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RESEARCH SUMMARY

The effect of the Diploma Programme (DP) on critical thinking development: An international multi-site evaluation

Summary developed by **IB Research** based on a report by:
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Background

Critical thinking plays an important role both in the classroom and everyday life, including being a key factor for determining individual and collective success in the face of complex global challenges (Butler 2012; Clarke, Double and MacCann 2017; Griffin and Care 2015; Kirschner 2020). In broad terms, critical thinking refers to a person's ability to analyse, synthesize and evaluate information (Halpern 2001). Given the importance of critical thinking for attaining valued outcomes, the International Baccalaureate (IB) Diploma Programme (DP) has made developing critical thinking a central focus of its programme and approach.

This study examined the effects of the DP on the critical thinking skills of students in Australia, England and Norway. Specifically, it investigated whether student participation in the DP contributed to higher levels of critical thinking, as measured by an established critical thinking assessment instrument. Researchers also examined DP curricular elements that may support critical thinking, and explored the perspectives of DP students and teachers.

Research design

The study included three phases. The first phase involved document analysis of IB materials to understand how the IB integrates critical thinking within and across DP subjects and components. Subsequently, the researchers conducted quantitative data collection in schools to assess differences between DP and non-DP students, using the pre-validated Cornell Critical Thinking Test (CCTT) (Ennis, Millman and Tomko 2005). This second phase used samples of grade 11 and grade 12 DP and non-DP students from schools in Australia, Norway and England.[1] The combined sample included 566 students from eight schools—282 students were enrolled in the DP and 284 students were enrolled in national programmes. Researchers used propensity score matching to construct comparison samples by matching each DP student with a non-DP student with similar characteristics. Regression analysis and analysis of variance were utilized to examine the impact of the DP on critical thinking scores. The final phase involved interviews with DP students (n = 18) and teachers (n = 9) from several schools that participated in phase two about their experiences learning or teaching critical thinking in the DP.

[1] One school in England with 21 DP students participated in the study, but due to the COVID-19 global pandemic, no further schools in England could be recruited. Sensitivity analyses were conducted to ensure that findings were not sensitive to the inclusion of this single English school; the results did not change substantively based on its inclusion and, therefore, the England sample was included.

Findings

Critical thinking in DP curriculum

In this phase, researchers conducted content analysis of select IB policy documents, instructional materials and subject guides (see table 1 in the full report to see a list of the included documents). The documents were reviewed and analysed to address possible pathways by which DP students develop critical thinking.

The document analysis revealed that the DP places a strong focus on teaching critical thinking to all students. This emphasis on explicitly teaching critical thinking skills was evident at both a general and a subject-specific level. At a general level, the theory of knowledge (TOK) course provided critical thinking instruction outside of any content area. Subject-specific instructional approaches to critical thinking were also evident within the documents and were expected across all courses and subjects. One-to-one mentorship represented another potential pathway for critical thinking development. The extended essay (EE) offers one such opportunity for mentorship, with teachers fostering students' inquiry and research skills.

The IB embraces a mixed approach to critical thinking development, which is largely in line with best practice, as established by recent meta-analyses examining pedological approaches to critical thinking development (Abrami et al. 2008; Abrami et al. 2015; Niu et al. 2013). The DP philosophy ensures that critical thinking instruction is not assumed to follow from other gains in knowledge, but is purposefully taught within the classroom. This approach may represent one of the likely ways that DP students gain a competitive critical thinking advantage because national programmes rarely include general critical thinking instruction courses.

Quantitative findings

Overall comparison

Researchers conducted regression analyses to explore overall differences in critical thinking between samples of DP and non-DP students. After controlling for covariates—including student personality variables, cognitive abilities, socio-economic status indicators and demographic characteristics—participation in the DP was a significant predictor of critical thinking. Specifically, DP students had significantly higher critical thinking than their non-DP peers ($\beta = .21$, $p < .001$).

Comparison of matched samples

Furthermore, researchers used propensity score matching—a statistical technique that allowed them to construct matched IB and non-IB samples with similar characteristics for comparison. **The results of the tests performed on these matched samples showed that the DP students had significantly higher levels of critical thinking than the non-DP students ($p < .001$), with a moderate effect size ($d = 0.48$).**

Grade level comparison

The study also examined differences in critical thinking across grade levels among the matched DP and non-DP students. **Analyses showed that the advantage seen in DP students was more pronounced in grade 12 students compared to grade 11 students ($F(1,360) = 7.11$, $p = .008$). This suggests that the difference in critical thinking between IB and non-IB students increases over the course of the DP (see figure 1).**

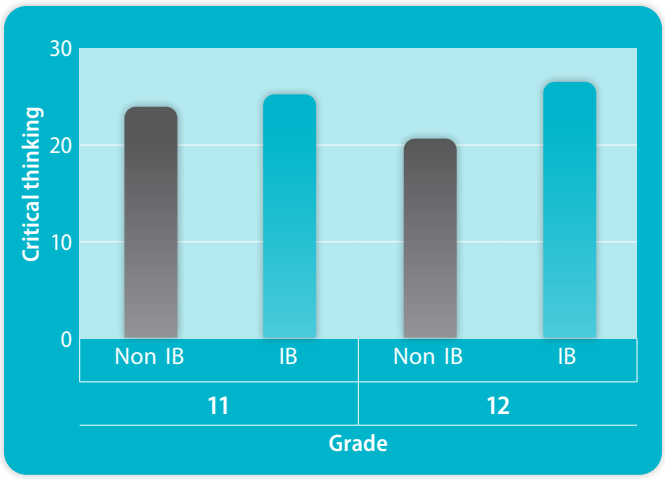

Figure 1. Critical thinking as a function of grade and IB participation

Qualitative findings

DP students and teachers were interviewed to learn more about their perceptions of the learning, teaching and assessment of critical thinking in the DP.

Students' views

Students believed TOK, the EE and particular subjects were helpful in developing their critical thinking skills. Regarding TOK, students explained that they believed the whole idea of the course was to challenge their thinking and, specifically, the way they understood and accepted knowledge. They were constantly reminded by their teachers to look at multiple perspectives and different points of view. A student from Australia explains how TOK helped to develop her thinking.

> "First, I think theory of knowledge develops your … critical thinking skills because … I think it makes you really be aware of how knowledge and its acquisition and production is significant to our everyday lives. And it makes you think about how there are also always two sides or more to things, and how we can look at them from different perspectives and gain a greater understanding and a critical understanding of the significance of knowledge and acquisition." (Student, Australia)

Additionally, students believed that the DP better prepared them for future studies compared to other school systems, and suggested that the teaching of critical thinking made them better learners, with deeper understanding and knowledge of different subjects. Students also highlighted the EE and particular subjects as opportunities to enhance their critical thinking. However, students generally believed that critical thinking was more suitable for subjects such as history and English rather than science and mathematics.

Teachers' views

Teachers claimed that the DP approach plays a central role in fostering students' critical thinking skills. Like students, overall, teachers felt that the DP offers stronger preparation for university studies compared to national or state programmes. All teachers interviewed, whether they were subject teachers or TOK teachers, agreed that the DP enhanced students' thinking skills, which could provide a comparative advantage to DP students. These perspectives are exemplified in the following comments from teachers.

> "I feel like our students end up maybe more rounded than other students would, just because we kind of facilitate both sides and thinking about things from different perspectives and then coming up with their own validated conclusions. And I think that's a very valuable part of the course." (Environmental systems and societies teacher, England)

> "It's very rewarding and that's something you don't ever want to give up once you get into it … It's a lot of work and sometimes you feel like, you know, you're not getting anywhere. But I think we can all agree that every single student is better off having done IB, and core in particular." (Teacher, Australia)

Additionally, teachers in Australia and England expressed a very favourable view of the DP for enabling student growth in critical thinking skills. Staff reported on how they had witnessed evidence of students' development of critical thinking through TOK in particular. As this DP Coordinator in England explained:

> "I certainly see, for example, with my year 12 of this year in theory of knowledge that they're starting to kind of question things much more and think a little bit more critically about where they're getting knowledge from …"

Similarly, many teachers believed that the EE was helpful in fostering students' critical thinking. Teachers pointed to students developing skills such as the ability to conduct independent research, analyse multiple perspectives and deal with complexity. Teachers also believed that the EE was good preparation for university—an edge that DP students would have over many non-DP students.

All teachers described using mixed teaching approaches for critical thinking, in line with best practice research. They reported using a variety of teaching strategies, including making critical thinking an explicit objective of their lessons, using questioning techniques and reflective writing, building linkages across subjects and planning lessons with colleagues to better promote critical thinking across the DP. Teachers explained how they facilitated dialogue in the classroom and found discussions and debates to be highly valuable for developing students' critical thinking skills. It was also evident that teachers included different types of formative assessment strategies, such as giving feedback to students to stimulate their thinking.

Both teachers and students were more critical of some aspects of assessing critical thinking, such as the use of assessment rubrics and whether the assessments were able to adequately assess such a complex cognitive skill. To better support students, teachers suggested that more professional development would be helpful, for example, sessions on research methods. Teachers also expressed an interest in receiving more guidance, including clear models of the IB's expectations for critical thinking, as well as lesson plans.

Summary

The results suggest that the IB embraces a mixed approach to critical thinking development, which is largely in line with evidence-based best practice. This approach makes teaching critical thinking an explicit goal, ensuring that critical thinking instruction is not assumed to necessarily follow from other knowledge gains but is specifically taught within the classroom.

Quantitative findings indicate that IB students had significantly higher levels of critical thinking than their non-IB peers—an advantage that held even after relevant covariates were controlled for using regression approaches and propensity score matching. The critical thinking advantage seen in IB students was more pronounced in students that were in the later stage of the DP compared to those at the beginning of the DP. Overall, these results provide evidence that DP participation benefits critical thinking, as measured by a pre-validated critical thinking assessment. However, there are a range of unaccounted for pre-existing differences between IB and non-IB students that may contribute to the observed differences in critical thinking.

In interviews, students and teachers shared a belief that TOK, the EE and DP subjects foster the development of critical thinking. Additionally, teachers and students generally believed that the DP better prepares students for further study compared to national or state programmes.

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

To cite the full report, please use the following:
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