Challenge
How to improve exam results, creating personalized online guidance with connection to test exams, text books and open source material like YouTube video’s. Inspired by the Achievement Standards Network (ASN) and IMS Global curriculum framework, Kennisnet and SLO used open standards to link all these educational data. Thus we created a data–driven solution that supports both teacher and student, with the potential to be used successfully in any educational (examination) setting.

Solution
• We analyzed the complete HAVO (Dutch High School) curriculum, breaking each subject down to about 200 topics & achievement standards.
• Then we analyzed all exam questions of the last 5 years, connecting them to the various parts of the curriculum. We also noted historical scores on each question, creating a benchmark.
• We analyzed all current educational books, connecting topics to specific chapters, sections and pages. We also linked many open educational resources (from YouTube, the Dutch Wikiwijs, etc.) to the curriculum.
• We created a smart user interface, driven by recent exam questions, and a personalized dashboard for both the student and the teacher.

Learning impact outcomes
By answering test exam questions and comparing them to the benchmark, the student sees exactly which topics in the curriculum need some extra attention. Combining and evaluating scores on different questions, the system can even detect dyslectic problems as well as deficits that may go back to elementary school. The student gets relevant study suggestions: the exact sections in the text books and other materials to consult.
By means of further testing, both student and teacher can witness the study progress. This way, the teacher gets a better understanding of the needs of each student and an extra tool for personalized study guidance. The system is data–driven and self–learning: it can provide better learning suggestions with each new user and each new exam question answered.

Return on investment
• Students get personalized study guidance
• Teachers get a very useful educational tool
• Publishers can optimize study books
• Governments can improve the exams
• The system improves with every new user

Facts & Figures
• Final exams in secondary schools
• Analyzed & connected:
  • 8 subjects (like Math and Physics)
  • 3,000 exam questions of the last 5 years, including all (detailed) historical scores
  • >40,000 answers by 3,000 students
  • 12,000 text book pages
  • hundreds of open educ. sources
• All major publishers involved
• Other European countries showing interest

Key words
• Achievement Standards Network
• IMS Global curriculum framework
• Linked Open Data (LOD) standards
• Edustandaard: Dutch organization for open educational standards
• Supporting Bloom’s taxonomy
• Self–Learning
• Personalized guidance
• Continuous testing
• Learning analytics

About Kennisnet
We are the Dutch public organization for Education & ICT. We provide a national ICT–infrastructure, advise the sector councils and share our knowledge with the primary, secondary and vocational education. Together with the sector councils we enable the educational sector to realize their ambitions with ICT.

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Watch the animated presentation here: https://youtu.be/4XduUX9QADM