Data, algorithms and digital power

International Baccalaureate · IB Diploma · Digital Society · SL

IB Diploma Programme Digital Society SL (first assessment 2024; 2021 guide). This topic equips the course's CONCEPT core (2.1-2.7: change, expression, identity, power, space, systems, values and ethics) working on the first CONTENT areas (3.1 data, 3.2 algorithms), focused through CONTEXTS into inquiry with real-world examples, as demanded by Paper 1 (40% at SL). This handout teaches the concept lenses, the data-and-algorithm content and the inquiry focus. All worked examples are original classroom cases.

Must-know for data, algorithms and digital power:

Family	Content
concepts	change, expression, identity, power, space, systems, values and ethics: seven lenses
data	3.1: data vs information; collection, processing, storage
algorithms	3.2: instructions, bias in, decisions out
contexts	cultural, economic, environmental, health, human knowledge, political, social
inquiry	concept x content x context x real-world example: the focus formula

Seven concepts as lenses

The course inquires through seven **concepts** : CHANGE (evolution or transformation), EXPRESSION (who can speak, how far it travels), IDENTITY (self and group made and remade), POWER (who decides, who benefits), SPACE (place reconfigured by the digital), SYSTEMS (interlocking parts with emergent effects) and VALUES AND ETHICS (what is good, right, acceptable). A concept is a question asked of a case: the same app is a different object through POWER (whose data) and through IDENTITY (whose self-presentation).

Worked case. The school's attendance app, read four ways: CHANGE (the register moved from teacher memory to database), POWER (who may query the record), SPACE (attendance taken anywhere), VALUES AND ETHICS (locational tracking of minors).

Data and algorithms

In the content area of 3.1, **data** differs from information: data is the raw capture (timestamps, coordinates), information is data made meaningful (a pattern of lateness). The discipline of the content area: ask how data is COLLECTED (what the sensor can and cannot see), PROCESSED (cleaned, matched, modelled) and STORED (who holds it, how long); a dataset is an artefact with makers, not a window on the world. An **algorithm** (3.2) is an instruction sequence on that data: the course asks what the instructions assume (a threshold defines lateness), and what decisions flow out (the automated flag), because bias in becomes bias out.

Worked case, continued. The app's lateness rule: arrival after the second bell flags the record; the algorithm's assumption (one bell time for all bus routes) makes rural students 'late' by design: the dataset is not neutral, and the VALUES lens sees it.

Focusing inquiry

Inquiry is focused with the formula CONCEPT x CONTENT x CONTEXT x **real-world example** : a question worth asking (does automated attendance change the power to define lateness?), content that can answer it (data and algorithms), a context situating it (the social context of school; the economic context of transport), and a real case (the attendance app). The failure modes: the concept-only essay (no case), the case-only story (no concept), and the context dump (no digital system in view).

Worked case, concluded. Focused: POWER (concept) x ALGORITHMS (content) x SOCIAL and ECONOMIC (contexts) x the attendance app (example), answering whether automation relocates the power to define lateness from teachers to the rule's authors.

Checklist

- The seven concepts as questions asked of cases (concepts).
- Data vs information; collection, processing, storage; datasets have makers (data).
- Algorithms: assumptions in, decisions out, bias through (algorithms).
- The seven contexts situating each inquiry (contexts).
- The focus formula applied; the three failure modes avoided (inquiry). Boundary notes: the examiner must see the inquiry working: concepts named, sources diverse and evaluated, real-world examples real. All worked examples are original classroom cases.