

# RESEARCH SUMMARY

## *The International Baccalaureate (IB) Diploma Programme (DP): Alignment with the Pakistan National Curriculum for years XI and XII*



Summary developed by the IB Research department based on a report prepared by:

**The National Recognition Information Centre for the United Kingdom (UK NARIC)**

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### Background

UK NARIC conducted a comparative analysis to identify similarities and differences in the content, structure, assessment and cognitive demand of the DP and Pakistan's Higher Secondary School Certificate (HSSC), in addition to the aims and objectives that underpin the Pakistani education system, as outlined in the National Education Policy (NEP). In total, the following Pakistani educational documents and DP curriculum materials were examined:

- The National Education Policy (NEP), (2009)
- The Pakistan HSSC for years XI and XII in four selected subjects: mathematics, biology, chemistry and physics. The focus will be on the following sources:
  - The National Curriculum (2006)
  - A selected secondary education board in Pakistan, the Federal Board of Intermediate and Secondary Education (FBISE)
- *Diploma Programme assessment: Principles and practice* (2010)
- *Approaches to teaching and learning* (2014)
- *General regulations: Diploma Programme* (2014)
- *International Baccalaureate Diploma Programme: A guide to assessment* (2014)
- *What is an IB Education?* (2015)
- *Diploma Programme: From principles into practice* (2015)
- *Programme standards and practices* (2016)
- Higher Level (HL) subject guides (physics [2014], biology [2015], chemistry [2015], mathematics [2016])
- HL subject specimen papers and mark schemes (chemistry [2014], mathematics [2014], biology [2016], physics [2016]).

The study also compared the recognition of the DP and HSSC for the purpose of undergraduate admission by reviewing published admission requirements for universities within the top 100 *Times Higher Education World University Rankings* for 2016.

### Research design

The first phase of the project examined the policies and objectives of the DP and compared these to the educational vision, aims, priorities and goals of the Pakistani education system. The second phase included an analysis of curriculum and assessment materials that focused on comparing the DP content, structure, intended learning outcomes and assessment methods with the Pakistan National Curriculum (2006)<sup>1</sup> for years XI and XII in the four selected subjects<sup>2</sup> (mathematics, biology, chemistry and physics). These subjects were chosen for comparison, as DP students in Pakistan frequently pursue engineering and medicine undergraduate courses locally and abroad (table 1).

Additionally, the DP principles, practices and standards were compared with the pedagogical and learning approaches of the HSSC. The final phase of the project included a comparison of university admissions requirements for holders of the DP and HSSC. This data came from a sample of 52 institutions from the 2016 *Times Higher Education* top 100 institutions that publish their admission requirements and were based in key destination countries for Pakistani students.<sup>3</sup>

<sup>1</sup> Using the FBISE syllabuses on a secondary basis to observe the curriculum in practice.

<sup>2</sup> The DP syllabuses used included: mathematics HL, biology HL, chemistry HL and physics HL.

<sup>3</sup> As published by the UNESCO Institute of Statistics: UNESCO (2014). *Global Flow of Tertiary-Level Students [Pakistan—Where do students go?]*.

Subject	Pakistan National Curriculum	FBISE/HSSC	DP
Mathematics	Mathematics (I–X[XI–XII])	Mathematics (XI–XII)	Mathematics HL
Biology	Biology (XI–XII)	Biology (XI–XII)	Biology HL
Chemistry	Chemistry (XI–XII)	Chemistry (XI–XII)	Chemistry HL

Table 1. Syllabuses reviewed

## Findings

### Philosophical underpinnings of the DP and Pakistani education system

The study found many similarities between the DP and the aims and principles of the Pakistani education system. On a policy and objective level, both the DP and Pakistani system (as identified in the NEP) share the following goals.

- To develop self-reliant individuals, global citizens and original thinkers who value their individual responsibility towards society.
- To strive to deliver an education that caters to the social, political and spiritual needs of individuals and society.
- To aim to adhere to justice and equity, developing students who are aware of human rights and encouraging students to engage in service-oriented activities that uphold the principles of fairness, justice and respect.
- To encourage links between what is taught in the classroom and real life, understanding the importance of teacher professional development to ensure teachers are well placed to deliver this in practice.

Differences were observed in the operational contexts of the educational systems. In particular, the NEP outlines a national strategy for education, with emphasis on delivering an education system that reflects the needs and values of society in Pakistan. By contrast, the IB educational philosophy centres on the type of learner that IB programmes aim to develop (in terms of skills and qualities). Additionally, the IB is international in nature and does not adhere to any particular system, but instead provides an adaptable framework that can meet the needs of various institutions.

### Aims, objectives and outcomes

Based on the curriculum comparison, the study found that all HSSC aims, objectives and standards are included, or at least partially included, within the

DP. Although some of the HSSC aims were topic- or subject-specific, they were nonetheless identified within the DP content outlines or inferred from the DP aims.

Similarly, the Pakistani standards and benchmarks were mostly identified within the DP. As the majority of these standards are set at topic level, differences were only found where the topic outlines of the DP and HSSC differed. For example, the mathematics National Curriculum benchmark for students to “identify and analyse conic sections (circle, parabola, ellipse and hyperbola)” relates to the key topic on Conics, which is not a core topic of the DP mathematics course. The DP does not set topic level benchmarks or outcomes, but aims to develop student’s conceptual understanding.

Both programmes aim for students to become life-long learners, problem-solvers and investigators who have strong experimental and communication skills. When considering the DP and HSSC’s intended learning outcomes, both approaches aim for students to develop: a solid knowledge of the subject; scientific/rational thinking; an understanding of the importance of technology and the limitations of science; as well as cognitive, affective and psychomotor abilities.

In practice—as identified in the education board’s learning and teaching guidelines, together with assessment—in the Pakistani educational programme there is greater emphasis on students’ ability to recall, understand and in some cases apply their knowledge, with less apparent emphasis on higher-order thinking skills (such as analysis, evaluation and synthesis). In comparison, the DP places equal emphasis on developing conceptual understanding as well as the application of knowledge and skills associated with each concept, as demonstrated in the assessments and standards and practices.

### Content comparison

In terms of content, clear similarities could be seen in the key topics covered, although the DP includes

a larger breadth of topics in the subjects reviewed. The researchers noted some differences between the sub-topics within the programmes and, in some instances, the level of detail provided and/or prescribed for key topics. However, IB World Schools could feasibly cover the majority of the HSSC topics within the implemented DP curriculum. Additional details are provided for each subject examined in this study below.

### **Mathematics**

Both the HSSC and DP aim for students to become knowledgeable in mathematics and to develop logical thinking, reasoning, graphing skills and an appreciation of technology. The four National Curriculum standards for mathematics are similarly represented in the DP, with the exception of *Measurements and Geometry* in which only some of the benchmarks are included in the DP.

Many key mathematics topics are covered in both programmes, including: trigonometry; functions; vectors; and probability. Additionally, most of the sub-topics set out in the Pakistan National Curriculum are also included within the DP content outline, and overall the curriculums are of a similar depth and breadth.

### **Biology**

Both the DP and HSSC aim for students to develop solid scientific and biological knowledge, understanding and skills. Further, both programmes expect that students should be able to demonstrate their scientific knowledge, to construct new knowledge and to reflect on what they have learned.

When Pakistani educational benchmarks were not identified in the DP, this was often related to the slightly different scope of topics or sub-topics covered in the programmes. For example, the Pakistani benchmarks to discuss or describe the historical development of biology or the political and social factors affecting this development are not similarly included within the DP curriculum. In general, both programmes cover a similar breadth and depth of biology topics, with the exception of *Biology and Human Welfare* and *Biodiversity* (including acellular life, prokaryotes, protists and fungi, diversity among plants, and diversity among animals), which are covered in more depth in the Pakistan National Curriculum. In contrast, the DP covers *Cell biology, Ecology, and Genetics* in more depth.

### **Chemistry**

The DP and HSSC establish similar aims and objectives for students to become knowledgeable and skilled in chemistry and to be able to use technology effectively, to communicate understanding and

to apply their learning to the real world. Further, the majority of the National Curriculum benchmarks are also included in the DP.

Regarding content, both programmes include comparable key chemistry topics. Although many topic areas are shared, the Pakistan National Curriculum covers the topics in greater depth while the DP covers a larger breadth of topics.

### **Physics**

Both programmes aim for students to become scientific and rational lifelong learners who are knowledgeable about physics. Nearly all of the physics objectives—to construct, reflect on and use scientific knowledge—are also required of DP students, with both intending to develop students' investigative skills.

The majority of the topics from the Pakistan National Curriculum are also included within the DP content outline, with the exception of two Grade XII topics: *Physics of solids* and *Electronics*. Overall, the programmes cover a comparable breadth and depth of physics topics. In some cases, the DP includes greater focus on the application of knowledge and skills within these topics.

### **Pedagogical and learning approaches**

Both programmes require that teachers are fully prepared and trained to teach specific subject matter, with continued focus on improving their teaching or receiving professional development. Additionally, both the DP and Pakistan National Curriculum/HSSC encourage student-centred and inquiry-based teaching, allowing students to develop actively their own understanding of concepts.

According to both curriculums, teachers should support students in developing key communication, analytical and critical thinking skills. Further, both programmes encourage collaborative work and group discussions, and indicate that assessment should be both formative and summative. However, the DP includes all of these practices and approaches throughout its framework and policies, ensuring that these approaches are built into the curriculum and assessment.

The IB also prescribes additional teaching practices to support students in developing social and self-management skills. Overall, the IB framework emphasizes six pedagogical teaching principles. Three of these are shared with the HSSC, including teamwork, inquiry-based teaching and formative and summative assessment approaches. In addition, the DP approach to teaching is:

- focused on conceptual understanding
- developed in local and global contexts
- differentiated to meet the needs of all learners.

### Comparison of assessment practices

A comparison of assessment methods found that both the DP and HSSC employ external written examinations and include an element of practical assessment in the science subjects. In mathematics, the DP includes an individual project in addition to the written examinations. The overall duration spent on these assessments is similar between the two educational programmes; however, the volume of assessment for the DP subjects is slightly higher.

Similar question types were also identified between the programmes. Assessments included multi-part structured questions and multiple choice. The DP uses more multi-part structured questions than the HSSC and does not use any multiple-choice questions in the DP mathematics HL assessment. Assessments in both programmes include questions grounded in real-life scenarios or applications. This was more evident in the DP, with the DP papers comprising multi-part questions that explore a problem in depth and enable assessment of higher-order thinking skills. In comparison, the HSSC uses a series of short questions, which typically ask students to solve an equation or calculate a value.

While both the DP and HSSC assess knowledge, understanding and application skills, the HSSC includes more questions focused solely on knowledge recall than was found in the DP. Further, the DP assessments contain questions focused on analysis and evaluation skills, which although referenced in the National Curriculum, were not observed in the HSSC papers.

### University recognition

There are significant differences in the recognition of the DP and the HSSC for the purpose of admission to top-ranked universities around the world. A review of admission requirements for universities within the *Times Higher Education* World University Rankings top 100 for 2016, cross-referenced with key destination markets for Pakistani students, found the DP to be uniformly and globally recognized as a pre-university qualification. In the United States of America (USA), it is further recognized for advanced standing through credit exemptions towards the first year of study. By contrast, the HSSC is not as widely accepted for direct entry to universities internationally, with many requiring an additional year of study before entering a bachelor degree. From a sample of 25 highly ranked universities across

the globe, all accepted the DP, subject to achievement of requisite grades, while only eight accepted the HSSC.

The differences are even more apparent when examining recognition by top institutions in countries such as the United Kingdom (UK). In the UK, all 12 top 100 universities with published admission requirements accepted the DP for direct entry while only two of the 12 accepted the HSSC, and only for students from the pre-engineering or pre-medical streams. Recognition of the HSSC was also limited in countries such as Germany and Australia. Institutions in a number of other countries, such as the USA, the Netherlands, Sweden and Denmark, had little publicly available information on the HSSC for admissions purposes although they all had published statements regarding recognition of the DP.

### Summary

In conclusion, the study found that while clear similarities can be seen between underpinning philosophies and aims of the DP and Pakistan's education system, as well as between the key content covered within subjects of the DP and HSSC, the DP assesses subjects at a higher level of cognitive demand and is designed to be of a higher academic level overall. This objective evaluation of the curriculum and assessment is further supported by the greater level of recognition of the DP in relation to the general entrance requirements of universities worldwide.

This summary was developed by the IB Research department. A copy of the full report is available at [www.ibo.org/en/research/](http://www.ibo.org/en/research/). For more information on this study or other IB research, please email [research@ibo.org](mailto:research@ibo.org).

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