active in the movement towards sustainability (de Haan et al. 2009). Also, they should strive for Self-Directed Learning, through group or individual projects without outside assistance (Schugurensky 2000). This plays an important role, because when students take responsibility for their own, independent project work, it can serve as a test of real life situations in which students apply existing Knowledge and Skills, but also obtain new ones (Barth et al. 2007).

Managing Others

The Sustainability Challenge is not a solitary pursuit. “*Sustainable development can only be realized when we work together*” (de Haan 2006). Students must develop the ability to collaborate and cooperate with others in order to co-create solutions to the sustainability issues (Berglund, Gericke, and Rundgren 2014). These collaborative approaches demonstrate that there can be more than just one winner, allowing for Negotiation, Conflict Resolution, and compromise (Lander 2015). This necessitates promoting Partnership and Building Capacities within the group through transaction and feedback (Sterling 2003). Other important Skills in Managing Others include Motivation, Empowerment and Leadership as tools to bring about change (Dambudzo 2015). Empowering a group by increasing confidence and feelings of competence motivates them to create solutions together (de Haan 2006; Olsson and Gericke 2016). Students should cultivate Teamwork Skills by taking on different roles in the group, including leadership roles (Oxfam 2015). Furthermore, a student who has gained Leadership Skills can earn the respect of others and motivate individuals and organisations toward just sustainable behaviour (Holdsworth and Thomas 2015; Filho 2009).

Managing Situations

Globalisation trends have created increasingly complex issues in the world and require students to utilise reflection and action in response to this complexity (Hidalgo and Fuentes 2013). Complex situations present themselves in many forms, including transitions, obstacles, and other challenges. The ideal graduate would have learned to manage transition processes in reaction to a rapidly changing world (Hidalgo and Fuentes 2013). This allows students to be flexible in adapting to change and proactive in developing coping strategies (Hicks 2012). Finally, the student must have planning skills to anticipate and overcome challenges (Oxfam 2015). This allows students to tackle the ambiguities so often present in the modern Sustainability Challenge (Evitts, Seale, and Skybrook 2010).

3.3 Attitudes

An Attitude can be defined as a psychological tendency which is expressed by evaluating a particular entity with some degree of favour or disfavour (Eagly and Chaiken 1993). While it has been argued that Attitudes are motivated, guided or justified by values, the difference between the two terms ‘attitudes’ and ‘values’ has remained unclear, and researchers rarely distinguish between them (Davidov, Schmidt, and Schwartz 2008). The CASE uses the term Attitudes and divides this Category into two Groups according to whether they are outlooks on personal life or ways of viewing the world (see *Table 3.4*).

Table 3.4 The CASE Attitudes Groups.

| Attitudes | |
|-----------|-------------------|
| Self | People and Planet |

3.3.1 Attitudes about Self

The ideal graduate, ready to face the Sustainability Challenge, must look inward at themselves before they are able to look outward to the world. Self-Awareness, Self-Esteem and identity are important components for the successful graduate to understand themselves and their place in the world. A sense of self allows the graduate to interact with the world around them to evaluate their experiences, learning and feedback, and consequently enhance their future learning, thinking and action (Oxfam 2015). Students must possess the Courage and Resilience to change the world around them, along with the optimistic belief that as an individual, they can affect positive change (Lander 2015). A Value Driven student's actions and behaviours are informed by the principles and beliefs that align with sustainability (Filho 2009). Furthermore, the concept of Stewardship is the student's personal responsibility for their own individual actions and the responsibility to drive change around them (Tarrant and Thiele 2016).

While recognising the importance of Self, students should also have a deep understanding of the relationship to the whole and the interconnectedness of the planet and its inhabitants and apply this to their everyday lives, decisions, and actions. This represents a Holistic Viewpoint, which is the awareness that the individual is linked to the wider world, and the importance of viewing the whole over parts (Jóhannesson et al. 2011). This also allows students to understand their own place within the system (The Cloud Institute for Sustainability Education 2010).

3.3.2 Attitudes about People and Planet

Students need to be internationally minded and aware of the wider world which means that they have to develop a feeling of their own identity, but also a respect for other people and an appreciation of cultural diversity, including different religions, values and customs in the world (Jóhannesson et al. 2011; UNESCO 2012). This leads to a commitment to shape a Culture of Tolerance, Non-Violence and Peace at both local and global scales (UNESCO 2006). In addition, students should be able to integrate new perspectives into their way of thinking and act in accordance with the wider global perspective (de Haan 2010). The ideal graduate should have respect for the dignity and human rights of all people throughout the world and a commitment to social and economic justice for all (UNESCO 2006). This should be complemented by an active concern and a willingness to take action against injustice, inequalities, discrimination and exploitation, with a sense of solidarity with those suffering from Human Rights violations (Oxfam 2015). Respecting people's rights should go beyond today's generation to include respecting the rights of future generations and the future of the planet, with a commitment to Intergenerational Responsibility (UNESCO 2006). This can include analysing the roles and responsibilities of students' families, schools and local communities, as well as cultural understanding of the global context (USPESD 2009).

While it is important to care for humanity with Understanding, Compassion and Love, it is also essential to act responsibly toward nature and the environment, with respect to the Earth and the diversity of life (UNESCO 2012; Stir 2006). Students should be committed to engaging in

responsible individual and cooperative actions leading to a sustainable future (McDonald 2006). In addition, they should be willing to search out opportunities and responsibilities to engage with the larger community for active participation and collaboration in moving toward sustainability (Gottlieb et al. 2012). This includes, for example, a commitment to supporting democratic processes and learning more about their own role in this area.

4 Results of Phase 2: Evaluating the International Baccalaureate

“Curriculum evaluation is an attempt to toss light on two questions: Do planned courses, programs, activities, and learning opportunities as developed and organized actually produce desired results? How can the curriculum offerings best be improved?”

~ Glatthorn et al. (2011, 357)

To answer **Research Question 2: How does the International Baccalaureate Programme curricula currently align with the criteria for quality Sustainability Education?**, the CASE evaluation spreadsheet was used. By examining the IB LP, ATL, MYP Core, Aims, Objectives, Global Contexts, Key and Related Concepts, and DP Core, Aims, Objectives and Syllabi the team was able to establish which curricula aspects matched the CASE. The complete spreadsheet charts each Element against the official IB documents (see *Appendix H*). A key is provided to clarify the notations used in the spreadsheet (see *Appendix I*). An abridged version of the evaluation results is included in *Table 4.1* below.

Table 4.1 The CASE Evaluation in relation to IB.

| | LP | MYP - GC | MYP | ATL | DP | | | | | | DP - Core |
|--|----|----------|-----|-----|-----------------------|----------------------|-------------------------|----------|-------------|------|-----------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Knowledge | | | | | | | | | | | |
| Sustainable Development | | | | | | | | | | | |
| Sustainability Challenge | | • | • | | | | • | • | • | | |
| Sustainable Development Concepts | | • | • | | | | • | • | | | |
| Economy | | | | | | | | | | | |
| Economic Development & Policy | | • | • | | | • | • | • | | | |
| Corporate Responsibility | | • | • | • | | | • | • | | | |
| Environment | | | | | | | | | | | |
| Natural Science | | • | • | | | • | • | • | | | |
| Climate Change | | | | | | | • | • | | | |
| Natural Heritage & Resources | | • | • | | | | • | • | | | |
| Land & Water Management | | • | | | | • | • | • | | | |
| Environmentally friendly Living | | | | | | | • | • | | | |
| Society | | | | | | | | | | | |
| Social Science & Humanities | | • | • | | • | • | • | • | • | • | • |
| Human Rights | | • | | | | | • | • | | | |
| Human Security | | • | • | | | | • | • | | | |
| Health | | • | • | | | • | • | • | | | |
| Governance | | • | • | | | | • | • | | | |
| Skills | | | | | | | | | | | |
| Cognitive Thinking Skills | | | | | | | | | | | |
| Cognitive Thinking Skills | • | • | • | • | • | • | • | • | • | • | • |
| Practical & Functional Skills | | | | | | | | | | | |
| Technical & Quantitative Skills | | • | • | • | • | | • | • | • | • | |
| Process Skills | • | • | • | • | • | • | • | • | • | • | • |
| Interpersonal Skills | | | | | | | | | | | |
| Communication Skills | • | • | • | • | • | • | • | • | • | • | • |
| Managing Self | • | • | • | • | • | • | • | • | • | • | • |
| Managing Others | • | • | • | • | | | • | • | | • | • |
| Managing Situations | • | • | • | • | | | • | • | | | • |
| Attitudes | | | | | | | | | | | |
| Self | • | • | • | • | • | • | • | • | • | • | • |
| People & Planet | • | • | • | • | • | • | • | • | • | • | • |

4.1 Knowledge

The IB curricula is designed to foster broad skills and concepts in the MYP and more specific knowledge in the DP. Most of the coverage of the CASE Knowledge Elements will be generalised in the Global Contexts and Key and Related Concepts in the MYP, and covered in a more direct and specific manner in the Syllabi of the individual DP courses.

4.1.1 Sustainable Development

The concepts involved in SD are firmly embedded in the IB curriculum, both implicitly and explicitly.

Sustainability Challenge

During the MYP students are exposed to the Sustainability Challenge through the Global Contexts of ‘Globalization and Sustainability’, and ‘Scientific and Technical Innovation’. These Global Contexts are part of the overarching framework for the curriculum. ‘Globalization and Sustainability’ includes “*the impact of decision-making on humankind and the environment*”, and ‘Scientific and Technical Innovation’ contains “*the interaction between people and the natural world; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; [and] how humans adapt environments to their needs*” (IBO 2014f). In addition, the MYP Subject Guide for the Individuals and Societies course outlines the inclusion of the Key Concept of ‘Global Interactions’, which “*focuses on the connections between individuals and communities, as well as their relationships with built and natural environments, from the perspective of the world as a whole*” (IBO 2014g). Any student completing the MYP will have established an excellent sense of the impact and interactions of humans and the environment.

In the DP, the Impact of Human Activity on the Socio-Ecological System is touched upon in all of the Group 4 Sciences in a way that is specific to each discipline, except for Sports, Exercise, and Health Sciences, where it is not included at all. If a DP student chooses to take Geography for their Group 3 subject, they will receive a more holistic awareness of this Element. The concept of Population Growth in relation to SD is taught holistically in the MYP through the exploration of the ‘Globalization and Sustainability’ Global Context. Depending on subject choice, DP students may be exposed to specific areas of Population Growth.

Sustainable Development Concepts

The MYP Global Context of ‘Fairness and Development’ outlines discussion of “*rights and responsibilities; the relationship between communities; sharing finite resources with other people and with other living things; access to equal opportunities; [and] peace and conflict resolution*” (IBO 2014f). These concepts are central to the necessary acquired knowledge and understanding of SD. The MYP also includes a Related Concept ‘Sustainability’, which calls for a more detailed definition and description of the topic. Every MYP student will be exposed to this Element. DP students choosing Environmental Systems and Societies for their Group 3 or Group 4 subject will directly learn the definition of SD as it is explicitly in the Syllabus. While the idea of SD and its definition are well covered, SD Frameworks are only touched upon in DP Geography or Economics. It is left to the discretion of the teacher to include a

framework in practice. At NIST International School in Bangkok, many teachers used the UN former MDGs and the current SDGs as a basis for teaching these concepts.

4.1.2 Economy

Economic Development and Policy

The MYP curricula includes all Elements of Economic Development and Policy, except Financing SD. Within the MYP Individuals and Societies subject group, Economics encompasses the Related Concept of ‘Choice and Consumption’, covering the Element of Consumer Behaviour and Consumption Patterns. In addition, the Related Concepts ‘Globalization’, ‘Growth’, and ‘Poverty’ have corresponding Elements in the CASE. For example, the IB prescribes the discussion of growth to include “*whether or not economic growth leads to development (increased well-being for all persons in the economy) depends on what products are produced and how they are distributed*” (IBO 2014g).

Individuals and Societies at the DP level includes Globalisation in Group 3 Aims and defines the concept as “*a process by which the world’s local, national and regional economies, societies and cultures are becoming increasingly integrated and connected*” (IBO 2009). Specific Elements like Poverty Reduction and Financing SD are covered only in selected subjects of Group 3.

Corporate Responsibility

Some concepts involved with the Design and Manufacturing Element are covered in the MYP through the Global Context of ‘Scientific and Technical Innovation’, for example “*modernization, industrialization and engineering*” (IBO 2014f). The Related Concepts of ‘Sustainability’ and ‘Innovation’ highlight the importance of responsible Design and Manufacturing. Also, Design is one of the eight subject groups in the MYP. In DP, Design Technology in Group 4 contains the Elements Design and Manufacturing, Multinational Corporations, and Triple Bottom Line, both specifically and holistically. Outside of Design Technology, these Elements are only partially covered in Group 3 Economics and Business and Management, although the idea of balancing human, planet, and economic interests is present throughout the curriculum in a more holistic manner.

4.1.3 Environment

Natural Science

As science is a mandatory component in both the MYP and DP, IB graduates have a strong foundation in the Sciences. In the MYP, the Global Context ‘Scientific and Technical Innovation’ includes “*the natural world and its laws; how humans use their understanding of scientific principles; and the impact of scientific and technological advances on communities and environments*” (IBO 2014f). Thus the Elements of Laws of Nature, Science, Technology and Applied Science, and Integrated Science are included in MYP Curricula. In DP, all Group 4 subjects involve the Laws of Nature except for Computer Science. The other Elements are contained within the Group 4 Project. For example, the Element Global Ecological Systems is a comprehensive term for many topics including Oceans and Atmosphere, Biosphere and

Terrestrial and Aquatic Ecosystems. These are partially covered in the MYP Sciences and half of the DP Group 4 subjects.

Climate Change

The Causes and Effects of Climate Change are not specifically addressed in the MYP curriculum materials. In the DP, most of the Group 4 Sciences mention Climate Change in relation to the specific discipline, with the exception of Computer Science, and Sports, Exercise and Health Sciences. Students choosing Geography for Group 3 will be exposed to Climate Change concepts as part of the core theme of ‘Patterns and Change’. In Group 3 Global Politics, students view Climate Change through the lens of International Laws and Treaties.

Natural Heritage and Resources

Of the seven Elements included in Natural Heritage and Resources, only the most general terms are addressed in the MYP curricula. Resources and Conservation is included in three of the MYP Global Contexts. In the ‘Orientation in Space and Time’ Global Context, heritage, natural and human landscapes, and resources should be covered (IBO 2014f). The Global Context ‘Globalization and Sustainability’ contains “*consumption, conservation, natural resources and public goods*”, while ‘Fairness and Development’ includes “*sharing finite resources with other people and with other living things*” (IBO 2014f). Several Related Concepts also touch upon Resources and Conservation. Specific Elements such as Air and Water Quality, Renewable Energy, Biodiversity, Ecosystem Protection and Restoration, Deforestation and Pollution are not mentioned in the MYP.

In the DP, however, Environmental Systems and Societies addresses all of the CASE Elements in Natural Heritage and Resources. One of the course Aims is to “*be critically aware that resources are finite*”, and the rest of the Elements are contained within the Syllabus (IBO 2015b). Students choosing Group 4 Biology, Chemistry or Design Technology will be taught most of the Elements. Although Design Technology employs a more holistic approach than Biology or Chemistry, as resource management and sustainable production are contained in the core of the Syllabus. In Group 3 Geography also covers most Elements.

Land and Water Management

The ‘Globalization and Sustainability’ Global Context in the MYP specifically prescribes coverage of Sustainable Urbanisation and Infrastructure, however, it does not precisely cover other Elements. Related Concepts in Geography such as ‘Management and Intervention’, ‘Power’, and ‘Sustainability’ address general topics in the Subgroup of Land and Water Management. In the DP, the Environmental Systems and Societies course extensively covers all Elements, as would be expected from the course title. Physics addresses the specific point of nuclear waste; whereas students choosing Geography will engage with half of the Elements.

Environmentally Friendly Living

None of the Elements of Environmentally Friendly Living are mentioned in the MYP. However, the Related Concept of ‘Sustainability’ in Individuals and Societies states a definition for ecological footprint as “*the area of land and water required to support a defined human population at a given standard of living*” (IBO 2014g). This is closely related to the general idea of personal choices for sustainable living.

In the DP, all Elements are thoroughly addressed in Environmental Systems and Societies in terms of personal and societal scope. Most Elements are mentioned in Design and Technology in terms of manufacturing and societal attitudes toward waste. In Group 3, half of the Elements are referred to in the Syllabus of Geography. The Ethics of Sustainable Living is addressed sporadically in Global Politics, Economics, and Biology.

4.1.4 Society

Social Science and Humanities

All Elements of the Social Science and Humanities are addressed throughout the MYP curriculum documents, with the exception of Epistemology. The Global Contexts foster discussions in Ethics and Philosophy through ‘Identities and Relationships’ which states the inclusion of “*moral reasoning and ethical judgment*” (IBO 2014f). World Culture, History, and Historical Context are mentioned in the ‘Personal and Cultural Expression’ Global Context including “*social constructions of reality; philosophies and ways of life; belief systems; [and] ritual and play*” (IBO 2014f). ‘Orientation in Space and Time’ covers “*the relationships between, and the interconnectedness of, individuals and civilizations from personal, local, and global perspectives*” (IBO 2014f). In addition to the underlying framework provided by the Global Contexts, individual subject groups incorporate the CASE Elements. The subject Aims, Key Concepts, and Related Concepts in Mathematics, Individuals and Societies, Language and Literature, and Language Acquisition contribute to the area of Social Science and Humanities.

Every DP student is required to study an additional language, completing the Element of World Language Proficiency. In addition to the language requirement, every student participates in the Theory of Knowledge course at the DP level, thus addressing the Epistemology Element of the CASE. Ethics and Philosophy are covered in all Group 4 Sciences and in most of Group 3 Individuals and Societies courses. While World Culture, History and Historical Context have obvious connections with Group 3 Individuals and Societies, these Elements are also contained within the group Aims in Group 1: Language and Literature, Group 2: Language Acquisition, Group 5: Mathematics, and Group 6: the Arts.

Human Rights

The issues surrounding Human Rights are covered in multiple MYP Global Contexts and Related Concepts within the Subject Guides. Though the MYP fails to specifically mention Disenfranchised and Underrepresented Minorities, the Individuals and Societies course involves the Related Concept ‘Disparity and Equity’ that states students should learn the following (IBO 2014g):

“Equity involves concerns about fairness and justice. Disparity is the uneven distribution of a given quality, indicator or resource and it can be opposed to the concept of equity. Geography is often the study of the condition or fact of being unequal—recognizing that the world around us has inequality, disproportionate opportunity and discrepancy, which, creates disparity. As a related concept, disparity should have a degree of scale and harness the essential drivers of disparity: economics, opportunity, access to resources, choices, values and freedom. Inequality might be based on gender, ethnicity, age, location, citizenship and income, among other variables.”

In the DP, Environmental Systems and Societies addresses Human Rights in terms of a critical awareness *“that resources are finite, and that these could be inequitably distributed and exploited, and that management of these inequities is the key to sustainability”* (IBO 2014b). Group 3 Global Politics dedicates an entire unit to Human Rights, including the CASE Elements of Human Rights Principles, Socio-Economic Justice and Equity, Equality and Discrimination, and Disenfranchised and Underrepresented Minorities. Global Politics defines the Key Concept of ‘Human Rights’ as follows (IBO 2015):

“Human rights are basic claims and entitlements that, many argue, one should be able to exercise simply by virtue of being a human being. Many contemporary thinkers argue they are essential for living a life of dignity, are inalienable, and should be accepted as universal. The Universal Declaration of Human Rights adopted by the UN in 1948 is recognized as the beginning of the formal discussion of human rights around the world. Critics argue that human rights are a Western, or at least culturally relative, concept.”

There are also obvious links in DP Geography, History, and Anthropology. In Group 4, the only science that adequately investigates correlations to Human Rights is Biology, citing inequitable distribution of water, medicines, technologies, sharing of scientific knowledge, and implications of advancements in genetics in its Syllabus.

Human Security

In the MYP, Human Security Elements are all present, with the exception of Disaster Mitigation, which is only listed as an optional line of inquiry in Individuals and Societies. The Elements of Human Settlement, Nationalism, and Peace and Conflict are covered in MYP Global Contexts. For example, in ‘Identities and Relationships’ students learn about *“human relationships including families, friends, communities, and cultures; and affiliation”*, ‘Globalization and Sustainability’ includes *“population and demography, urban planning, strategy and infrastructure”*, and ‘Fairness and Development’ covers *“the relationship between communities; peace and conflict, and conflict management resolution.”* (IBO 2014f). These topics receive additional coverage in Key and Related Concepts.

DP curricula is weak in the area of Human Security. The Elements are covered in some of Group 3 subjects. There is no guarantee a DP student will cover all of the Elements of Human Settlement, Disaster Mitigation, Nationalism, and Peace and Conflict. Disaster Mitigation is addressed in Global Politics as a political issue and implicitly through the case studies in History, but only as an optional topic in some other DP Individuals and Societies subjects. In Group 4 Sciences, disasters are covered briefly in Computer Science in relation to data loss and at length in Environmental Systems and Societies, with historical context and examples. Other Elements are covered in only a few of the Group 3 subjects.

Health

In relation to Health, only the Element of Quality of Life and Well-being is present throughout the MYP and DP curricula. The MYP Global Context ‘Identities and Relationships’ includes *“personal, physical, mental, social, and spiritual health”* and *“physical, psychological and social development, transitions, health and well-being, and lifestyle choices”* (IBO 2014f). This is also covered in most of the DP subjects in Group 3 and Group 4, especially in Environmental Systems and Societies in the Human Systems unit.

HIV/AIDS and Disease Control and Prevention are not addressed in the MYP curriculum documents. In the DP, Biology includes a minor mention of HIV/AIDS in the Syllabus. Disease Control and Prevention is only covered in some of DP Group 3 Individuals and Societies, and Group 4 Sciences subjects.

Governance

All Elements of Governance are contained within the MYP Global Contexts, Key Concepts and Related Concepts. In the Global Context ‘Fairness and Development’, the MYP includes “*democracy, politics, government and civil society*” (IBO 2014f). In the MYP History course, the Related Concepts of ‘Governance’ and ‘Power’ address the definition of governance, “*Governance refers to mechanisms and processes that regulate authority in a given organization. It can apply to state and non-state institutions*” and relate the idea “*The balance of power is also significant in terms of human development and interaction—the relative power of government, transnational corporations, multilevel government organizations, civil society organizations and the rights of individual communities and citizens*” (IBO 2014g).

In the DP curriculum there is no mention of Democracy except in History, Global Politics, and as an option in Philosophy. Power and Governance is covered in half of the Group 3 courses and in Group 1 Language and Literature. International Organisations and Cooperation is included in the Group 3 Individuals and Societies Aims and is explicitly stated in Global Politics with reference to “*function and impact of international organizations and non-state actors in global politics*” (IBO 2015). International Organisation and Cooperation is mentioned in most of the Group 4 Sciences in regards to sharing scientific knowledge and data across borders. International Law and Treaties are covered in some of Group 3 subjects and half of Group 4, particularly in the Global Politics which aims to “*develop an understanding of the local, national, international and global dimensions of political activity*” (IBO 2015).

4.2 Skills

The CASE Skills Elements are covered in a variety of areas in the IB Programme. Many of the Skills are addressed holistically in the IB Learner Profile and with increasing degrees of specificity throughout the MYP and DP curricula.

4.2.1 Cognitive Thinking Skills

All Elements of Cognitive Thinking Skills are significantly acknowledged in the IB curricula. The IB LP attributes touch on many of them. For example, ‘Thinkers’ encourage Critical and Creative Thinking Skills, ‘Inquirers’ fosters Inquiry and Investigation plus Independent Thinking, while ‘Balanced’ and ‘Knowledgeable’ embed Viewing Issues from Multiple Perspectives, Viewing Issues from Local and Global Perspectives, Understanding Interdependence and Interconnectedness, as well as Interdisciplinary Thinking. Strategic Thinking is present in the MYP Physical and Health Education, Mathematics and the Projects’ ATL. In the DP, some of the Group 3 subjects contain mention of Strategic Thinking, as does the CAS Aims.

Cognitive Thinking Skills are also covered through ATL connections and the Aims of most of the MYP and DP subjects. Specifically, Inquiry and Investigation Skills are strongly supported

by many subjects, and by the Group 4 Project in the DP. Additionally, Critical Thinking is a criterion in some subjects and is used in the mandated interdisciplinary units. With regards to Systems Thinking, the concept is indirectly embedded throughout the curricula, however the term is only explicitly mentioned in one subject, DP Environmental Systems and Societies, which is an optional selection for either Group 3 or Group 4, so not all students are required to enrol. It is implicitly touched on by one of the Key and Related Concepts of the MYP, ‘Systems’, which states that “*systems are sets of interacting or interdependent components*” (IBO 2014f). There are a few references to Future Thinking in some aspects in the curricula, for example, one of the Aims of Group 5 subjects, Mathematics, is to enable students to “*apply and transfer skills to alternative situations, to other areas of knowledge and to future developments*” (IBO 2012c). Future Thinking is not adequately covered in the MYP.

4.2.2 Practical and Functional Skills

Technical and Quantitative Skills

All Elements of this Subgroup (Data Literacy, Computational Skills and Numeracy, and Technological Literacy) are well covered in both the MYP and DP, especially in Mathematics and Sciences, as well as the ATL. The MYP Mathematics Subject Guide Objectives state that students should be able to “*select [and apply] appropriate mathematical strategies when solving authentic real-life situations*”, and “*organize information using a logical structure*” (IBO 2014k). The Group 4 Project, which is required for all DP students, aims to develop students’ ability to apply 21st century technology in the study of science, “*(for example, data logging, spreadsheets, databases and so on) will be used in the action phase and certainly in the presentation/evaluation stage (for example, use of digital images, presentation software, websites, digital video and so on)*” (IBO 2014a).

Process Skills

The ATL, which apply to both the MYP and DP, acknowledge all Elements of Process Skills. The required projects in both MYP and DP, specifically cover Planning, Implementation, Evaluation, Problem Solving, Research, and Information Analysis including Media Literacy. For instance, the Extended Essay, as part of the core of DP, provides the opportunity for students to “*plan and pursue a research project with intellectual initiative and insight*” (IBO 2007). Group 1, Language and Literature, also encourages students to analyse information with a recognition of the contexts in which texts are written and received. However, there is limited reference to Risk Analysis, Decision Making, and Backcasting Skills.

4.2.3 Interpersonal Skills

Communication Skills

The IB strongly emphasises Communication Skills, including Oral and Written Communication, Active Listening, Shared Language, Discussion, Debate and Conversation Skills. The IB LP specifically mentions ‘Communicators’ as one of the attributes, stating that IB learners are expected to “*express [themselves] confidently and creatively in more than one language and in many ways. [They] collaborate effectively, listening carefully to the perspectives of other individuals and groups*” (IBO 2013). In addition, one of the ATL categories is ‘Communication’, which is embedded throughout both MYP and DP curricula.

However, Negotiation Skills are not often touched upon, with a slight mention in the MYP and DP Design.

Managing Self

Amongst Managing Self Skills, Reflection is particularly well addressed throughout the curricula. It is stated in the LP that “*As IB learners we strive to be reflective. We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development*” (IBO 2013). It is also highlighted in most of the MYP and DP subjects. Motivation of Self, Participatory Skills and Self-Directed Learning are largely driven by the projects and the core of the MYP and DP, as well as by the ATL. In terms of Flexibility and Adaptability Skills, they are holistically included in the ATL, but not specifically embedded in subject syllabi.

Managing Others

There is significant focus on learning to work in teams during a student’s IB study, as Teamwork together with Collaboration and Cooperation Skills are very well encompassed. There is a specific ATL skill cluster titled ‘Collaboration’. In the subjects, these Skills are fostered by the Group 4 Project, the Sciences, and the MYP Physical and Health Education which aims to enable students to “*collaborate and communicate effectively*” and “*build positive relationships and demonstrate social responsibility*” (IBO 2014m). However, other Elements of this Subgroup, which are linked to facilitation capabilities, have limited presence in the subjects. These include Leadership, Motivating and Empowering Others, Capacity Building and Partnership, and Conflict Resolution.

Managing Situations

The Skill of Managing Uncertainty is comprehensively acknowledged across the LP, MYP and DP. Risk-takers, an attribute of the LP, states that IB students should “*approach uncertainty with forethought and determination*” and that they are “*resourceful and resilient in the face of challenges and change*” (IBO 2013). Furthermore, one of CAS’ learning outcomes is encouraging students to tackle a new challenge such as an unfamiliar experience. One of the Aims of Group 3 subjects, Individuals and Societies, is that students recognise that their learning must encompass the tolerance of uncertainty. Managing Uncertainty is present in multiple MYP subjects, as well. On the other hand, Managing Complexity and Managing Change Skills are only adequately covered in some areas of the MYP and DP. ‘Change’ is a Related Concept in the MYP, mentioned in Individuals and Societies, Physical and Health Education, and Sciences.

4.3 Attitudes

While it may be difficult to include Attitudes into a curriculum, the IB lends itself to fostering Attitudes in alignment with the CASE, particularly through the Learner Profile (*Appendix D*). Seven out of the ten LP attributes refer to the CASE Elements of Attitudes about Self and Attitudes about People and Planet. The Aim of the LP can be seen as an overarching goal that staunchly supports the Attitude Elements of the CASE.

4.3.1 Attitudes about Self

All of the CASE Elements of Attitudes about Self are included in the IB LP attributes, with the exception of Self-Reliance and Stewardship. Nevertheless, Self-Reliance is covered in some of the ATL, including ‘Affective’, ‘Reflection’, and ‘Collaboration’, and in the MYP Global Context ‘Identities and Relationships’ where it states that “*students explore identity formation, self-esteem, status, roles and role models, personal efficacy and agency, and independence*” (IBO 2014f). Stewardship is specifically mentioned in the Aim of the LP which mentions the “*shared guardianship of the planet*” (IBO 2013). The Aims of TOK and CAS touch on many of the Elements like Self-Awareness, Resilience, Courage, Curiosity, Engagement, Responsibility and Accountability, and being Values Driven. TOK’s Aims include that students “*understand that knowledge brings responsibility which leads to commitment and action*” and “*critically reflect on their own beliefs and assumptions, leading to more thoughtful, responsible and purposeful lives*” (IBO 2013a). Therefore, it clearly embeds Responsibility and Accountability into the course. Curiosity is, for example, included in the CAS Aim to “*explore new possibilities, embrace new challenges and adapt to new roles*” (IBO 2015).

The Elements of Self-Awareness, Curiosity, and Engagement are covered throughout the IB curriculum. Courage and Open-Mindedness are only narrowly mentioned in the DP subjects. For instance, Courage is fostered through the Aims of the Information Technology in a Global Society course, while Open-Mindedness is embedded in the Group 3 Aims; “*develop an awareness in the student that human attitudes and beliefs are widely diverse and that the study of society requires an appreciation of such diversity*” (IBO 2009). ‘Open-minded’ is one of the LP’s attributes, as well. The LP, MYP Global Contexts, MYP and DP subjects are acknowledging the Elements of Integrity, Lifelong-Learning, Values Driven, and Holistic Viewpoint. An example to be mentioned is the coverage of Lifelong Learning in the LP attribute ‘Inquirers’ which states “*We learn with enthusiasm and sustain our love of learning throughout life*” (IBO 2013). This Element is also highlighted by the MYP subjects’ Aims of Language Acquisition, and Language and Literature, as well as a DP Group 1 Aim which states an aspiration to “*promote in students an enjoyment of, and lifelong interest in, language and literature*” (IBO 2011a). Moreover, DP Group 6 subjects’ Aim to enable students to “*express ideas with confidence and competence*”, touching on the Element Self-Esteem (IBO 2014r).

It is worth mentioning that the MYP Design Subject Guide contains the Element of Holistic Viewpoint in the overarching Aims that expects students to “*appreciate past, present and emerging design within cultural, political, social, historical and environmental contexts*” (IBO 2014e). The Elements of Responsibility and Accountability, Empathy, and Inspiration and Optimism are named through the different aspects of the IB. Resilience and Resourcefulness are covered through the ATL. For example, the ATL ‘Affective’ refers to Resilience through the following explanation “*Practise ‘bouncing back’ after adversity, mistakes and failures, practise ‘failing well’, practise dealing with disappointment and unmet expectations, and practise dealing with change*” (IBO 2014f). In another example, Resourcefulness is acknowledged in the ATL ‘Creative Thinking Skills’ by encouraging students to “*use brainstorming and visual diagrams to generate new ideas and inquiries, create novel solutions to authentic problems, design improvements to existing machines, media and technologies, and create original works and ideas using existing works and ideas in new ways*” (IBO 2014f).

Two-thirds of the MYP Global Contexts specifically refer to a number of Elements in Attitudes about Self, and most of the Elements are named in the MYP subjects, as well. They are covered

in the DP subjects in Group 3, Group 4, Group 5, and Group 6, which mention them either in the group Aims, the specific Subject Aims or the particular Subject Syllabi.

4.3.2 Attitudes about People and Planet

The IB LP attributes cover all Elements of the Attitudes about People and Planet, except Commitment to Participation and Intergenerational Responsibility. The MYP Global Context ‘Fairness and Development’ touches upon Intergenerational Responsibility, referring to *“sharing finite resources with other people and with other living things”*, as well as by some of Group 3 subjects (IBO 2014f). Whereas Commitment to Participation is encompassed by CAS. A special emphasis lays on the Elements of International Mindedness, and Tolerance and Respect for Diversity. Both are acknowledged throughout almost all of the IB aspects. MYP Individuals and Societies Subject Aims, for example, highlights that students should *“act as responsible citizens of local and global communities”* and *“appreciate human and environmental commonalities and diversity”* (IBO 2014g). Culture of Nonviolence and Peace and Human Solidarity are not explicitly mentioned in the MYP and DP subjects, but they are covered through the overall LP Aim. Furthermore, the Human Solidarity is encompassed in the MYP Individuals and Societies’ Key Concept ‘Global Interactions’ which says *“For individuals and societies, global interactions focuses on the interdependence of the larger human community, including the many ways that people come into conflict with and cooperate with each other, and live together in a highly interconnected world to share finite resources”* (IBO 2014g).

The Elements of Commitment to Justice, Equality and Equity, and Concern for Environment and Nature are named throughout almost the whole of IB aspects. As examples, the ATL ‘Collaboration Skills’ stresses Commitment to Justice, Equality, and Equity by emphasising *“[making] fair and equitable decisions”*, while Concern for Environment and Nature is stated in the DP CAS Aims which highlights *“responsibilities towards each other and the environment”* (IBO 2014f; IBO 2015). Both Elements are also acknowledged through specific DP Group 3 Subject Guides such as Geography and Global Politics. Commitment to Human Rights and Understanding, Compassion, and Love for Humanity are discussed in the LP, MYP Global Contexts as well as some of DP Group 3 and Group 4 Subjects. The DP Philosophy Subject Guide states in the Core Syllabus *“This compulsory theme explores the fundamental question of what it is to be human. This exploration takes place through a discussion of key concepts such as identity, freedom, and human nature, and through a consideration of questions such as what sets humans apart from other species, where the boundaries of being human lie, and whether animals or machines could be considered persons”* (IBO 2014i).

4.4 Recommendations

Based on evaluating the IB curricula against the CASE, as well as interviewing practitioners, the following recommendations are suggested to further improve the IB curricula with regard to SE.

4.4.1 Integrating more Sustainability Education into the Curricula

While the IB curricula generally aligns with the CASE Elements, there are some missing components that this paper recommends integrating within the curricula.

Including Knowledge Elements

It is recommended that the Element of Poverty Reduction should be better covered in the curricula in all DP Group 3 courses according to the context of the different subjects. It is also recommended to have more depth and details on Corporate Responsibility in Economics and Business and Management subjects. Although the Causes and Effects of Climate Change are covered in DP Group 4 Science subjects, this vital topic should be introduced at the MYP level. The Global Contexts provide a good platform. Land and Water Management Elements should be included in a more specific manner in units already covering resources.

As SD frameworks are only mentioned in Geography and Economics of the DP, it is recommended to introduce and map sustainability related frameworks and concepts throughout the subjects' curricula where applicable, rather than leaving it at the discretion of the teachers. For example, a practitioner who has experience with teaching all the IB Programmes suggested “[mapping] the SDGs through our programmes especially through our subjects” (Edwards 2016). An MYP teacher has specifically recommended “to use the SDGs with curriculum planning” (Jackson 2016). Another MYP teacher argued that “if they made a stronger connection to Global Contexts and the SDGs, I think that might be a good first step” (Hortop 2016). However, this has to be in a natural way rather than a way that “students or teachers could think that it is forced and trying to make it super sustainable. You do not want to get to the point where it is constraining more than enriching your learning” (Chunnananda 2016).

In addition, the Elements of Human Security, can be further covered in more subjects of DP Group 3, Individuals and Societies. What is more, it is vital that HIV/AIDS and Disease Control and Prevention topics are better addressed in both the MYP and DP curricula, as they are not addressed at all in the MYP, and have only minor mentions in DP subjects. Environmentally Friendly Living Elements, such as Composting and Recycling, could be further fostered, as well.

Including Skills Elements

It is recommended that students are better trained with regard to Risk Analysis, Decision Making, Backcasting, and Negotiation Skills as they have limited reference within the DP and could be strengthened. Additionally, students should be better trained to take the role of leader in a team, and their facilitation capabilities should be developed even further, including Leadership, Motivating and Empowering Others, Capacity Building and Partnerships, and Conflict Resolution. These Skills now have a limited presence within IB curricula. As Future Thinking is not adequately covered, it is recommended to be made stronger across the curricula. The same applies to Systems Thinking, which is implicitly touched upon, but could be further developed.

Including Attitudes Elements

Intergenerational Responsibility should be improved as it is only adequately touched upon by the MYP Global Context ‘Fairness and Development’, and due to the importance of this matter, it should be fostered even further. The concept could also be added to the overall Aim of the LP that addresses creating a better and more peaceful world.

Including Sustainability in Literature

One way to ensure raising students' awareness of sustainability matters is having them read sustainability related texts in their languages classes, as they are compulsory for all MYP and DP students. While this approach is already taken by DP Group 2 Language Acquisition subjects, this could be further developed and improved. An MYP English teacher has explained that *"with English I think the best is finding texts that show issues related to the [SDGs or similar topics], or how people are working towards achieving similar issues"*. She added that the texts students read should help them be more analytical, *"it is not just we are doing a novel or a short story, it is the content of the story as well that also matters"* (Bell 2016). Nonetheless, the language level of the selected texts should be matched with students' level of language at a particular grade.

Including Sustainability in Projects

Another way to ensure addressing sustainability with students can be through the projects the students undertake. CAS projects contained within the DP core are compulsory for all DP students. Including a sustainability component at this level would ensure that all students are engaged with sustainability. As described by an IB teacher, CAS could be *"about students engaging in something towards the sustainable future, so that could bring in the disciplines as well, so it could be that they are engaging in something to do with sustainable economics, or to do with service learning or service activities, look at maybe sustainable development in a particular area within the region in which they live"* (Pickering 2016).

Balance should be found between a student's interests and a sustainability related topic. CAS or any other project should be matched with a student's interests, and it should be personal to individual students, as highlighted by many practitioners, because *"the moment we tell kids they have to do service and we associate it with a penalty, then the job might be getting done, but if the kids get so turned off by doing service and looking at sustainability in high school ..., then we are doing more damage than doing good"* (Moss 2016). An IB student has stressed that *"you have to do something that you are really passionate about"* (Chunnananda 2016). This raises the role of students' advisors to encourage students to do things that are compatible with their talents as pointed out by a CAS coordinator (Sanisuriwong 2016).

4.4.2 Sustainability Oversight

It is recommended that the IB designates someone who is in charge of sustainability oversight across the curricula, given that *"there is no directive within the academic division [of the IB] that sustainability has to be looked at in each of the subject group areas"*, as explained by a Senior Curriculum Strand Manager at the IB Organization (Riviere 2016). Although sustainability is implicitly covered in the theme 'international mindedness', which goes across all of the subjects, it is suggested that sustainability should be explicitly looked at in order to emphasise its importance. The person who is responsible for sustainability oversight should also ensure that sustainability related issues are aligned together across the curricula (Jackson 2016).

4.4.3 Support and Resources for Teachers

The IB Organization generally provides good support to schools and teachers as highlighted by a practitioner, *"IB does not just sell you a curriculum or a frame, it sells you a community of practice, so you have IB workshops and IB conferences, and IB educators are very much*

part of a community” (Tung 2016). However, this could be further strengthened with respect to SE. An IB teacher has stated that “on the IB Organization website they have examples of units, but they should have more that has to do with [sustainability] ..., teachers need to understand how they can incorporate sustainability into the units ..., if they want to make this a priority, then they need to make the resources available to teachers” (Art 2016).

5 Discussion

5.1 Strategic Sustainable Development in Sustainability Education

It is important to highlight the difference between SD and SSD and the treatment of these concepts within the research. The literature review did not support the inclusion of SSD in secondary education curriculum. The Knowledge, Skills and Attitudes are SD related. While Strategic Thinking is included as a Skill, it is applied in a general sense, not taught specifically as a framework for achieving sustainability. Only one group of researchers defined Strategic Thinking in terms of SSD, calling strategic competence the ability to “*collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability*” (Wiek, Withycomb, and Redman 2011). However, the literature does suggest using strategic methods to develop and implement changes in curriculum to include sustainability elements (Junyent and de Ciurana 2008; Pepper and Wildy 2008). Christina McDonald (2006) suggests that “*future developments in the area of EfS calls for strategic, systemic, and concerted action to support educators as they work to develop students’ knowledge, skills and values that contribute to a sustainable future*”. A strategic approach needs to consider the whole system when creating solutions in order to avoid negative effects somewhere else or at a later time (Missimer, Robèrt, and Broman 2016). Therefore, the concept of SSD can be applied to curriculum development and alignment.

Education itself can be a strategic move towards sustainability, as can the implementation of SD concepts in a curriculum. Education of the next generation can act as an agent of social change. This paper focused on the Knowledge, Skills, and Attitudes a secondary school graduate would need to be sustainability literate. Backcasting from this vision of success, quality SE can be a key strategy for fostering SD understandings and actions in the next generation. Literature supports this claim, “*students explain how education can impact the sustainable practices of an individual and community*” (USPESD 2009).

While secondary schools students do not necessarily need to learn the specifics of the FSSD, it could be used when developing or evaluating curricula to promote SD in education, and the CASE can be used as a tool for this strategy. Lagun Mesquita, Broman, and Hallstedt (2016) have highlighted that the FSSD has proven to be a useful framework for evaluating the strengths and weaknesses of several tools and concepts from a strategic sustainability perspective.

5.2 Applications of the Criteria for Analysing Sustainability Education

The CASE can be applied differently by various users, such as researchers, policy makers, school administrators, curricula developers, and teachers. Although the CASE may be used as a checklist to enable simple comparison, ideally it should be looked at from a holistic viewpoint. Wiek, Withycombe, and Redman (2001) state, “*literature is still dominated by laundry lists of competencies rather than conceptually embedded sets of interlinked competencies*”. A more integrated and comprehensive approach is preferred. The CASE should not be interpreted as rating scale or quality assurance method, but instead it should facilitate

reorienting curricula towards SE. It is a thinking tool for SE rather than a prescription. Curriculum should be assessed holistically, looking at the overall feel and quality of the curriculum, and the overall strength of addressing the issues that students should be exploring (Riviere 2016).

The research team used the CASE to examine the strengths and weaknesses of the IB MYP and DP curricula and overall framework. Using a best fit approach, gaps between the CASE and the IB were evaluated in order to make recommendations to the IB Organization.

5.3 Structure of the International Baccalaureate Curricula

The paper assumes that students go through both the MYP and DP. However, a graduate who has done only the DP for example, will not necessarily cover all aspects highlighted in this evaluation. It is also important to note that DP students choose only one discipline from each subject group, therefore, depending upon their choices, they will not cover all of the information outside the core modules. This is *“the puzzle of the diploma, if it’s not in the core you can’t guarantee that every student gets it”* (Tung 2016). However, a Senior Curriculum Strand Manager at the IB Organization stated (Riviere 2016):

“It would be difficult to plan a DP selection of subjects without dealing with the issue of sustainability either explicitly or implicitly. Any exposure to an IB education sets you apart from students who have had no exposure. I would say that because I think the Learner Profile is evident throughout the DP and international mindedness is evident throughout the DP”.

The results section indicates which areas are affected by this lack of consistency in the IB DP students experience. It is interesting to note that a DP student selecting Environmental Systems and Societies for Group 4 and Geography or Economics for Group 3 would have the best chance of encountering all the Elements identified in the CASE.

The IB states that the aim of their curriculum review and development involves creating research based, internally minded curricula (IBO 2014h). However, the curriculum development process can be prohibitive in terms of timing. The IB conducts curriculum reviews in a seven-year cycle. In the DP, this is done on a rolling basis where the IB does not review all curricula at the same time. This makes implementing changes across the entire programme very difficult and slow moving. In contrast, the MYP curriculum is viewed holistically and is reviewed, changed, and implemented in its entirety all at once.

5.4 Terminology Usage in the International Baccalaureate

While examining the documents provided for the IB curricula was critical to the research methodology, speaking with practitioners and IB personnel was helpful in identifying terminology usage. For example, many of the Elements in the CASE are contained in the curricula under different names, *“in terms of documentation I would guess that the MYP framework actually encompasses most, if not everything, that you would expect to find in quality sustainability curriculum, even if it’s not labelled as sustainability etc., it might be*

labelled differently like global citizenship or service, or whichever word it might be” (Tung 2016). Systems Thinking is another example of an important concept in the CASE not readily found in the IB curriculum documents labelled as ‘Systems Thinking’. An IB personnel states, “I think it’s about acknowledging that complexity theory and systems thinking exist and acknowledging that these discussions do influence our curriculum design and signposting within our own courses that these are examples of systems thinking in practice without saying that all of our curriculum design is going to be centred around systems thinking and complexity theory” (Riviere 2016).

5.5 Strengths and Weaknesses of the International Baccalaureate Curricula

The main strengths of the IB curricula lie in the LP, the core aspects, and the interdisciplinary approach. The LP covers the vast majority of the Skills and Attitudes vital to the ideal graduate. As an overarching theme throughout the IB continuum, the LP exemplifies the qualities manifested in the CASE. In the core aspects, students learn skills and concepts that will help them process, understand, and contextualise knowledge. The ATL and Global Contexts provide a framework for all future learning, allowing students to internalise new ideas from the viewpoint of a sustainability literate individual. The interdisciplinary approach put forth in the IB curricula allows for a holistic and interconnected view of the world. The Subject Guides provide links to other subjects, historical contexts, international mindedness, and epistemology. For example, in the DP Sciences guides, the curriculum suggests considering the time period in which a new discovery was made and the implications of the discovery to peoples in other places and eras. The research team concedes that the seeking and treatment of knowledge is more important than the particular knowledge students are introduced to during their tenure in secondary schools. While some Knowledge issues in the CASE are not specifically present in the IB curriculum, the treatment of Skills and Attitudes compensates for any inadequacies.

While the IB Organization is an independent body, it faces many external pressures. Operating in 147 different countries, IB must consider the differing educational perspectives of local communities, schools, universities and parents. The curriculum must be flexible enough to satisfy a wide variety of viewpoints without sacrificing content and vision. This is particularly apparent at the DP level, where rigorous university requirements demand a prescriptive and sometimes rigid treatment of knowledge. Without university approval and acceptance, the IB DP would not be adopted by secondary schools. Universities have been slow in appreciating the value of a skills-based education, and some universities are very traditional in their expectations of content (Riviere 2016). Leadership also seems to be a weak point in the IB curricula, though this observation is dependent upon the chosen definition of leadership itself. The traditional mentality of a leader being in charge and directing the actions of others is not apparent in the IB Subject Guides, the LP, and core materials. However, a more modern view of a leader as a facilitator and collaborator is readily apparent in the IB Programmes of study. This modern definition is evident in the CASE Subgroup Managing Others.

5.6 Teaching and Implementation

While curriculum development is a fundamental facet of the education system, it is only one part of the larger equation. While beyond the scope of this research, it is worth mentioning that

how a teacher unpacks and presents the material in the classroom is of vital importance. A considerable portion of quality SE is dependent upon the teacher. A curriculum should support the teachers rather than restrict them. An administrator at an IB school suggested *“instead of focusing on the curriculum and putting every little thing into it, we should trust that teachers are professionals and will convey the necessary content”* (Tung 2016). Teachers should be given the freedom to choose examples that are relevant to their students, so the concepts become tangible and useful rather than abstract. An interviewee suggested using economics to understand local realities and teaching the idea of poverty based on local manifestations and comparing it to definitions of poverty abroad. IB curriculum developers are wary of adding additional layers, trying instead to offer sign posts to where it already exists in the curriculum, giving examples and providing teacher support material (Riviere 2016).

Curriculum is important, but it is not necessarily the biggest leverage point. IB does not only provide the curricula, but also a community of practice, including workshops and conferences (Tung 2016). This is especially important given the international nature of the programme and the differences in norms of teacher training, instruction, and learning around the globe. It is notable that changes are occurring in the field of teaching; *“Teaching as a profession is going through a paradigm shift of teachers seeing themselves as the holders of knowledge, the keepers of knowledge. They are the ones that impart knowledge to students”* (Riviere 2016). The new paradigm involves teachers as facilitators of learning. The IB must be aware of the nature of teaching in addition to the importance of curriculum.

5.7 Additions to the Criteria for Analysing Sustainability Education

Many Attitudes in the CASE are mind sets that are developed in combination with Skills, such as Holistic Viewpoint and Systems Thinking. There are many overlaps in the CASE that are not apparent when presented as a list. A more graphic format could better appreciate the complexity of the CASE. All Elements of the CASE are literature based and found in materials focusing on quality SE. However, it is the opinion of the research team that other components should be included. Self-expression is a general term for voicing one’s own opinions, emotions, and aspirations. This is valuable to the ideal graduate as a way to share their feelings and visions concerning humanity and the planet. Recognising patterns and trends, as well as causes and effects would be valuable in many areas of SD and should be included in the Skills for quality SE. The Skills and Attitudes associated with being a change agent should be consolidated and clarified within the CASE through multiple foci of individual, everyday choices and affecting large scale change. Finally, the mastery of transfer skills should be included to ensure that the graduate can apply their learnings to the real world in which they live and function, for what good are the Knowledge, Skills, and Attitudes if they are not applicable.

5.8 Further Research

Given the importance of education as a strategy for SSD, there are many areas that could be investigated. During the thesis process many interesting aspects were encountered, and they are suggested for future research. For instance, the CASE can be used and tested as a curriculum development tool. Also, the IB Primary Years Programme and Career Programme could be analysed in terms of SE and SSD. Furthermore, the efficacy of SE in teacher training and classroom implementation could be studied, as well as the educational outcomes of secondary school graduates.

6 Conclusion

In conclusion, education plays a major strategic role in moving society towards sustainability. By backcasting from the envisioned future of the ideal graduate, education should be strategically designed in accordance to the desired outcome, future leaders who are prepared to face the Sustainability Challenge. While several SE frameworks exist, with different names and purposes, they generally address SD rather than SSD. A strategic, systems approach is needed in order to ensure that creating a solution for an issue does not result in negative impacts somewhere else or at a later time. SSD can be a good framework for achieving the goal. Although SE is important at all levels of formal education, it is argued that the adolescent time period, in particular, has significance as it can have major influence on adult life. As an important aspect of education, curricula should be strategically designed to achieve the anticipated objectives and act as a guideline for educators. In order to ensure that curricula provide quality SE, they should include particular Knowledge, Skills and Attitudes that foster sustainability literacy.

The Criteria for Analysing Sustainability Education, which this research has developed through meta-analysis of literature, provides a list of the required Knowledge, Skills and Attitudes. In terms of Knowledge, the CASE advises developing students' awareness of SD, Economy, Environment and Society. With regard to Skills, enhancing students' capabilities regarding Cognitive Thinking Skills, Practical and Functional Skills, and Interpersonal Skills should be promoted. Lastly, the Attitudes include Attitudes about Self and Attitudes about People and Planet. The Knowledge, Skills, and Attitudes included are viewed as important stepping stones in strategically moving society towards sustainability. Yet, the CASE should be treated as a thinking tool rather than a prescription, and its Elements should be looked at from a holistic perspective. The CASE can be used throughout the world to develop, evaluate, or align curricula that will produce the next generation of citizens to drive changes moving society towards sustainability. The tool is designed to be used in multiple contexts in local, national, or global curricula. Adoption of this tool could foster widespread improvements in SE.

By analysing the IB curricula, including the LP, and MYP and DP Subject Guides, in comparison to the CASE, it can be concluded that the IB generally aligns with the criteria for quality SE. Although the IB was not solely designed as an SE model, the Aim of its Learner Profile and the interdisciplinary approach of the IB naturally lend themselves to SE. However, some gaps have been identified; and recommendations have been suggested to further improve the IB curricula in relation to SE. The improvements can be attained through integrating SD frameworks and more SE elements into the curricula, having sustainability oversight, and providing more support and resources to teachers. The popularity and prevalence of IB across the globe provides a platform for widespread change. If IB adopts recommendations based on the CASE and moves toward a more comprehensive coverage of SE, students and communities in 147 countries can benefit from a generation of young adults equipped to tackle the Sustainability Challenge.

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8 Appendices

Appendix A: The Millennium Development Goals

| The Millennium Development Goals (Sustainable Development Goals Fund 2015) | |
|--|--|
| Goal 1 | Eradicate extreme poverty and hunger. |
| Goal 2 | Achieve universal primary education. |
| Goal 3 | Promote gender equality and empower women. |
| Goal 4 | Reduce child mortality. |
| Goal 5 | Improve maternal health. |
| Goal 6 | Combating HIV/AIDs, malaria, and other diseases. |
| Goal 7 | Ensure environmental sustainability. |
| Goal 8 | Develop a global partnership for development. |

Appendix B: The Sustainable Development Goals

| The Sustainable Development Goals (UN 2015) | |
|--|--|
| Goal 1 | End poverty in all its forms everywhere. |
| Goal 2 | End hunger, achieve food security and improved nutrition, and promote sustainable agriculture. |
| Goal 3 | Ensure healthy lives and promote well-being for all at all ages. |
| Goal 4 | Ensure inclusive and equitable quality education and promote life-long learning opportunities for all. |
| Goal 5 | Achieve gender equality and empower all women and girls. |
| Goal 6 | Ensure availability and sustainable management of water and sanitation for all. |
| Goal 7 | Ensure access to affordable, reliable, sustainable, and modern energy for all. |
| Goal 8 | Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all. |
| Goal 9 | Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. |
| Goal 10 | Reduce inequality within and among countries. |
| Goal 11 | Make cities and human settlements inclusive, safe, resilient and sustainable. |
| Goal 12 | Ensure sustainable consumption and production patterns. |
| Goal 13 | Take urgent action to combat climate change and its impacts. |
| Goal 14 | Conserve and sustainably use the oceans, seas, and marine resources for sustainable development. |
| Goal 15 | Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss. |
| Goal 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. |
| Goal 17 | Strengthen the means of implementation and revitalize the global partnership for sustainable development. |

Appendix C: The Evolution of Sustainability Education

| The Evolution of Sustainability Education (adapted from de Leo 2012; DESD 2008) | |
|---|--|
| Late 1960s | Early ideas around concepts of ‘environmental sustainability’ first began to emerge, with the birth of Environmental Education. |
| 1970 | EE was first formalised at a meeting of the International Union for the Conservation of Nature and Natural Resources (IUCN) in Nevada, where the definition included ‘values’ and the ‘cultural’ context. |
| 1972 | The first UN Conference on the Human Environment (UNCHE) was held in Stockholm, and recommended that the International Environmental Education Programme (IEEP) be established to develop Environmental Education for promoting understanding through education in managing, protecting and improving the environment (UN 1972). |
| 1977 | Inter-Governmental Conference on Environmental Education held in Tbilisi described the aim of Environmental Education, reflecting the inter-relatedness of the multiple dimensions of sustainable development (UNESCO-UNEP 1978). |
| Between the 1970s and 1980s | EE continued to develop with concerns about the Earth’s capacity to sustain growing patterns of consumption and production and their effects on the environment in terms of pollution and depletion of resources. But Environmental Education was to anticipate and solve only environmental problems rather than finding systemic solutions to socio-political, cultural, environmental and economic concerns. |
| 1991 | The IUCN publication ‘Caring for the Earth’, emphasised the importance of Environmental Education for changing behaviour necessary for sustainable development (IUCN 1991). |
| 1992 | The UN Conference on Environment and Development (UNCED) outlined the Global Action Plan for Sustainable Development in Agenda 21, which highlighted the critical importance of fostering values and attitudes of respect for the environment through education. Chapter 36 of Agenda 21 specifically discusses promoting education, public awareness and training with special emphasis on: 1. reorienting education towards sustainable development, 2. increasing public awareness, 3. and promoting training. (UN 1992). |
| 1993 | Agenda 21 led to the establishment of the Environment, Population and Information for Human Development (EPD) project, which included social, environmental and economic considerations. |
| 2000 | Agenda 21 catalysed the development of ‘The Earth Charter Initiative’, which outlined a set of values and principles for a sustainable future for educational purposes, to build a “just, sustainable and peaceful global society for the 21st century” (ECI 2000). |

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| 2002 | The United Nations General Assembly proclaimed the UN Decade of Education for Sustainable Development, 2005-2014, (DESD), emphasising that education is an indispensable element for achieving Sustainable Development (DESD 2008). |
| 2005 - 2014 | The UN Decade of Education for Sustainable Development. |
| 2009 | the UNESCO World Conference on Education for Sustainable Development was held in Bonn, Germany, and published 'Bonn Declaration' which included a call for action (Bonn Declaration 2009). |

Appendix D: The International Baccalaureate Organization Learner Profile

| The International Baccalaureate Organization Learner Profile (adapted from IBO 2013) | |
|--|---|
| The Aim of the Learner Profile | The Aim of all IB Programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world. |
| Inquirers | They develop their natural curiosity. They acquire the skills necessary to conduct inquiry and research and show independence in learning. They actively enjoy learning and this love of learning will be sustained throughout their lives. |
| Knowledgeable | They explore concepts, ideas and issues that have local and global significance. In so doing, they acquire in-depth knowledge and develop understanding across a broad and balanced range of disciplines. |
| Thinkers | They exercise initiative in applying thinking skills critically and creatively to recognize and approach complex problems, and make reasoned, ethical decisions. IB students contribute to discussions in a meaningful way. |
| Communicators | They understand and express ideas and information confidently and creatively in more than one language and in a variety of modes of communication. They work effectively and willingly in collaboration with others. |
| Principled | They act with integrity and honesty, with a strong sense of fairness, justice and respect for the dignity of the individual, groups and communities. They take responsibility for their own actions and the consequences that accompany them. |
| Open-minded | They understand and appreciate their own cultures and personal histories, and are open to the perspectives, values and traditions of other individuals and communities. They are accustomed to seeking and evaluating a range of points of view, and are willing to grow from the experience. |
| Caring | They show empathy, compassion and respect towards the needs and feelings of others. They have a personal commitment to service, and act to make a positive difference to the lives of others and to the environment. |
| Risk-takers | They approach unfamiliar situations and uncertainty with courage and forethought, and have the independence of spirit to explore new roles, ideas and strategies. They are brave and articulate in defending their beliefs. |
| Balanced | They understand the importance of intellectual, physical and emotional balance to achieve personal well-being for themselves and others. |
| Reflective | They give thoughtful consideration to their own learning and experience. They are able to assess and understand their strengths and limitations in order to support their learning and personal development. |

Appendix E: The International Baccalaureate Diploma Programme Subject Guides

| The International Baccalaureate Diploma Programme Subject Guides (adapted from the IBO 2014) | |
|--|--|
| Studies in Language and Literature Group 1 | <ul style="list-style-type: none"> • Language A: Literature • Language A: Language and Literature • Literature and Performance |
| Language Acquisition Group 2 | <ul style="list-style-type: none"> • Language B • Language B ab initio • Classical Languages |
| Individuals and Societies Group 3 | <ul style="list-style-type: none"> • Business Management • Economics • Geography • Global Politics • History • Information Technology in a Global Society • Philosophy • Psychology • Social and Cultural Anthropology • World Religions |
| Sciences Group 4 | <ul style="list-style-type: none"> • Biology • Computer Science • Chemistry • Design Technology • Physics • Sports, Exercise and Health Science • Environmental Systems and Societies (can also be taken as a Group 4 course) |
| Mathematics Group 5 | <ul style="list-style-type: none"> • Mathematical Studies • Mathematics SL • Mathematics HL • Further Mathematics |
| Arts Group 6 | <ul style="list-style-type: none"> • Dance • Music • Film • Theatre • Visual Arts |

Appendix F: The five levels of the FSSD

| The five levels of the FSSD (Broman and Robèrt 2015) | |
|--|---|
| 1. System | <p>The system level includes principles for the functioning of the global system, i.e., the human society within the biosphere, and our knowledge on resource stocks and flows, biogeochemical cycles, assimilation capacity, climate regulation capacity, biodiversity, resilience, the basic constitution of human beings, trust between people and societal institutions, etc., and known relationships between human practices and impacts in the ecological and social systems. For a specific organization, its dependence on the general regional and global support systems as well as how it is nested in value chains and other stakeholder networks and how it is affected by unsustainability impacts also belong to the system level. As an analogy, in chess, the system level includes the board and its constitution, the different pieces and the rules for how they can be moved.</p> |
| 2. Success | <p>The success level includes the definition of the vision. The FSSD requires any vision to be framed by basic sustainability principles. Why aspire for a vision that cannot be in the future? For a specific organization, additional success criteria in the form of core purpose, core values and overall ‘end goals’ specific to the organization can be added. Besides the sustainability principles, the FSSD is non-prescriptive. A multitude of possible visions exist within the principled frame. Relating to the chess analogy, there are almost uncountable combinations fulfilling the few basic principles of checkmate. When a vision has been defined it can guide supplementary studies of the system (including what need not to be studied), as well as selection, combination and development of supplementary forms of support as needed to enable the transition.</p> |
| 3. Strategic Guidelines | <p>The strategic guidelines level includes guidelines for how to approach the principle-framed vision strategically. The FSSD provides a number of generic guidelines for stepwise transitions. For a specific organization, additional guidelines can be added depending on the context. Besides the obvious that actions should be selected and combined based on their capacity to serve as economically viable platforms towards the vision, ensuring that resources continue to feed the process all the way, the FSSD is non-prescriptive. A multitude of viable routes towards any sustainable vision exist. Referring to the chess analogy, there are almost uncountable possible routes towards checkmate.</p> |
| 4. Actions | <p>The actions level includes the concrete actions that have been prioritized by the specific organization into a strategic plan, using the strategic guidelines and the vision to inspire, inform, and scrutinize the possible actions. Examples of actions in the sustainability context may include sustainability education of staff, phasing out certain substances, introducing certain procurement practices, phasing out non-renewable energy sources, requiring certain working conditions throughout the value chain, etc. The strategic plan is re-assessed repeatedly as the specific</p> |

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| | contextual conditions change and learning takes place with time as the development unfolds. |
| 5. Tools | The tools level includes methods, tools and other forms of support that are often required for decision making, monitoring, and disclosures of the actions to ensure they are chosen in line with the strategic guidelines to arrive step-by-step at the defined success in the system. Examples in the sustainability context include modelling, simulation, life cycle assessment, management systems, indicators, etc. |

| | McClain and Diefenbacher 2015 | McDonald 2006 | McKenzie 2012 | McKeown 2002 | McLean 2014 | Missimer and Connell 2012 | Mochizuki and Fadeeva 2010 | Ofsted 2008 | Olsson and Gericke 2016 | Oxfam 2015 | Rowe 2007 | Shepherd and Duglar 2015 | Šorgo and Kamensek 2012 | Sterling 2010 | Stir 2006 | Tilbury and Wortman 2004 | Uitto and Saloranta 2010 | UNESCO 2006 | UNESCO 2011 | UNESCO 2012 | UNESCO 2012a | USPESD 2009 | Wiek, Withycombe, and Redman 2011 | Zinser 2012 | Zoller 2012 |
|--|-------------------------------|---------------|---------------|--------------|-------------|---------------------------|----------------------------|-------------|-------------------------|------------|-----------|--------------------------|-------------------------|---------------|-----------|--------------------------|--------------------------|-------------|-------------|-------------|--------------|-------------|-----------------------------------|-------------|-------------|
| Knowledge | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainable Development | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainability Challenge | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impact of Human Activity on the Socio-Ecological System | | | • | | | | | | • | | | | • | | | | | | | | | | • | | |
| Population Growth | | | • | | | | | | | | | | | | | | | | | • | | • | | | |
| Sustainable Development Concepts | | | | | | | | | | | | | | | | | | | | | | | | | |
| Defintions | | | • | | | | | | • | | | | | | | | | | | | | • | • | | |
| Frameworks | | | | • | | | | | | | | | | | | | | | | | | | | | |
| Economy | | | | | | | | | | | | | | | | | | | | | | | | | |
| Economic Development & Policy | | | | | | | | | | | | | | | | | | | | | | | | | |
| Globalisation & Global Economic Systems | | | • | • | | | | | • | | | | | | | | | | • | | | • | • | | |
| Poverty Reduction | | | | • | | | | | | • | | | | | | | | • | | • | | • | | | |
| Market Economy | | | | | | | | | | | | | | | | | | • | | | | | | | |
| Financing Sustainable Development | | | | • | | | | | | | | | | | | | | | | | | • | | | |
| Consumer Behaviour & Consumption Patterns | | | | • | | | | | | • | | | • | | | | | | | • | | | | | |
| Corporate Responsibility | | | | | | | | | | | | | | | | | | | | | | | | | |
| Design & Manufacturing | | | | | | | • | | • | | | | | | | | | | | | | • | | | |
| Multinational Corporations | | | | • | | | | | | • | | | | | | | | | | | | | | | |
| Triple Bottom Line | | | | | | | | | | | | | | | | | | | | | | • | | | |
| Environment | | | | | | | | | | | | | | | | | | | | | | | | | |
| Natural Science | | | | | | | | | | | | | | | | | | | | | | | | | |
| Laws of Nature | | | | • | | | | | | | | | | | • | | | | | • | | | | | |
| Science, Technology, & Applied Science | | | | • | | | | | | • | | | • | | | | | | | | | • | | | • |
| Integrated Science | | | | | | | | | | | | | | | | | | | | | | | | | • |
| Global Ecological Systems (Oceans & Atmosphere, Biosphere, Terrestrial & Aquatic Ecosystems) | | | | • | | | | | • | | | | • | | | | | • | • | | • | • | • | | |
| Climate Change | | | | | | | | | | | | | | | | | | | | | | | | | |
| Causes | | | | | | | | • | • | | | | • | | | | | • | | • | | | | | |
| Effects | | | | • | | | | • | • | | | | • | | | | | • | | • | | | | | |
| Natural Heritage & Resources | | | | | | | | | | | | | | | | | | | | | | | | | |
| Air & Water Quality | | • | | • | | | | • | | | | | | | | | | | | | | • | | | |
| Renewable Energy | | | | • | | | | • | | | | | | | | | | | | | | | | | • |
| Biodiversity | | | | • | | | | • | | • | | | • | | | | | | | • | | • | | | |
| Resources & Conservation | | | | • | | | | | • | | | | • | | | | | • | • | | | • | | | |
| Ecosystem Protection & Restoration | | | | • | | | | | | | | | • | | | | | • | • | | | | | | • |
| Deforestation | | | | • | | | | | | | | | | | | | | | | • | | | | | |
| Pollution | | | | | | | | | | | | | • | | | | | | | | | | | | |

| | Baker 2008 | Barth et al. 2007 | Benedict 1999 | Berglund, Gericke, and Rundgren 2014 | Biasutti 2015 | Brunold-Conesa 2010 | Cabeza-Erikson, Edwards, and van | Christie et al. 2015 | Clarke 2009 | Dambudzo 2015 | de Haan 2006 | de Haan 2010 | Eco-Schools 2014 | Evitts, Seale, and Skybrook 2010 | Fancett, van Zaanen, and Várfi 2012 | Filho 2009 | Gottlieb et al. 2012 | Gu, Gomes, and Brizuela 2011 | Harris 2008 | Hicks 2012 | Hidalgo and Fuentes 2013 | Holdsworth and Thomas 2015 | Hopkinson and James 2010 | Jekling and Wals 2008 | Johannesson et al. 2011 | Kim, Aymeric, and Changkun 2012 | Lander 2015 | MacDonald 2015 | |
|---|------------|-------------------|---------------|--------------------------------------|---------------|---------------------|----------------------------------|----------------------|-------------|---------------|--------------|--------------|------------------|----------------------------------|-------------------------------------|------------|----------------------|------------------------------|-------------|------------|--------------------------|----------------------------|--------------------------|-----------------------|-------------------------|---------------------------------|-------------|----------------|--|
| Land & Water Management | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainable Urbanization | | | | • | | | | | | | | | | | | | | | | | | | | | | • | | | |
| Rural Development | | | | • | | | | | | | | | | | | | | | | | | | | | | | • | | |
| Traffic, Transport, & Infrastructure | | | | | | | | | | | | | • | | | • | | | | • | | | | | | | | | |
| Agriculture & Food Production | | | | | | | | | | | | | | | | • | | | | • | | | | | | | | | |
| Fresh Water | | | | • | | | | | | | | | • | | | | | | | • | | | | | | • | | | |
| Solid, Hazardous Waste, & Sewage | | | | | | | | | | | | | • | | | • | | | | • | | | | | | | | | |
| Environmentally friendly Living | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ethics of Sustainable Living | | | | | | | | | | | | | • | | | | • | | | • | | | | | | | | | |
| Composting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Recycling | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Carbon Footprint | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Energy Use | | | | | | | | | | | | | • | | | | | | | • | | | | | | | | | |
| Society | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Social Science & Humanities | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ethics & Philosophy | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | |
| World Culture & History | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | |
| Historical Context | | | | | | | | | | | | | | | | | | | | | | • | | | | | | | |
| Language (World Language Proficiency) | | | | | | • | | | | | | • | | | | | | | | | | | | | | • | | | |
| Geography & Demographics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Epistemology | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Rights | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Rights Principles | • | | | • | | | | | | | | | • | | | | | | | | • | | | | | | | | |
| Socio-Economic Justice & Equity | • | | | | | | | | | | • | • | | | | • | | | | | | | | | | | • | | |
| Equality & Discrimination | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Disenfranchised & Underrepresented Minorities | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | |
| Human Security | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Settlement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Disaster Mitigation | | | | • | | | | | | | • | | | | | | | | | | | | | | | | | | |
| Nationalism | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peace & Conflict | • | | | | | | | | | | • | | | | | | | | | | • | | | | | | • | | |
| Health | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIV/AIDS | | | | • | | | | | | | • | | | | | | | | | | | | | | | | | | |
| Disease Control & Prevention | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quality of Life & Well-being | | | | • | | | | | | | | | • | | | | | | | | | | | | | | • | | |
| Governance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Civil Societies | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Democracy | | | | | • | | | | | | | • | | | | | | | | | | | | | | | • | | |
| International Law & Treaties | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| International Organisations & Cooperation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power & Governance | • | | | • | | | | | | | | | | | | | | | | | | | | | | | | | |

| | McClain and Diefenbacher 2015 | McDonald 2006 | McKenzie 2012 | McKeown 2002 | McLean 2014 | Missimer and Connell 2012 | Mochizuki and Fadeeva 2010 | Ofsted 2008 | Olsson and Gericke 2016 | Oxfam 2015 | Rowe 2007 | Shepherd and Dulgar 2015 | Šorgo and Kamensek 2012 | Sterling 2010 | Stir 2006 | Tilbury and Wortman 2004 | Uitto and Saloranta 2010 | UNESCO 2006 | UNESCO 2011 | UNESCO 2012 | UNESCO 2012a | USPESD 2009 | Wiek, Withycombe, and Redman 2011 | Zinser 2012 | Zoller 2012 |
|---|-------------------------------|---------------|---------------|--------------|-------------|---------------------------|----------------------------|-------------|-------------------------|------------|-----------|--------------------------|-------------------------|---------------|-----------|--------------------------|--------------------------|-------------|-------------|-------------|--------------|-------------|-----------------------------------|-------------|-------------|
| Land & Water Management | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sustainable Urbanization | | | | | | | | | | | | | | | | | | • | | | | • | | | |
| Rural Development | | | | • | | | | | | | | | | | | | | • | | | | | | | |
| Traffic, Transport, & Infrastructure | | | | | | | • | | | | | • | | | | | | | | | | | | • | |
| Agriculture & Food Production | | | | • | | | | | | • | | | | | | | | | | | • | | • | | • |
| Fresh Water | | | | • | | | • | | | | | | • | | | | • | • | | | • | | • | | |
| Solid, Hazardous Waste, & Sewage | | | | • | | | | | | | | | • | | | | | | | • | | | | | |
| Environmentally friendly Living | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ethics of Sustainable Living | | • | | • | | | • | | • | | | • | | | | | | | • | • | | | | | |
| Composting | | | | | | | • | | | | | | | | | | | | | | | | | | |
| Recycling | | | | | | | • | | | | | | | | • | | | | | | | | | | |
| Carbon Footprint | | | | | | | • | | | | | • | | | | | | | | | | • | | | |
| Energy Use | | | | | | | • | | | | | | | | | | | | | | | • | | | |
| Society | | | | | | | | | | | | | | | | | | | | | | | | | |
| Social Science & Humanities | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ethics & Philosophy | | | • | | | | | | | | | • | | | | | • | | | | | | | | |
| World Culture & History | | | | | | | | | • | | | | | | | | | | | | | | | • | |
| Historical Context | | | | • | | | | | • | | | | | | | • | | | • | | | | | | |
| Language (World Language Proficiency) | | | • | | | | | | | | | • | | | | | | | | | | | | • | |
| Geography & Demographics | | | • | | | | • | | | | | | | | | | | | | | | | | • | |
| Epistemology | | | • | | | | | | | | | | | | | | | | | | | | | | |
| Human Rights | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Rights Principles | | | | • | | | | | | • | | | | | | | | • | • | | | • | | | |
| Socio-Economic Justice & Equity | | | | • | | | | | | • | | | | | | | | | • | • | | • | | | |
| Equality & Discrimination | | | | • | | | | | | • | | | | | | | | | | | | | | | |
| Disenfranchised & Underrepresented Minorities | | | | • | | | | | | | | | | | | | | | | • | | | | | |
| Human Security | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Settlement | | | | • | | | | | | | | | | | | | | | | | • | | | | |
| Disaster Mitigation | | | | | | | | | | | | | | | | | | • | | | | | | | |
| Nationalism | | | | • | | | | | | • | | | | | | | | | | | | | | | |
| Peace & Conflict | | | | • | | | | | | • | | | | | | | | • | • | | | • | • | | |
| Health | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIV/AIDS | | | | | | | | | | | | | | | | | | • | | | | | | | |
| Disease Control & Prevention | | | | | | | | | | | | | | | | | | • | | | | | | | |
| Quality of Life & Well-being | | | | • | | | | | | • | | | | | | | | • | | | | • | | | |
| Governance | | | | | | | | | | | | | | | | | | | | | | | | | |
| Civil Societies | | | | • | | | | | | • | | | | | | | | | | | | | | | |
| Democracy | | | | | | | | | | • | | | | | | | | | | | | | • | | |
| International Law & Treaties | | | | • | | | | | | • | | | | | | | | | | | | • | | | |
| International Organisations & Cooperation | | | | • | | | | | | | • | | | | | | | | | | | | | | |
| Power & Governance | | | | • | | | | | | • | | | | | | | | • | | | | • | • | | |

| | Baker 2008 | Barth et al. 2007 | Benedict 1999 | Berglund, Geriöke, and Rundgren 2014 | Biasutti 2015 | Brunold-Conesa 2010 | Cabeza-Erikson, Edwards, and van | Christie et al. 2015 | Clarke 2009 | Dambudzo 2015 | de Haan 2006 | de Haan 2010 | Eco-Schools 2014 | Evitts, Seale, and Skybrook 2010 | Fancett, van Zaanen, and Várfi 2012 | Filho 2009 | Gottlieb et al. 2012 | Gu, Gomes, and Brizuela 2011 | Harris 2008 | Hicks 2012 | Hidalgo and Fuentes 2013 | Holdsworth and Thomas 2015 | Hopkinson and James 2010 | Jickling and Wals 2008 | Johannesson et al. 2011 | Kim, Aymeric, and Changkun 2012 | Lander 2015 | MacDonald 2015 | |
|--|------------|-------------------|---------------|--------------------------------------|---------------|---------------------|----------------------------------|----------------------|-------------|---------------|--------------|--------------|------------------|----------------------------------|-------------------------------------|------------|----------------------|------------------------------|-------------|------------|--------------------------|----------------------------|--------------------------|------------------------|-------------------------|---------------------------------|-------------|----------------|---|
| Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cognitive Thinking Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Strategic Thinking | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Systems Thinking | | | | | | • | • | | | • | | | | • | • | | | • | • | | | • | • | | | | • | • | |
| Critical Thinking | • | | | | • | | • | • | | • | | | | | | | • | • | • | | | • | • | • | | • | | • | |
| Independent Thinking | | | | • | | | | • | | | | | | | | | | | | | | | | | | | | | |
| Creative Thinking | • | | | | | | | | | • | | | | | | | • | • | | | • | | • | | | | • | • | • |
| Interdisciplinary Thinking | | • | • | | • | | • | | | • | • | • | | | | | | | | | | • | | | | | • | • | • |
| Future Thinking | | • | | | | | | | | | • | • | | | • | | | • | | | • | | • | | • | | • | | • |
| Inquiry & Investigation | | | | | | | • | | | • | | • | | | | | | | | • | | | • | | | | | | |
| Viewing Issues from Multiple Perspectives | | | | | | | | | | | • | | | | | | | | | | | | • | | | | | | |
| Viewing Issues from Local & Global Perspectives | • | • | • | • | • | | | • | | • | • | • | | | • | • | | | | | • | • | • | | | | • | • | • |
| Understanding Interdependence & Interconnectedness of Issues | | | | | • | | | | • | | | | | • | | | | | | | • | | | | | | | • | • |
| Practical & Functional Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Technical & Quantitative Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data Literacy | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Computational Skills & Numeracy | | | | | | | | | | • | | | | | | | | | | | | | | | | | | | |
| Technological Literacy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Process Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Planning & Organisation | | • | | | | | • | | | • | • | | | | | | | | | | | | | | | | | | |
| Implementation | | • | | | | | | | | • | • | | | | | | | | | | | | | • | | | | | |
| Evaluation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Problem Solving | | | | • | | | • | | • | • | | | | • | • | | • | | | | • | | | | | | | | • |
| Risk Analysis | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Decision Making | | | | • | | • | | | | • | | | | | | | | | | • | | | | • | | | | | |
| Backcasting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Research | | | | | | | • | | • | • | | | | | | | | | | • | | | • | | | | | | |
| Information Analysis, including Media Literacy | • | | | | | | | | | | • | | | | | | | | | | • | | | | | | | | |
| Interpersonal Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Communication Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Discussion, Debate, & Conversation | | | | • | | • | | | | | | | | | | | | | | | | | | | | | | | • |
| Negotiations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oral & Written Communication | • | | | | | • | | | • | • | • | | | | • | | • | | | • | | | | | • | | | | |
| Active Listening Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shared Language | | | | | | | | | | | • | | | | | | | | | | | | | | | | | | |
| Managing Self | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reflection | • | • | | | | | | | | • | • | | | | | | • | • | | | • | | • | | | | • | | |
| Motivation of Self | | • | | | | • | | | | • | • | | | | • | | | | | • | | • | | | | | | | |
| Participatory Skills | | • | • | | | | | | | | | | • | • | | | • | | | • | | • | | • | • | • | | | |
| Self-Directed Learning | | • | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flexibility & Adaptability | | | | | | | | | | | | | | | | | • | | | • | • | | | | | | | | |

| | McClain and Diefenbacher 2015 | McDonald 2006 | McKenzie 2012 | McKeown 2002 | McLean 2014 | Missimer and Connell 2012 | Mochizuki and Fadeeva 2010 | Ofsted 2008 | Olsson and Gericke 2016 | Oxfam 2015 | Rowe 2007 | Shephard and Dulgar 2015 | Šorgo and Kamenšek 2012 | Sterling 2010 | Stir 2006 | Tilbury and Wortman 2004 | Utito and Saloranta 2010 | UNESCO 2006 | UNESCO 2011 | UNESCO 2012 | UNESCO 2012a | USPESD 2009 | Wiek, Withycombe, and Redman 2011 | Zinser 2012 | Zoller 2012 | |
|--|-------------------------------|---------------|---------------|--------------|-------------|---------------------------|----------------------------|-------------|-------------------------|------------|-----------|--------------------------|-------------------------|---------------|-----------|--------------------------|--------------------------|-------------|-------------|-------------|--------------|-------------|-----------------------------------|-------------|-------------|---|
| Skills | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cognitive Thinking Skills | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Strategic Thinking | | | | | | • | | | | | | | | | | | | | | | | | | | | |
| Systems Thinking | • | | | • | • | • | | | | | | • | | | | | | | • | • | | • | • | • | • | • |
| Critical Thinking | | | • | • | • | • | | • | | • | | • | | | | | | • | • | • | | • | • | | | |
| Independent Thinking | | | • | | | | | | | | | | | | | | | | | | | | | | | |
| Creative Thinking | | | | • | | | | | | • | | • | | | | | | | • | | | | | | • | |
| Interdisciplinary Thinking | | | • | • | • | • | | | | | | • | | | | | | • | | | • | • | • | • | • | • |
| Future Thinking | | | | • | • | • | | | | • | | | • | | | • | | | • | • | • | | • | | | |
| Inquiry & Investigation | | | | • | | | | | | | | | | | | | | | • | | | | | | • | |
| Viewing Issues from Multiple Perspectives | | | | • | | | | • | | • | | | | | | | | | | • | | • | | | | |
| Viewing Issues from Local & Global Perspectives | | | • | • | • | | | | | • | | • | | | | | | • | • | | • | • | • | • | • | • |
| Understanding Interdependence & Interconnectedness of Issues | • | | | • | | | • | | • | • | | | | | | | | • | | | • | • | | | | |
| Practical & Functional Skills | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Technical & Quantitative Skills | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data Literacy | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Computational Skills & Numeracy | | | | • | | | | | | • | | | | | | | | | | | | | | | • | |
| Technological Literacy | | | | | | | | | | | | | | | | | | | | | | | | | • | |
| Process Skills | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Planning & Organisation | | | | • | | | | | | • | | • | | | | • | | | • | • | • | • | • | • | | |
| Implementation | | | | | | | | | | | | | | | | • | | | • | • | • | • | • | | | |
| Evaluation | | | | | | | | | | • | | | | | | | | | • | | | | | | | • |
| Problem Solving | | • | | | | • | | | | • | | • | | | | | | • | | | | • | • | • | • | • |
| Risk Analysis | | | | | | | | | | | | | | | | | | | | | | | | | | • |
| Decision Making | | • | | • | • | • | • | • | | | | | | | | | | • | • | | | • | | | | • |
| Backcasting | | | | | | | | | | | | | | | | | | | | | | | | | | • |
| Research | | | | • | | | | | | | | | | | | | | | • | | | | | | | • |
| Information Analysis, including Media Literacy | | | | • | | | | | | • | | • | | | | | | | | | | • | | | | |
| Interpersonal Skills | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Communication Skills | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Discussion, Debate, & Conversation | | | | • | • | • | • | • | • | | | | | | | | | | • | | | | | | | • |
| Negotiations | | | | | | | | | | | | | | | | | | | | | | | | • | • | |
| Oral & Written Communication | | | | • | | | • | | | • | | • | | | | | | | | • | | | | • | • | |
| Active Listening Skills | | | | | | • | | | | • | | | | | | | | | | | | | | | | • |
| Shared Language | • | | | | | | | | | | | | | | | | | | | | | | | | | |
| Managing Self | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reflection | | | | • | • | • | | | | • | | | | | | | | | | | | • | • | | | |
| Motivation of Self | | | | | | | | | | | | | | | | • | | | | | • | • | | | | |
| Participatory Skills | | | | • | • | • | | | | • | | | | | | | | | | | | | • | | | |
| Self-Directed Learning | | | | | | • | | | | | | | | | | | | | | | | | | | | |
| Flexibility & Adaptability | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | McClam and Diefenbacher 2015 | McDonald 2006 | McKenzie 2012 | McKeown 2002 | McLean 2014 | Missimer and Connell 2012 | Mochizuki and Fadeeva 2010 | Ofsted 2008 | Olsson and Gericke 2016 | Oxfam 2015 | Rowe 2007 | Shephard and Dugar 2015 | Šorgo and Kamenšek 2012 | Sterling 2010 | Stir 2006 | Tilbury and Wortman 2004 | Uitto and Saloranta 2010 | UNESCO 2006 | UNESCO 2011 | UNESCO 2012 | UNESCO 2012a | USPESD 2009 | Wiek, Withycombe, and Redman 2011 | Zinser 2012 | Zoller 2012 |
|--|------------------------------|---------------|---------------|--------------|-------------|---------------------------|----------------------------|-------------|-------------------------|------------|-----------|-------------------------|-------------------------|---------------|-----------|--------------------------|--------------------------|-------------|-------------|-------------|--------------|-------------|-----------------------------------|-------------|-------------|
| Managing Others | | | | | | | | | | | | | | | | | | | | | | | | | |
| Teamwork | | | | | | • | | | | • | | | | | | | | | | | | | | • | |
| Empower People | | | | | | | | | • | | | | | | | | | | | | | | | | |
| Motivation of Others | | | | | | • | | | | | | | | | | • | | | | | • | | • | | |
| Leadership Skills | | | | | | | | | | • | | | | | | • | | | | | | • | | | |
| Collaboration & Cooperation | | • | | • | | • | • | | | • | | | | | | | | • | | | • | | • | | |
| Capacity Building & Partnership | | | | | • | | | | | | | | | | | | | | | | | | | | |
| Conflict Resolution | | | | | | • | | | | • | | | | | | | | | | | | | • | | |
| Managing Situations | | | | | | | | | | | | | | | | | | | | | | | | | |
| Managing Complexity | | | | | | • | | | | • | | | | • | | | | | | | | | | | |
| Managing Change | | | | | | • | | | | • | • | | | | | | | | | | | • | • | | |
| Managing Uncertainty | | | | | | | | | | | | | | | | | | | | | • | | • | | |
| Attitudes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Self | | | | | | | | | | | | | | | | | | | | | | | | | |
| Self-Awareness | | | | | | | | | | • | | | | | | | | | | | | | | | |
| Self-Esteem | | | | | | | | | | • | | | | | | | | | | | | | | | |
| Self-Reliance | | | | | | • | | | | | | | | | | | | | | | | | | | |
| Self-Control | | | | | | | | | | | | | | | | | | | | | | | | | |
| Resilience | | | | | | | | | | | | • | | | | | | | | | | | | | |
| Resourcefulness | | | | | | | | | | | | • | | | | | | | | | | | | | |
| Integrity | | | | | | | | | | | | | | | | | | | | | | | • | | |
| Courage | | | | | | | | | | | | | | | | | | | | | | | • | | |
| Curiosity | | | | | | | | | | | | | | | | | | | | | | | | | |
| Open-Mindedness | | | | | | | | | | • | | | | | | | | | | | • | | • | | |
| Engagement | | | | | | | | | | | | • | | | | | | | | | | | | | |
| Lifelong Learning | | | | | | • | | | | | | | | | | | | | | • | | • | | | |
| Responsibility & Accountability | | | | | | | | | | • | | | • | | | | | | | | | • | | | |
| Empathy | | | | • | | • | | | | • | | | | | | | | | | | • | | • | | |
| Inspiration & Optimism | | | | | | • | | | | • | | | | | | | | | | | | | | | |
| Values Driven | | | | | • | | | | | | | | | | | | | • | | | | | | | |
| Stewardship | | | | | | | | | | • | | | • | | | | | | | | | • | | | |
| Holistic Viewpoint | | | | | | | • | | | | | | | | | | | • | | | | | • | | |
| People & Planet | | | | | | | | | | | | | | | | | | | | | | | | | |
| International Mindedness | • | | | • | | | | • | | • | | | | | | | | | | | | • | | | |
| Culture of Non-Violence & Peace | | | | | | | | | | • | | | | | | | | • | | • | | | | | |
| Tolerance & Respect for Diversity | | | • | • | | • | | | | • | | | | | | | | • | • | • | • | • | • | | |
| Commitment to Justice, Equality, & Equity | • | | | • | | | | | | • | | | | | | | | • | • | • | | • | • | | |
| Commitment to Human Rights | | | | | | | | | | • | | | | | | | | | | | | | | | |
| Commitment to Participation | | • | • | • | | | | | • | • | | | | | | | | | | • | | | | • | |
| Human Solidarity | | | | • | | • | | | | • | | | | | | | | | | | • | | • | | |
| Understanding, Compassion, & Love for Humanity | | | | • | | • | | | | | | | | | | | • | | | • | | | • | • | |
| Intergenerational Responsibility | | | | • | | | | | | • | | | | | | | | • | | • | | • | • | • | |
| Concern for Environment & Nature | | | | • | | | | | | • | | | | | • | | | • | | • | | | | | |

Appendix H: Evaluating the International Baccalaureate

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|---|----|-------------------|---|----------|-----------------------|----------------------|---|--|-------------|------|---------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Knowledge | | | | | | | | | | | |
| Sustainable Development | | | | | | | | | | | |
| Sustainability Challenge | | | | | | | | | | | |
| Impact of Human Activity on the Socio-Ecological System | | GC: STI GC: GS | IS, KC: Systems | | | | Geo Aims | Bio Syl. 4 Chem Syl. 1,3,8 Chem HL Syl. 14 CS Aims DT Aims DT Syl. 2,8, HL 10 DT IA ESS BQ ESS Aims ESS Syl | | | |
| Population Growth | | GC: GS | | | | | Eco Syl. 4 Geo Syl. 1 Hist Syl. Core | Bio Syl. 11 ESS Syl. 1,2,3,5,8 | HL Syl. 1 | | |
| Sustainable Development Concepts | | | | | | | | | | | |
| Definitions | | GC: GS GC: FD | IS, RC: Sustainability | | | | Geo Aims Geo Syl. 3 GP Syl. Core | DT Syl. 8 ESS BQ ESS Syl. 1,2,3 | | | |
| Frameworks | | | | | | | Eco Syl. 4 Geo Syl. 2 | | | | |
| Economy | | | | | | | | | | | |
| Economic Development & Policy | | | | | | | | | | | |
| Globalisation & Global Economic Systems | | GC: GS | IS, KC: Time, Place and Space IS, RC: Globalization | | | | G3 Aim B&M Syl. 1.3,1.6,5,4 Eco Syl. 1,2,3,4 Geo Aims Geo Syl. 2 ITGS Syl. 1,2 SCA Syl. 2 GP Syl. Core | CS Syl. 3 | | | |
| Poverty Reduction | | | | | | | Eco Syl. 1,2,4 | | | | |
| Market Economy | | GC: GS | IS, RC: Trade | | | | B&M Syl. 1.1,1.3,4.1 Eco Syl. 1,2,4 SCA Syl. 2 GP Syl. Core | DT Syl. 5, HL 9 | | | |
| Financing Sustainable Development | | | | | | | B&M Syl. 1.1,3,4,5 Eco Syl. 4 Geo Syl. 2 GP Syl. Core | | | | |
| Consumer Behaviour & Consumption Patterns | | GC: GS | Design, RC: Markets and Trends IS, RC: Consumption | | | LB ai Syl. | B&M Syl. 4.1, 4.5 Eco Syl. 1, 2, 3 Geo Syl. 4 | DT Syl. 2,5,8 ESS Syl. 1,4,5,6,8 | | | |
| Corporate Responsibility | | | | | | | | | | | |
| Design & Manufacturing | | GC: STI | Design, Aims Design, RC: Sustainability IS, RC: Sustainability; Innovation and Revolution | Creative | | | B&M Aims B&M Syl. 4.1 ITGS Obj. Psycho Syl. Core ITGS Syl. 1,2,3 | DT Aims DT Obj. DT Syl. | | | |
| Multinational Corporations | | | | | | | B&M Syl. 1.2, 1.6 Eco Syl. 4 | DT Syl. 2,4, HL 9 | | | |
| Triple Bottom Line | | | | | | | B&M Syl. 1.3 | DT Syl. 8, HL 9 | | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|--|----|---------|------------------------------|-----|-----------------------|----------------------|---|--|-------------|------|---------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Environment | | | | | | | | | | | |
| Natural Science | | | | | | | | | | | |
| Laws of Nature | | GC: STI | | | | | Geo Syl. 3 | Bio Syl. Chem Syl. Phys Syl. DT Syl. SEHS Syl. ESS Syl. | | | |
| Science, Technology, & Applied Science | | GC: STI | Science Obj. | | | LB ai Syl | ITGS Aims ITGS Obj. ITGS Syl. 1,2,3 SCA Syl. 2 Psycho Syl. Core | G4 Project Bio Aims Bio Obj. Bio Syl. Chem Aims Chem Obj. Chem Syl. Phys Aims Phys Obj. Phys Syl. CS Aims CS Obj. CS Syl. 1 DT Aims DT Syl. 2 SEHS Aims ESS Syl. | | | |
| Integrated Science | | GC: STI | Science Aims Science Obj. | | | | | G4 Project Bio Aims Bio Syl. Chem Aims Chem Syl. Phys Aims Phys Syl. CS Aims DT Aims SEHS Aims ESS Aims | | | |
| Global Ecological Systems (Oceans & Atmosphere, Biosphere, Terrestrial & Aquatic Ecosystems) | | GC: STI | | | | | Geo Syl. 3 | Bio Syl. 2,4,8 Bio HL Syl. 9 Chem Syl. 1,3,5,6,8 Chem HL Syl. 14 DT Syl. 2,8 ESS Aims ESS Syl. 1,2,4,5,6 | | | |
| Climate Change | | | | | | | | | | | |
| Causes | | | | | | | Geo Syl. 3 | Bio Syl. 2,3 Chem Syl. 6 Chem HL Syl. 15 Phys Syl. 8 DT Syl. 4 ESS Syl. 1,3,6,7 | | | |
| Effects | | | | | | | Geo Syl. 3 GP Syl. Core | Bio Syl. 2,3 Chem Syl. 6 Chem HL Syl. 15 Phys Syl. 8 DT Syl. 4 ESS Syl. 1,2,4,6,7 | | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|--------------------------------------|----|-----------------------------|--|-----|-----------------------|----------------------|--|---|-------------------------|------|---------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Natural Heritage & Resources | | | | | | | | | | | |
| Air & Water Quality | | | | | | | Geo Syl 3 | Bio Syl 2 Chem Syl DT Syl 8 ESS Syl 2,3,4,6 | | | |
| Renewable Energy | | | | | | | Geo Syl 4 | Bio Syl 2 Chem HL Syl 9,10,19 Phys Syl 8 DT Syl 2 ESS Syl 2,4,6,7,8 | | | |
| Biodiversity | | | | | | | Geo Syl 3 | Bio Syl 5 ESS Syl 1,2,3,5 | | | |
| Resources & Conservation | | GC: GS GC: FD GC: OST | IS, KC: Global Interactions IS, RC: Resources; Sustainability | | | | Eco Syl 1, 2, 3, 4 Geo Syl 4 GP Syl Core | Bio Syl 2 Chem Syl 4 Chem HL Syl 13,20 Phys Syl 8 DT Syl 2,4 ESS Aims ESS Syl 1,3,4,5,6,8 | | | |
| Ecosystem Protection & Restoration | | | | | | | | Bio Syl 4 Chem Syl 4,6 Chem HL Syl 19 DT Syl 4 ESS BQ ESS Aims ESS Syl 1,2,5,6 | | | |
| Deforestation | | | | | | | Geo Syl 3 | DT Syl 4 ESS Syl 2 | | | |
| Pollution | | | | | | | | Chem Syl 1,8,10 Chem HL Syl 13 DT Syl 2,8 ESS Syl | | | |
| Land & Water Management | | | | | | | | | | | |
| Sustainable Urbanization | | GC: GS | | | | | LB ai Syl | Geo Syl 3 SCA Syl 2 GP Syl Core | ESS Syl 4,5,6 | | |
| Rural Development | | | | | | | LB ai Syl | | ESS Syl 5 | | |
| Traffic, Transport, & Infrastructure | | GC: GS | | | | | LB ai Syl | GP Syl Core SCA Syl 2 ITGS Syl 3 | Phys Syl 2 ESS Syl 8 | | |
| Agriculture & Food Production | | | | | | | Geo Syl 3 | Bio Syl 3 Bio HL Syl 9,11 Chem Syl 1,7,10 Chem HL Syl 20 DT Syl 8 ESS Syl 1,2,4,5,6 | | | |
| Fresh Water | | | | | | | Geo Syl 3 | Bio Syl 2,4 Chem Syl 9 ESS Syl 4,6 | | | |
| Solid, Hazardous Waste, & Sewage | | | | | | | | Chem HL Syl 19 Phys Syl 7 Phys HL Syl 12 DT Syl 2,4,8, HL 10 ESS Syl 1,2,4,6 | | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|---------------------------------|----|--------------------|---|-----|---|--|---|--|-------------|---|-------------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Environmentally friendly Living | | | | | | | | | | | |
| Ethics of Sustainable Living | | | Design, RC: Sustainability | | | | GP Syl Eco Syl | DT Syl ESS Aims ESS Syl Bio Syl | | | |
| Composting | | | | | | | Geo Syl 4 | ESS Syl 8 | | | |
| Recycling | | | | | | | Geo Syl 4 ITGS Syl 2,3 | Chem Syl 5 DT Syl 2 ESS Syl 4 | | | |
| Carbon Footprint | | | | | | | | Bio Syl 4 DT Syl 2 ESS Syl 1 | | | |
| Energy Use | | | | | | | | Chem Syl 5 Phys Syl 2,8 DT Syl 2,8 ESS Syl 2,6,7,8 | | | |
| Society | | | | | | | | | | | |
| Social Science & Humanities | | | | | | | | | | | |
| Ethics & Philosophy | | GC: IR GC: PCE | Math Aims | | | | B&M Aims B&M Syl 1.3,2.3,3.4, 4.1,4.4 ITGS Syl 1,2,3 SCA Obj. SCA Syl 6,7,9 1,2 Philo Aims Philo Obj. Philo Syl Core Psycho Syl Core WR Aims WR Obj. WR Syl Core GP Syl Core | Bio Aims Bio Obj. Bio Syl Chem Aims Chem Obj. Chem Syl 6,7,9 Phys Aims Phys Obj. Phys Syl 7 CS Aims CS Syl 1 DT Aims DT Obj. DT Syl 2,4,8, HL 9 SEHS Aims ESS Aims ESS Syl 6 | G5 Aims | TOK Aims CAS LO | |
| World Culture & History | | GC: OST GC: PCE | LA Aims LA, RC Context IS, KC: Change IS, RC: Culture LL Aims LL, KC: Connections LL, RC: Context | | G1 Aims LanA: LL Aims LanA: LL Syl 1,3 LanA: Lit Obj. LanA: Lit Syl 1 L&P Aims L&P Obj. | G2 Aims CL Obj. CL Syl 1,2 LB Syl | Geo Syl 2 SCA Aims SCA Obj. SCA Syl 1,2 Philo Aims Philo Syl Core Psycho Syl Core WR Aims WR Obj. WR Syl Core GP Syl Core GP Obj. GP Aims Hist Aims Hist Obj. Hist Syl Core | Bio Syl 1 Phys Syl 1,7,8 DT Aims DT Syl 1,4,5,7, HL 9 ESS Aims ESS Obj. ESS Syl 1,4,8 | G5 Aims | G6 Aims Dance Aims Dance Obj. Dance Syl Film Syl 2 Music Obj. Music Syl Theatre Syl | TOK Aims |
| Historical Context | | GC: OST | Math Aims Design Aims IS, KC: Change IS, KC: Time, Place and Space LL Aims LL, RC: Context LA, RC: Context | | G1 Aims LanA: LL Syl 3 | | Eco Syl 4 SCA Syl 2 GP Syl Core Hist Aims Hist Obj. Hist Syl Core | Bio Syl 1 Chem Syl 3 Phys Syl 1,4,5,7,8 ESS Syl 1 | G5 Aims | Dance Aims Dance Obj. Dance Syl Film Obj. Film Syl 2 Music Obj. Music Syl | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|---|----|-----------------------------|--|-----|--|---|--|--|-------------|------|-------------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Language (World Language Proficiency) | | GC: PCE | LA Aims LA Obj. LL Aims LL Obj. LL, KC: Connections; Communication | | G1 Aims LanA: LL Aims LanA: LL Obj. LanA: LL Syl 1 | G2 Aims LB ai Obj. LB ai Syl CL Aims CL Obj. CL Syl 1,2 LB Obj. LB Syl | | CS Syl 2,4 | | | |
| Geography & Demographics | | GC: OST GC: GS | IS, KC: Time, Place and Space | | | | B&M Syl 2.1 Eco Syl 4 Geo Syl 1,2,4 SCA Obj. SCA Syl 2 GP Syl Core Hist Syl Core | DT Syl 1 ESS Syl 1,8 | | | |
| Epistemology | | | | | | | SCA Syl 2 | Bio Syl Chem Syl Phys Syl CS Syl DT Syl SEHS Syl ESS Syl | G5 Aims | | TOK Aims |
| Human Rights | | | | | | | | | | | |
| Human Rights Principles | | GC: IR GC: FD | | | | | Geo Syl 1 ITGS Syl 1 SCA Syl 2 Philo Syl Core GP Syl Core Hist Syl Core | Bio Syl 2,3,4 | | | |
| Socio-Economic Justice & Equity | | GC: FD | IS, RC: Equity | | | | Eco Syl 2,3,4 SCA Syl 2 GP Syl Core Hist Syl Core | Bio Syl 2 ESS Aims | | | |
| Equality & Discrimination | | GC: FD | IS, RC: Equity | | | | Eco Syl 2,4 Geo Syl 1 ITGS Syl 1,3 SCA Syl 2 WR Aims GP Syl Core Hist Syl Core | Bio Syl 2,3 Phys Syl 8 ESS Aims | | | |
| Disenfranchised & Underrepresented Minorities | | GC: FD GC: OST | | | | | Geo Syl 1 SCA Syl 2 GP Syl Core Hist Syl Core | Bio Syl 2,4 ESS Aims | | | |
| Human Security | | | | | | | | | | | |
| Human Settlement | | GC: OST GC: GS GC: FD | IS, KC: Global Interactions | | | | Geo Syl 1 SCA Syl 2 GP Syl Core Hist Syl Core | | | | |
| Disaster Mitigation | | | | | | | GP Syl Core Hist Syl Core | CS Syl 1 ESS Syl 1 | | | |
| Nationalism | | GC: IR | | | | | SCA Syl 2 GP Syl Core | | | | |
| Peace & Conflict | | GC: OST GC: GS GC: FD | IS, KC: Global Interactions IS, RC: Conflict | | | | SCA Syl 2 GP Syl Core Hist Syl Core ITGS Syl 1 | Chem Syl 2,7 Phys Syl 7 ESS Syl 7 | | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|---|----|------------------|---|-----|-----------------------|----------------------|---|--|-------------|------|---------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Health | | | | | | | | | | | |
| HIV/AIDS | | | | | | | | Bio Syl. 6 | | | |
| Disease Control & Prevention | | | | | | | Eco Syl. 4 SCA Syl. 2 GP Syl. Core Hist Syl. Core | Bio Syl. 1,2,3,6,7,8 Bio HL Syl. 11,20 SEHS Syl. ESS Syl. 6 | | | |
| Quality of Life & Well-being | | GC: IR | PE Aims PE Obj. PE, KC: Change IS Aims | | | LB ai Syl. | Eco Syl. 2,4 Geo Syl. 1,2 ITGS Syl. 2 SCA Syl. 2 GP Syl. Core Hist Syl. Core | Bio Syl. 2,3,6,7 Bio HL Syl. 10,11 Chem Syl. 9 Chem HL Syl. 20 CS Syl. 3 DT Aims DT Syl. 1,4,7,8 SEHS Syl. ESS Syl. 6,8 | | | |
| Governance | | | | | | | | | | | |
| Civil Societies | | GC: FD | | | | | B&M Syl. 1,2,4.1 Eco Syl. 2,3,4 ITGS Syl. 1,2 SCA Syl. 2 GP Aims GP Obj. GP Syl. Core | DT Syl. 8 ESS Syl. 3 | | | |
| Democracy | | GC: FD | | | | | SCA Syl. 2 GP Syl. Core | | | | |
| International Law & Treaties | | GC: FD | IS, RC: Governance | | | | Eco Syl. 1,2,3,4 ITGS Syl. 1,2,3 SCA Syl. 2 GP Aims GP Syl. Core Hist Syl. Core | Bio Syl. 3,6 Chem Syl. 6, 14 Phys Syl. 2,4,6,7 DT Syl. 2,4,5,8 ESS Syl. 1,6,7,8 | | | |
| International Organisations & Cooperation | | GC: FD GC: GS | IS, KC: Time, Place and Space IS, RC: Cooperation | | | | G3 Aims B&M Aims B&M Syl. 1,2,1.6,5.1 Eco Syl. 2,3,4 GP Syl. Core | Bio Syl. 1,2,5,6 Chem Syl. 1,2,6,8,9,11 ,12,14 Phys Syl. 2,4,6,7 CS Syl. 1 DT Syl. 2,4,5,8 ESS Syl. | | | |
| Power & Governance | | GC: FD | IS, RC: Power; Management & Intervention; Conflict; Governance; Interdependence | | LanA: LL Syl. | | GP Obj. GP Syl. 1 Hist Syl. Eco Syl. SCA Syl. Philo Syl. Psycho Syl. | | | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|----------------------------------|-------------------------|--|---|---|--|----------------------|--|--|---|---|--|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Skills | | | | | | | | | | | |
| Cognitive Thinking Skills | | | | | | | | | | | |
| Strategic Thinking | | | PE Obj. Math Obj. Project ATL | Organization | | | B&M Aims B&M Syl Geo Syl Hist Syl | DT Syl | | | CAS Aims |
| Systems Thinking | | GC: OST GC: STI GC: GS | Design, KC: Systems Science, KC: Systems IS Aims IS, KC: Systems Math, RC: System PE, RC: System | Critical | | | Eco Syl 1,2,4 Geo Obj. Geo Syl 2,4 ITGS Aims ITGS Syl 1 SCA Aims SCA Syl 2 Philo Aims Psycho Aims Psycho Syl Core GP Aims GP Syl Core Hist Syl Core | ESS BQ ESS Syl 1,6 | | | |
| Critical Thinking | Thinkers | GC: PCE Project Obj. Project ATL | Math Aims Math Obj. Math, KC: Logic LA Aim IS Obj. LL Aims LL, KC: Creativity; Perspective | Communication Info Critical Creative | LanA: LL Aims LanA: LL Obj. LanA: LL Syl 4 LanA: Lit Syl 1 L&P Aims L&P Syl 3 | CL Aims CL Obj. | G3 Aims B&M Aims B&M Syl 3 Eco Syl 1 ITGS Aims Philo Aims Psycho Aims GP Syl Core IA | G4 Project Bio Aims Bio Obj. Bio Syl Bio IA Chem Aims Chem Syl Chem Obj. Chem IA Phys Aims Phys Obj. Phys Syl Phys IA CS Syl 4 CS IA DT Aims DT IA SEHS Syl 5 SEHS IA ESS IA | G5 Aims MS Obj. MS Syl SL Obj. SL Syl HL Obj. HL Syl FM Obj. | G6 Aims Dance Obj. Film Aims Film Obj. Film Syl 1 Music Obj. Theatre Syl VA Aims VA Obj. VA Syl. | TOK Aims EE Aims EE Obj. CAS LO |
| Independent Thinking | Inquirers | Project Aims Project Obj. | Math Aims | Media Creative | LanA: Lit Aims LanA: Lit Obj. LanA: Lit Syl 1 IA | | B&M Syl 3 Eco Syl 1 Geo Obj. ITGS Aims ITGS Obj. Philo Obj. IA | Bio IA Chem IA Phys IA CS Aims CS IA DT Aims DT IA SEHS IA ESS IA | MS Project SL Math Exp. HL Math Exp. | Film Aims Theatre Aims | TOK Obj. EE Aims |
| Creative Thinking | Thinkers Risk-Takers | GC: PCE Project Aims Project ATL | Arts Aims Math Aims Design Aims LL Aims LL Obj. LL, KC: Creativity IS, RC: Innovation and Revolution | Creative | L&P Aims L&P Syl 3 | G2 Aims LB Syl | | | G5 Aims | G6 Aims Dance Aims Dance Syl Film Aims Film Obj. Film Syl 3 Music Obj. Music Syl Theatre Obj. Theatre Syl VA Aims IA | EE Aims CAS Aims |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|---|--|----------------------|---|---|-----------------------|--------------------------------|--|---|--|---|--|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Interdisciplinary Thinking | Knowledgeable | GC: PCE | Arts Aims Math Aims Math, KC: Relationship Design Aims LA Aims IS Aims LL Aims | Communication Transfer | | G2 Aims CL Obj. CL Syl 2 | Eco Syl. 1,3,4 ITGS Aims ITGS Obj. GP Syl. Core Hist Syl. Core SCA Syl. 2 | G4 Project Bio Syl. Chem Syl. Phys Syl. | | Film Obj. Film Syl. 1,2 | TOK Aims TOK Obj. |
| Future Thinking | | GC: FD | Math Aims Design Aims IS, KC: Time, Place and Space | Reflection Critical | | | B&M Syl. 3.7 Hist Syl. Core ITGS Syl. 3 | Bio Syl. 1 CS Aims CS Syl. 1,3,4 ESS BQ | G5 Aims | | |
| Inquiry & Investigation | Inquirers | GC: STI Project Aims | Arts Aims PE Aims LA Aims Science Aims Science Obj. IS Aims IS Obj. | Media Creative Transfer | | CL Aims CL Syl 3 | SCA Aims Philo Aims WR Aims IA | G4 Project Bio Aims Bio Obj. Bio Syl. Bio IA Chem Aims Chem Syl. Chem Obj. Chem IA Phys Aims Phys Obj. Phys IA CS Aims CS Obj. DT Aims DT Obj. DT IA SEHS Aims SEHS Obj. SEHS IA ESS Obj. ESS Syl. 2 ESS IA | MS Project SL Math Exp. HL Math Exp. | Dance Syl. Film Syl. 1,2 Music Syl. Theatre Obj. VA Syl. | TOK Obj. EE Aims EE Obj. CAS Aims |
| Viewing Issues from Multiple Perspectives | Knowledgeable Open-Minded Balanced Reflective | | Math, Aims Design, Aims LA, Aims IS Obj. IS, RC: Significance LL Aims LL, KC: Perspective LL, RC: Point of View Art, RC: Role Design, RC: Perspective LA, RC: Point of View PE, RC: Perspective | Media Critical Creative Transfer | G1 Aims | G2 Aims CL Aims | B&M Aims B&M Syl. 4,5 Eco Syl. 1,3 SCA Aims SCA Obj. SCA Syl. 2 Philo Obj. Philo Syl. Core Psycho Obj. Psycho Aims Psycho Syl. Core WR Aims WR Syl. Core GP Aims GP Syl. Core Hist Aims Hist Syl. Core | CS Syl. 4 DT Aims DT Syl. 7 ESS Aims ESS Obj. ESS Syl. 1,2,7 | | Film Aims Film Syl. 1 VA Obj. VA Syl. | TOK Obj. |
| Viewing Issues from Local & Global Perspectives | Knowledgeable Balanced | GC: OST GC: GS | Arts, KC: Aesthetics LA Aims LA Obj. IS Aims IS, KC: Time, Place and Space | | | LB Syl. Core | SCA Aims SCA Syl. 2 B&M Aims Eco Aims Eco Syl. 4 Geo Aims Geo Syl. 2 ITGS Aims ITGS Obj. ITGS Syl. 1 SCA Aims WR Aims GP Aims GP Syl. Core Hist Aims Hist Syl. Core | Bio Aims Chem Aims Phys Aims CS Syl. 4.1 DT Aims DT Syl. ESS Aims ESS Obj. ESS Syl. 1,2,7 | | | CAS Aims |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|--|---------------------------|------------------------------|---|---|--|----------------------|--|--|---|--|----------------------------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Understanding Interdependence & Interconnectedness of Issues | Knowledgeable Balanced | GC: OST GC: STI GC: GS | Design, KC: Community LA, KC: Connections Science, KC: Relationships IS, Aims IS, KC: Global Interactions; Systems Thinking IS, RC: Networks; Interdependence LL, KC: Connections PE, RC: Interaction | | LanA: LL Syl 1 LanA: LL Syl 3 | G2 Aims CL Aims | B&M Syl 1.1,1.3,4 Eco Aims Eco Syl 1.4 Geo Aims Geo Syl 3,4 ITGS Obj. ITGS Syl 1,2,3 Philo Obj. Psycho Syl Core GP Syl Core GP Aims Hist Syl. Core | Bio Aims Chem Aims Phys Aims CS Syl 1 ESS Aims ESS Syl 1,2,7 | G5 Aims | Film Syl 2 Music Syl Theatre Obj. Theatre Syl | TOK Obj. CAS Aims |
| Practical & Functional Skills | | | | | | | | | | | |
| Technical & Quantitative Skills | | | | | | | | | | | |
| Data Literacy | | | Math Obj. Design Ob. Science, KC: Relationships Math, RC: Model Science, RC: Models | Communication Critical | | | B&M Syl 3,4,4, Eco Syl 1.2,3 Geo Obj. Geo Syl 1,4 SCA Obj. SCA Syl 1 Psycho Obj. ITGS Syl 1,2,3 | G4 Project Bio Syl. Bio IA Chem Syl. Chem IA Phys Syl Phys IA CS Syl CS IA DT Syl 1 DT IA SEHS Syl 4,6 ESS Obj. ESS Syl 1,2,3,4,8 | MS Obj. MS Syl. SL Obj. SL Syl 2 HL Obj. HL Syl 2 FM Obj. FM Syl. | | |
| Computational Skills & Numeracy | | GC: STI | Math Ob.. Math, KC: Relationship Science, KC: Change Math, RC: Quantity | | | | B&M Syl 3 Eco Syl 1 | Bio IA Chem IA Phys Syl Phys IA CS Syl 4 DT Syl DT IA SEHS Syl 6 ESS Syl | G5 Aims MS Obj. MS Syl. SL Obj. SL Syl. HL Obj. HL Syl. FM Obj. FM Syl. | | |
| Technological Literacy | | GC: STI | Design Aims Design Obj. LL Obj. | Communication Collaboration Organization Info Media Creative Transfer | LanA: LL Syl 2 | | ITGS Aims ITGS Obj. ITGS Syl 1,2,3 | G4 Project Bio Aims Bio Obj. Bio Syl. Bio IA Chem Aims Chem Obj. Chem Syl. Chem IA Phys Aims Phys Obj. Phys Syl. Phys IA CS Aims CS Obj. CS Syl CS IA DT Aims DT Obj. DT Syl. DT IA SEHS Aims SEHS Syl. 6 ESS Syl 3,6 | G5 Aims MS Obj. MS Syl. SL Obj. SL Syl. HL Obj. HL Syl. FM Obj. FM Syl. | Film Obj. Film Syl. 1,3 VA Obj. | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|-------------------------|-------------|---------------------------------------|--|-------------------------------------|--|----------------------|--|---|--|--|---------------------------------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Process Skills | | | | | | | | | | | |
| Planning & Organisation | | Project Aims Project Obj. Project ATL | Design Obj. Design, KC: Development PE Obj. Science Aims Science Obj. IS Obj. LL Obj. | Communication Organization Critical | IA | LB Obj. | Geo Obj. Philo Obj. WR Obj. IA | G4 Project Bio Aims Bio Obj. Bio IA Chem Aims Chem Obj. Chem IA Phys Aims Phys Obj. Phys IA CS Obj. CS Syl. 1,4 CS IA DT Obj. DT IA SEHS Aims SEHS Obj. SEHS IA ESS Syl. 2 ESS IA | MS Obj. MS Project SL Obj. SL Math Exp. HL Obj. HL Math Exp. FM Obj. | Dance Obj. Dance Syl. Film Obj. Film Syl. 3 Theatre Obj. VA Obj. IA | EE Aims EE Obj. CAS Aims CAS LO |
| Implementation | | Project Aims Project Obj. | PE Obj. Science Obj. Design Obj. Science Aims IS Obj. | Organization Critical | IA | | Geo Obj. ITGS Aims ITGS Syl. 1 SCA Obj. Philo Aims Philo Obj. Psycho Aims Psycho Obj. Psycho Syl. Core | G4 Project Bio Aims Bio Obj. Bio IA Chem Aims Chem Obj. Chem IA MS Project SL Obj. SL Math Exp. HL Obj. HL Math Exp. FM Obj. | MS Obj. MS Project SL Obj. SL Math Exp. HL Obj. HL Math Exp. FM Obj. | Dance Obj. Film Obj. Film Syl. 3 Theatre Aims Theatre Syl. VA Obj. IA | EE Aims EE Obj. CAS LO |
| Evaluation | Open-Minded | Project Obj. | Arts Obj. Arts, KC: Change Math Obj. Design Ob. Design, KC: Development PE Obj. Science Aims Science Obj. IS Obj. LL Obj. Design, RC: Evaluation | Reflection Info Critical | LanA: LL Obj. LanA: Lit Aims LanA: Lit Obj. L&P Obj. | | G3 Aims Geo Obj. Geo Syl. 1,2 ITGS Aims ITGS Syl. 1,3 SCA Obj. Philo Obj. Psycho Syl. Core WR Obj. GP Obj. GP Syl. Core Hist Obj. Hist Syl. Core | G4 Project Bio Aims Bio Obj. Bio IA Chem Aims Chem Obj. Chem IA Phys Aims Phys Obj. Phys IA CS Obj. CS Syl. 1,4 CS IA DT Obj. DT IA SEHS Aim SEHS Obj. SEHS IA ESS Syl. 2 ESS IA | MS Obj. MS Project SL Obj. SL Math Exp. HL Obj. HL Math Exp. FM Obj. | Dance Syl. Film Obj. Film Syl. 2,3 Music Syl. Theatre Obj. VA Obj. VA Syl. | TOK Obj. EE Obj. |
| Problem Solving | | GC: STI | Math Obj. Design Aims Design Obj. PE Obj. Science Aims. Science Obj. | Info Critical Transfer | | | Geo Obj. ITGS Syl. 1,3 | G4 Project Bio Obj. Bio IA Chem Obj. Chem IA Phys Obj. Phys IA | G5 Aims MS Obj. MS Syl. MS Project SL Obj. SL Syl. SL Math Exp. HL Obj. HL Syl. HL Math Exp. FM Obj. FM Syl. | Dance Obj. | |
| Risk Analysis | Risk-Takers | GC: STI | | Critical | | | | CS Syl. 1,2,4 | | | |
| Decision Making | Thinkers | GC: GS | Math, KC: Logic Science Aims PE, RC: Change IS, RC: Choice | Collaboration Info Media | | | | CS Syl. 1,4 DT Aims ESS Aims | | Film Syl. 3 VA Syl. | CAS LO |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|--|---------------|---------------------------|---|--|--|---------------------------------------|--|---|--|--|----------------------------------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Backcasting | | Project Obj. | Design Obj. | Organization | | | | | | | CAS Aims |
| Research | Inquirers | Project Obj. | Design Obj. Design, KC: Development Science Aims Science Obj. IS Ob. LL Obj. | Info Media | LanA: LL Obj. L&P Obj. | CL Aims CL Syl 3 | B&M Syl 4.4 Geo Obj. SCA Obj. Philo Obj. Psycho Obj. Psycho Syl Core WR Obj. WR Syl Core GP Obj. Hist Syl Core IA | G4 Project Bio Aims Bio Obj. Bio IA Chem Aims Chem Obj. Chem IA Phys Aims Phys Obj. Phys IA DT Obj. DT Syl 5,7 SEHS Obj. ESS Obj. ESS IA | MS Project SL Math Exp. HL Math Exp. | Dance Syl Film Obj. Film Syl Film Syl Music 2,3 Theatre Obj. Theatre Syl VA Syl | TOK Obj. EE Aims EE Obj. |
| Information Analysis, including Media Literacy | Thinkers | GC: STI Project ATL | Math Obj. Design Aims Design Obj. PE Obj. LA Aims LA Obj. Science Aims Science Obj. IS Obj. LL Aims LL Obj. LL, KC: Creativity LL, KC: Perspective Science, RC: Evidence | Communication Collaboration Info Media Critical | G1 Aims LanA: LL Aims LanA: LL Obj. LanA: LL Syl 1,2,3,4 LanA: Lit Syl 1 L&P Syl1 IA | LB Syl Core | G3 Aims B&M Syl 3,4,4 Eco Syl 1,2 Geo Obj. Geo Syl 1 ITGS Aims ITGS Syl 1,2,3 SCA Obj. SCA Syl 1 Philo Obj. Psycho Obj. Psycho Syl Core WR Obj. WR Syl Core GP Obj. GP Syl Core Hist Aims Hist Syl Core IA | G4 Project Bio Aims Bio Obj. Bio Syl Bio IA Chem Aims Chem Obj. Chem Syl Chem IA Phys Aims Phys Obj. Phys Syl Phys IA CS IA DT Obj. DT IA SEHS Aims SEHS IA ESS Syl 2 ESS IA | MS Obj. MS Project SL Obj. SL Math Exp. HL Obj. HL Math Exp. FM Obj. | Film Syl 1 | TOK Obj. EE Obj. |
| Interpersonal Skills | | | | | | | | | | | |
| Communication Skills | | | | | | | | | | | |
| Discussion, Debate, & Conversation | Communicators | GC: PCE | Math Obj. Math, KC: Logic Math, RC: Justification LA Obj. Science Aims Science Obj. LA, RC Argument IS Obj. LL Aims LL Obj. LL, KC: Communication | Communication Critical Creative | LanA: LL Obj. LanA: Lit Obj. LanA: Lit Syl 4 L&P Obj. | LB ai Syl CL Obj. LB Obj. IA | Eco Syl 1,3,4 Geo Obj. ITGS Aims Psycho Obj. GP Syl Core Hist Syl Core ITGS Syl 3 ESS Syl 2 | Bio Aims Chem Aims Phys Aims CS Aims CS Obj. CS Syl 1 DT Aims DT Obj. DT Syl 3,6 SEHS Aims SEHS Obj. SEHS Syl 5 ESS Syl 2 | G5 Aims | Film Syl 2 Theatre Obj. VA Obj. VA Syl | TOK Obj. EE Obj. CAS LO |
| Negotiations | Communicators | | Design Obj. | Communication Collaboration | | | Geo Obj. ITGS Aims Hist Syl Core | DT Syl 6 | | Film Syl 3 | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|------------------------------|-------------------------|--|---|--|---|---|---|--|--|---|----------------------------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Oral & Written Communication | Communicators | Project Aims Project Obj. Project ATL | Math Aims Math Obj. Design Obj. Design, KC: Communication PE Obj. LA Aims LA Obj. Science Aims LA, RC Accent IS Obj. LL Aims LL Obj. LL, KC: Communication Art, RC: Audience; Narrative | Communication Info Media | G1 Aims LanA: LL Obj. LanA: LL Syl. 1 LanA: Lit Obj. LanA: Lit Syl. 2,4 L&P Obj. IA | G2 Aims LB ai Obj. LB ai Syl. CL Obj. LB Obj. IA | Geo Obj. SCA Obj. Philo Aims Philo Obj. Psycho Obj. GP Obj. Hist Obj. IA | G4 Project Bio Aims Bio IA Chem Aims Chem IA Phys Aims Phys IA CS Aims CS Obj. CS Syl. 1 CS IA DT Aims DT Obj. DT IA SEHS Aims SEHS Obj. SEHS Syl. 5 SEHS IA ESS IA | | Dance Syl. Theatre Obj. | TOK Obj. EE Aims |
| Active Listening Skills | Communicators | | LL Aims | Communication Collaboration | | LB ai Syl. LB Obj. | | | | | |
| Shared Language | Communicators | GC: PCE | Arts Obj. Arts, KC: Communication Math Obj. Design, KC: Communication Science Aims IS Obj. LA, RC Accent | Communication | LanA: LL Obj. LanA: LL Syl. 1,4 LanA: Lit Obj. L&P Obj. | LB ai Obj. | Philo Obj. Psycho Aims | G4 Project Bio Syl. 1,5 Chem Syl. 1,4,7,8,11 Phy Syl. 5 CS Obj. CS Syl. 2,3,4 ESS Syl. 1,2 | G5 Aims MS Obj. MS Syl. MS Project SL Obj. SL Syl. SL Math Exp. 1 HL Obj. HL Syl. HL Math Exp. FM Obj. FM Syl. | Dance Obj. Film Aims Film Obj. Film Syl. 1 Music Obj. Music Syl. VA Obj. VA Syl. Obj. | TOK Obj. EE Obj. |
| Managing Self | | | | | | | | | | | |
| Reflection | Reflective | GC: PCE Project Obj. Project ATL | Arts Aims Math Aims PE Aims PE Obj. PE, KC: Relationships LA Aims Science Aims Science Obj. IS Obj. LL Aims LL Obj. LL KC | Reflection | LanA: LL Syl. 3 L&P Syl. 3 L&P IA | | Philo Syl. Core Hist Aims Hist Syl. Core | G4 Project Bio IA Chem IA Phys IA CS IA DT Syl. 3 | MS Project SL Math Exp. HL Math Exp. | G6 Aims Dance Obj. Film Obj. Film Syl. 3 Music Obj. Music Syl. Theatre Syl. VA Obj. VA Syl. IA | TOK Aims CAS Aims |
| Motivation of Self | | GC: IR Project Aims Project Obj. | PE Obj. | Organization Affective | | | | Bio IA Chem IA Phys IA | MS Project SL Math Exp. HL Math Exp. | Music Syl. | EE Obj. |
| Participatory Skills | | | PE Aims | Communication Collaboration | | | | G4 Project | | Music Syl. Music, Dance, Theater IA | CAS Aims CAS LO |
| Self-Directed Learning | Inquirers Reflective | Project Aims Project Obj. | LL Aims | Organization Reflection Transfer | IA | CL Aims | Geo Obj. ITGS Aims Philo Obj. IA | Bio IA Chem IA Phys IA CS IA DT Aims DT IA SEHS IA ESS IA | MS Project SL Math Exp. HL Math Exp. | IA | EE Aims |
| Flexibility & Adaptability | Risk-Takers | | Design, KC: Development PE, KC: Change Science Aims PE, RC: Adaptation | Reflection Creative | | | Geo Obj. | | | | CAS Aims |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|---------------------------------|---|---|--|---|--------------------------------|----------------------|---|---|---|---|---|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Managing Others | | | | | | | | | | | |
| Teamwork | Inquirers Communicators Risk-Takers | GC: IR | PE Aims | Collaboration | | | | G4 Poject | | Dance Syl Music Syl Theater IA | |
| Empower People | | GC: FD | | Collaboration | | | | CS Syl. 1 DT Syl. 2 | | | |
| Motivation of Others | | GC: IR | | Collaboration | | | WR Aims | DT Syl. 2 | | | |
| Leadership Skills | | GC: IR | | Collaboration | | | | SEHS Syl. 5 | | | |
| Collaboration & Cooperation | Inquirers Communicators Risk-Takers Caring | GC: IR GC: FD Project Obj. Project ATL | PE Aims Science Aims IS, KC: Global Interactions Design, RC: Collaboration | Communication Collaboration Reflection | | | | G4 Project Bio Aims Chem Aims Phys Aims CS Aims CS Syl. 1 DT Aims DT Syl. 5 SEHS Aims ESS Obj. | | Dance Aims Dance Syl. Film Syl. 3 Music Aims Music Syl. Theatre Aims Music, Dance. | CAS Aims CAS LO |
| Capacity Building & Partnership | | | PE Aims | Collaboration Reflection | | | | CS Syl. 1 SEHS Syl. 5 | | | |
| Conflict Resolution | | GC: FD | IS, KC: Global Interactions | Collaboration | | | GP Syl. Core Hist Syl. Core | DT Syl. 6 | | | |
| Managing Situations | | | | | | | | | | | |
| Managing Complexity | Thinkers | GC: GS | Math Obj. Design, KC: Community IS, RC: Management and Intervention | Critical | | | Eco Syl. 3 Geo Syl. 2 Psycho Aims WR Aims GP Aims GP Syl. Core Hist Aims Hist Syl. Core | CS Aims CS Syl. 4 DT Aims | | | |
| Managing Change | Risk-Takers | | Design, KC: Development PE, KC: Change PE, RC: Adaptation | Affective | | | GP Syl. Core Hist Syl. Core | CS Syl. 1 | | | |
| Managing Uncertainty | Risk-Takers | | Math Obj. PE Obj. Science Obj. | Transfer | | | G3 Aims Eco Syl. 1 Geo Obj. SCA Obj. GP Syl. Core Hist Syl. Core | Phys Syl. Chem Syl. 11 DT Aims | | | CAS LO |
| Attitudes | | | | | | | | | | | |
| Self | | | | | | | | | | | |
| Self-Awareness | Balanced Reflective | GC: IR GC: PCE | Arts Aims Arts, KC: Identity PE, KC: Change LL, KC: Creativity LL, RC: Self- expression IS, RC: Identity | Affective Reflection Info Organization | LanA: LL Syl. 1 L&P Aims | LB ai Syl. | SCA Aims Philo Aims Philo Syl. Core Psycho Aims | SEHS Syl. 5 | | Theatre Syl VA Aims | TOK Aims CAS Aims CAS LO |
| Self-Esteem | Balanced | GC: IR Project Aims | Math Aims | | | | ITGS Aims | | | G6 Aims Music Syl. | |
| Self-Reliance | | GC: IR | Math Aims | Affective Reflection Collaboration | | | | | | | |
| Self-Control | Balanced | | | Affective | | | Philo Syl. Core WR Aims | | G5 Aims MS Project SL Math Exp. HL Math Exp. | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|---------------------------------|------------------------|-------------------------|---|-----------------------------------|--|----------------------|--|--|--|--|---|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Resilience | Risk-Takers | | Math Aims | Affective | | | | CS Obj. SEHS Obj. | G5 Aims | | CAS Aims CAS LO |
| Resourcefulness | Risk-Takers | | | Affective Creative Transfer | | | | DT Aims | | | |
| Integrity | Principled | GC: IR | Design Aims | | | | | DT Aims | | | |
| Courage | Risk-Takers | | | | L&P Syl. 3 | | ITGS Aims | | | | CAS Aims CAS LO |
| Curiosity | Inquirers | GC: PCE Project Aims | Math Aims LA Aims | Reflection | | CL Syl. 3 | B&M Aims Philo Aims WR Aims | Bio HL Syl. 11 Bio IA Chem IA Phys HL Syl. 9 Phys IA CS IA DT Aims DT Syl. 5 DT IA SEHS IA ESS IA | | Film Syl. 1 | EE Aims CAS Aims |
| Open-Mindedness | Open-Minded | | | | | | G3 Aims Geo Syl. 2 Psycho Aims WR Aims WR Syl. Core GP Aims GP Syl. Core | | | | |
| Engagement | Caring | GC: FD | Design, KC: Community IS Aims LL Aims LL, KC: Creativity | Reflection | G1 Aims LanA: Lit Syl. 1 L&P Aims | CL Aims | ITGS Aims | G4 Project Bio IA Chem IA Phys IA | MS Project SL Math Exp. HL Math Exp. | G6 Aims Dance Syl. Film Syl. 2 Music Syl. Theatre Aims VA Syl. | TOK Aims EE Aims CAS Aims CAS LO |
| Lifelong Learning | Inquirers | | LA Aims LL Aims | | G1 Aims | CL Aims | Philo Syl. Core WR Aims GP Syl. Core Hist Syl. Core | CS Aims DT Aims | | G6 Aims Film Syl. 1 | |
| Responsibility & Accountability | Thinkers Principled | GC: FD Project Aims | Design Aims PE Aims IS Aims | Collaboration | | | Geo Syl. 3 ITGS Syl. 1 | DT Aims ESS Aims | | | TOK Aims CAS Aims CAS LO |
| Empathy | Caring | | LA, KC: Culture LA, RC Empathy | Collaboration | | | WR Aims | DT Syl. 7 HL 9 | | | |
| Inspiration & Optimism | Caring Aim of LP | GC: FD | Arts Obj. Design Obj. | Affective Creative | | | ITGS Aims WR Aims | DT Aims | | | |
| Values Driven | Principled | GC: IR GC: PCE | | | | | Philo Syl. Core | ESS BQ ESS Syl. 1 | | | TOK Aims |
| Stewardship | Aim of LP | | | | | | | DT Syl. 8 | | | |
| Holistic Viewpoint | Balanced | GC: GS | Design Aims Design, KC: Systems Science, KC: Systems IS, KC: Systems Thinking | | | | B&M Aims B&M Syl. 2.1 Geo Syl. 2 SCA Aims Philo Syl. Core Psycho Syl. Core WR Aims WR Syl. Core Hist Syl. Core | DT Syl. 8 | | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|--|--|---|--|---------------|-----------------------|---|---|--|-------------|----------------------------------|---|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| People & Planet | | | | | | | | | | | |
| International Mindedness | Knowledgeable Balanced Reflective Aim of LP | GC: IR GC: OST GC: PCE GC: STI GC: FD | Arts Aims Math Aims LA, KC: Culture IS Aims | | L&P Aims | G2 Aims LB ai Obj. LB ai Syl. LB Syl. Core LB Syl. | G3 Aims Eco Aims Eco Syl. 2,4 Geo Syl. 2 Psycho Aims WR Aims WR Obj. WR Syl. Core GP Aims GP Syl. Core Hist Aims Hist Obj. Hist Syl. Core ITGS Syl 1,2 | G4 Project Bio Aims Bio Syl. Chem Aims Chem Syl. Phys Aims Phys Syl. CS Syl. DT Aims DT Syl. SEHS Syl. ESS Syl. | G5 Aims | Dance Aims Theatre Syl. | CAS Aims CAS LO |
| Culture of Non-Violence & Peace | Aim of LP | GC: FD | | | | | GP Syl Core | | | | |
| Tolerance & Respect for Diversity | Open-Minded Aim of LP | GC: GS GC: FD | Arts, KC: Aesthetics Design Aims LA Aims IS Aims LA, KC: Communication IS, RC: Diversity | | G1 Aims | G2 Aims CL Aims | G3 Aims B&M Syl. 2.2,2.3 Eco Syl. 4 Geo Aims ITGS Syl. 1 SCA Aims SCA Syl. 2 Philo Aims Philo Syl. Core Psycho Aims WR Aims WR Syl. Core GP Aims GP Syl. Core | CS Syl. 1 ESS Aims ESS Syl. 1 | | G6 Aims Dance Syl. | TOK Aims |
| Commitment to Justice, Equality, & Equity | Principled | GC: FD | | Collaboration | | | Eco Syl. 2,3,4 Geo Syl. 2 ITGS Syl. 1,3 GP Syl. Core SCA Syl. 2 | CS Syl. 1 ESS Aims ESS Syl. 1 | | | |
| Commitment to Human Rights | Principled | GC: IR GC: FD | | | | | Geo Syl. 1 ITGS Syl. 1 Philo Syl. Core GP Syl. Core | ESS Aims | | | |
| Commitment to Participation | | GC: FD | PE Aims IS Aims | Collaboration | | | | ESS Syl. 1 | | | TOK Aims CAS Aims CAS LO |
| Human Solidarity | Aim of LP | GC: IR GC: GS GC: FD | IS, KC: Global Interactions | | | | Philo Syl. Core | | | | |
| Understanding, Compassion, & Love for Humanity | Caring Aim of LP | GC: IR GC: FD | | | | | Philo Syl. Core Psycho Aims WR Aims WR Syl. Core | DT Aims | | | |

| | LP | MYP GC | MYP | ATL | DP | | | | | | DP Core |
|----------------------------------|-----------|-----------------------------|-------------------------|------------|-----------------------|----------------------|---|---------------------|-------------|------|----------|
| | | | | | Language & Literature | Language Acquisition | Individuals & Societies | Sciences | Mathematics | Arts | |
| Intergenerational Responsibility | | GC: FD | | | | | Eco Syl 4 Geo Syl 2 ITGS Syl 1,3 SCA Aims SCA Syl 2 GP Syl Core Hist Syl Core | | | | |
| Concern for Environment & Nature | Aim of LP | GC: GS GC: FD GC: STI | Science Aims IS Aims | Reflection | | LB ai Syl | B&M Aims Geo Aims Geo Syl 3 Geo Syl 4 Philo Syl Core GP Syl Core | DT Aims ESS Aims | | | CAS Aims |

Appendix I: Key for the Evaluation of the International Baccalaureate

| Learner Profile (LP) | | MYP - Global Contexts (GC) | | MYP Subjects, Key Concepts, & Related Concepts (KC & RC) | | Approaches To Learning (ATL) | | Code | | | | | |
|--|--|------------------------------|--|--|--|-------------------------------------|--|----------------------|--|--------------|--|-----------------------------|--|
| The LP terms remain the same as listed in 1.6.1. | | Identities & Relationships | | Language & Literature | | Communication | | Communication | | | | | |
| Orientation in Space & Time | | OST | | Individuals & Societies | | Collaboration | | Collaboration | | | | | |
| Personal & Cultural Expression | | PC | | Mathematics | | Organization | | Organization | | | | | |
| Scientific & Technical Innovation | | STI | | Design | | Affective | | Affective | | | | | |
| Globalization & Sustainability | | GS | | Arts | | Reflection | | Reflection | | | | | |
| Fairness & Development | | FD | | Sciences | | Information literacy | | Info | | | | | |
| Aims | | Aims | | Physical & Health Education | | Media literacy | | Media | | | | | |
| Objectives | | Obj. | | Language Acquisition | | Critical thinking | | Critical | | | | | |
| Approaches to Learning | | ATL | | | | Creative thinking | | Creative | | | | | |
| DP | | | | | | | | | | | | | |
| Language & Literature Group 1 | | Language Acquisition Group 2 | | Individuals & Societies Group 3 | | Sciences Group 4 | | Mathematics Group 5 | | Arts Group 6 | | Code | |
| Language A: Literature | | Language B | | Business Management | | Biology | | Mathematical Studies | | Dance | | Dance | |
| Language A: Language & Literature | | Language B ab initio | | Economics | | Computer Science | | Mathematics SL | | Music | | Creativity, Action, Service | |
| Literature & Performance | | Classical Languages | | Geography | | Chemistry | | Mathematics HL | | Film | | Theory of Knowledge | |
| | | | | Global Politics | | Design Technology | | Further Mathematics | | Theatre | | Extended Essay | |
| | | | | History | | Physics | | Big Question | | Visual Arts | | Learning Objectives | |
| | | | | Information Technology in a Global Society | | Sports, Exercise and Health Science | | | | | | | |
| | | | | Social and Cultural Anthropology | | Environmental Systems & Societies | | | | | | | |
| | | | | Psychology | | | | | | | | | |
| | | | | Philosophy | | | | | | | | | |

