heinnovate

Smart Education at Schools Programme fosters teacher-driven technological innovation

KU Leuven, Belgium

Abstract

The *Smart Education at Schools* (SEATS) programme, part of the Smart Education Research Programme led by imec and the KU Leuven itec group, helps Flemish teachers develop tech-based solutions to educational challenges. Teachers submit project proposals, and selected ideas receive €75,000 to be co-developed with schools, researchers, and industry. Since 2017, 25 innovations have emerged from seven project calls, including *VRkeer* (a VR tool for traffic safety) and *Fonemi* (an app for phonemic awareness in toddlers). These tools enhance teaching while strengthening teachers' didactic and entrepreneurial skills. SEATS applies a "quadruple helix" model, promoting strong partnerships across education, research, policy, and industry. Challenges include keeping all stakeholders engaged and ensuring long-term sustainability of solutions. To address this, SEATS introduced workshops to support teachers in idea development and project management. Flexibility in scaling is essential, with some projects requiring commercialisation to grow.

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Year: 2024

HEInnovate dimensions affected:

European Commission | OECD

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Institutional Profile

Imec, itec and KU Leuven

Imec is a leading independent research and development organisation in nano-electronics and digital technologies based in Leuven, Belgium. Imec's innovations serve as the bedrock of many new applications impacting compute technology and systems, connectivity, health, automotive, industry 4.0, agritech, energy and education. Itec is an interdisciplinary research group of Katholieke Universiteit (KU) Leuven and imec. Their research focuses on the design, development and evaluation of personalised and adaptive digital solutions. Itec's primary application domains include education and training as well as health. Their research outcomes provide evidence-based guidelines for the effective integration of technology in those application domains, and they aim to help experts and end users to capture and interpret data in order to make effective decisions. In 2017, these educational research activities drove the itec team to draw up a plan to formalise the already ongoing collaborations in close alignment with the government and imec. The result was a four-layered research programme, namely the Smart Education Research Programme. Up until this day, itec remains one of the main drivers of the Smart Education Research Programme and a key player in determining the strategy of its future development. As itec spearheaded the establishment of this programme, it remains closely involved in its third layer, the Smart Education at Schools programme.

Smart Education Research Programme

Since 2017, imec runs the Smart Education Research Programme, a government-funded initiative that unites industry, research and school expertise to evaluate the efficient use of educational technology (edtech) solutions. The programme runs in funding cycles (covenants) of five years, with the current covenant running until December 2026. The programme operates in four layers: fundamental and strategic basic research, company-driven innovations, school-driven innovations, and roll-out in Flanders – see the following Figure.

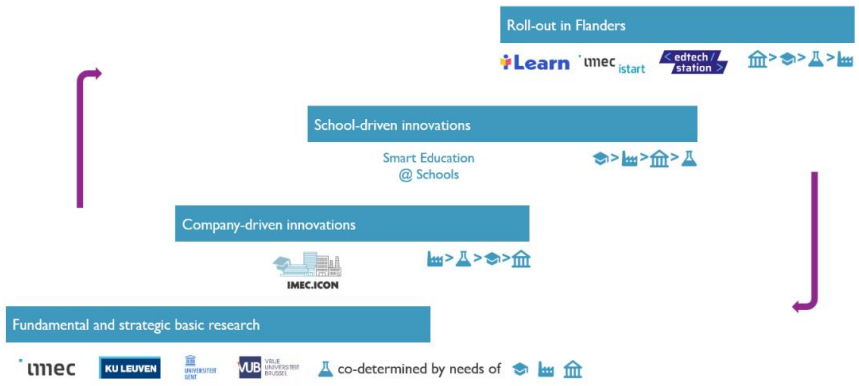

FIGURE 1 - FOUR LAYERS OF THE SMART EDUCATION RESEARCH PROGRAMME (SOURCE: IMEC)

In the first layer of the Smart Education programme, four university research groups[1] conduct **fundamental and strategic basic research**. The focus lies on the development and testing of smart technologies such as sensors, algorithms and adaptive learning platforms, to enhance personalised learning. The second layer focuses on **company-driven innovations**. The aim is to co-create technology in real contexts of education and training in close collaboration with the industry. Schools are involved as user groups and have their own valorisation goals and tasks. They make sure that the developed solutions are well-aligned with the actual needs. In the third layer, an innovation programme called Smart Education at Schools (SEATS) funds **school-driven innovations**. In an annual call, teachers can submit an idea about a technological solution that tackles didactic challenges. Selected proposals receive a grant of 75,000 EUR and have one year to develop the solution in close collaboration with partners such as companies and researchers, including itec. The aim of this layer is to stimulate collaboration between the key players in the edtech landscape (schools, companies, policy and research) and thus deliver technological solutions that create impact in the classroom. The fourth and final layer aims at a broad **roll-out and implementation** of educational technology in Flanders. A good example is the i-Learn project, an online portal that collects digital tools from different providers, allowing teachers to create personalised learning trajectories.

This case study focuses on the third layer of the research programme, the Smart Education at Schools programme. It will look at its activities, drivers and barriers as well as its impacts and lessons learned.

Aims of the Smart Education at Schools Programme

First, Smart Education at Schools aims to **annually deliver three to six innovative technological solutions** that are tailored to the Flemish educational system. Ultimately, these solutions should have a positive impact on teachers and pupils in as many Flemish schools as possible.

Secondly, SEATS aims to **empower Flemish teachers** in primary, secondary and adult education to think about how technology could and should support their teaching practice. After all, teachers are in a prime position to estimate what technology is needed in the classroom and what its specific functionalities ought to be. Teachers with a great idea about a technological solution that might have a big impact in the classroom can turn to the SEATS programme.

Lastly, the programme aims to enable **co-creation in the quadruple helix** (policy – research – schools – industry). During one-year projects, the four actors of the helix are involved. The projects aim to involve teachers not only during the final testing stage but also and primarily during the initiation and development stage.

[1] itec (Catholic University Leuven), the research group for Media, Innovation and Contemporary Technology (MICT, Ghent University) and the Internet Technology and Data Science Lab (IDLab, Ghent University), and Studies in Media, Technology and Innovation (SMIT, Free University of Brussels).

Introduction and Rationale

Smart Education at Schools was established in the context of the broader Smart Education Research Programme. By establishing the four layers, it was the aim to cover all key actors of the edtech ecosystem (academics, companies and schools) and all technology readiness levels. In the third layer, the Smart Education at Schools Programme, the focus lies on innovations driven by schools on a relatively high technology readiness level (TRL 6 to 7). This third layer was conceptualised in order to promote teacher entrepreneurship and to be able to develop bottom-up edtech solutions that really match the needs of the educational field.

First, the bottom-up aspect of the programme is outstanding in the sense that there are very few similar Flemish initiatives. Most other project calls focus on company- or research-driven innovation, involving schools only in a later testing stage. The only other Flemish teacher-driven project call is InnoVET, but their focus lies solely on Vocational Education and Training. In Smart Education at Schools, teachers from all education levels (primary, secondary and adult education) and programmes (general, technical, vocational and artistic education) can submit an idea.

Initiative Description

Stakeholders and their activities

The Smart Education at Schools programme relies on a broad network of players who select and guide the projects and help shape the set-up of the programme. Most of these partners are part of the quadruple helix in which the programme wants to stimulate collaboration.

The **steering committee** of the programme has the final power of decision on the selection and evaluation of projects. Next to that, the members of the committee help shape and, if necessary, reform the set-up of the programme. The steering committee is represented by experts from itec (KU Leuven), imec, the Department of Education and the Free University of Brussels.

A representative of the **Department of Education** of the Flemish government closely follows the selection and project progress of all selected proposals as part of the steering committee and jury. This ensures that the programme upholds a close connection to the existing policy.

<edtech/station>, the Belgian educational technology hub for technology providers in the field of learning solutions, is a key stakeholder in the SEATS programme. Firstly, they play a crucial role in the application process by matching schools to the right industry partners. Secondly, <edtech/station> also supports project teams during the valorisation track.

Edtech companies, often from the network of <edtech/station>, play a central role in the actual development of technological solutions. In close collaboration with the teachers, they develop a technological solution that matches their specific needs.

Start-up accelerator **imec.istart** is a key partner starting from the proposal phase. Not only is a representative part of the jury selection process, but they are also heavily involved in the valorisation track during the development year. Many aspects of their expertise in guiding start-ups can be transferred to the SEATS projects. Moreover, if a project team has the ambition to eventually transform their project into a start-up, they immediately have access to the best possible support.

The programme upholds a close connection with researchers from **imec research groups** such as itec (KU Leuven) and MICT (Ghent University). Researchers with the relevant expertise help project teams in their ideation and are a part of the jury during the second selection. Next to that, itec and MICT researchers act as an informal sounding board for project teams who are developing their idea.

The last and crucial partner of the process are **Flemish teachers in primary, secondary and adult education**. Teachers come to the researchers with a didactic problem and a preliminary idea about a technological solution. The aim of the projects is to involve teachers not only during the final testing stage, but also and mostly during the initiation and development stage.

Input: Resources supporting the Smart Education at Schools Programme

The Smart Education Research Programme runs on funding that comes from a covenant with the Flemish government. With the first one (2017-2021) completed, the programme currently runs in the second covenant (2022-2026). Within that covenant budget, **250,000 euro** is allocated to Smart Education at Schools every year; 200,000 euro for projects and 50,000 euro for management.

Next to the covenant funding, the SEATS programme has received additional funding in order to safeguard the continuation of the developed technological solutions. In 2020, the programme received 300,000 euro from the governmental agency Flanders Innovation & Entrepreneurship (VLAIO), in 2022 500,000 euro from Digisprong, a governmental knowledge and advisory centre. This budget went to projects that had finished the SEATS programme and needed extra funding for the continuation and roll-out of their solution.

Activities

Smart Education at Schools runs a yearly project call to collect ideas from teachers in primary, secondary and adult education. Selected proposals receive a maximum of 75,000 euro to develop a proof of concept of their innovative idea. Each year, the programme selects three to six projects.

Application process

The application process of projects takes almost one school year, during which the programme provides the necessary support to shape the submitted ideas into well-founded proposals – see the following Figure.

During the **info session** (September) interested teachers, companies and researchers receive all the necessary information about the project call. It is also an excellent moment for applicants to meet other innovators who might be working on a similar idea. During the **intake meeting**, the teachers briefly explain the idea to the project manager of SEATS. The manager assesses whether the idea fits within the scope of the project call, gives some tips and tricks for the submission and makes connections with other projects or researchers where possible. If they need an industry partner, the teacher is referred to <edtech/station> (see stakeholders). For the **first deadline** in October, applicants fill in a short abstract (1,500 words) about the idea and objectives. All abstracts are read and evaluated by an independent jury according to the project call criteria. They receive a traffic light assessment: green, orange or red. Only the green and orange abstracts go to the next round, orange meaning that the idea still needs thorough scoping.

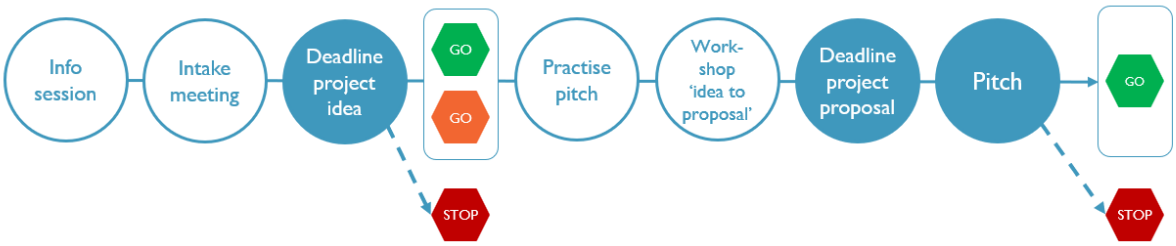

FIGURE 2 - FIGURE - THE SMART EDUCATION AT SCHOOLS APPLICATION PROCESS (SOURCE: IMEC)

In December, the ideas that survived the first round give a practice pitch of their idea to an audience of other selected applicants, alumni from the SEATS programme and experts from the research, educational and business field. The feedback and questions they receive help them in further shaping the idea. In January, the teams attend a workshop which helps them to shape their ideas into a proper project proposal. Given that the majority of the applicants have never submitted a proposal before, this workshop is crucial to guide them into the next step of the application process. For the second and final deadline, project teams submit the final project proposal in March. This proposal is significantly longer than the abstract (7,000 words) and includes all information on objectives, team, budget, timeline and activities. One week after the deadline, the teams defend their proposal during a pitch in front of an independent jury. The jury subsequently makes their final decision what projects will be selected and thus receive funding to develop a proof of concept.

Execution of the project

At the start of their projects, all selected teams gather for a collective kick-off. They now have twelve months to develop a working proof of concept. Every month they report their

progress to the Smart Education at Schools team, but otherwise, they work independently in their teams.

In the 2024 project call, an extra component was added to the process: the **valorisation track**. Through workshops and individual support from experts (<edtech/station> and imec.istart, see stakeholders), the project teams receive the necessary guidance on how to valorise their project in the long term. Projects follow this valorisation track in the same year as the development year, making the process a bit more challenging. But ultimately, this added track leads to more future-proof projects.

Dissemination

The SEATS programme focuses strongly on dissemination on three levels: the project call, the project results and the methodology.

The dissemination of the **project call** (with the goal of finding teachers with new ideas) and the dissemination of **project results** often go hand in hand. Communication efforts (website, newsletter, news articles, social media) and a strong presence on events that focus on teachers and educational technology (such as Flemish events SETT, ICT-praktijkdag, Learning Bytes Festival and Onderwijs met Games, but also international events such as bett London) ensure a broad outreach.

Next to that, the programme recognises the importance of disseminating the **programme methodology**. The project manager regularly consults with similar co-creation programmes, both nationally (for example Innovet and amai!) and internationally (for example NOLAI and Npuls in the Netherlands). By comparing and exchanging methodologies and experiences, the programmes can always learn from and inspire one another.

Impact and Success Factors

Internal impact (institutional development, capacity building)

The Smart Education at Schools programme (SEATS) fosters teacher entrepreneurship by allowing teachers to take ownership of edtech development. Teachers are pushed outside their comfort zone by working with developers, business experts, educational researchers, and other professionals. This provides teachers with opportunities for capacity building and encourages them to remain active in the innovative world.

Teachers' involvement in the programme also creates enthusiasm about technological innovation, which supports their professional development. Additionally, teachers occasionally become entrepreneurs through their involvement, as seen with Smart Symbols, where a team of teachers started a startup thanks to the tools and connections provided by the programme.

Next to that, the programme also involves **students**. They help teachers in the different testing phases of the development. With their feedback, the technological solutions can be

updated and refined. Some teachers even involve their students in the development process through co-creation. By asking them what they would like to see in the tool, they increase their enthusiasm about the tool.

External impact (community, regional innovation, partnerships)

The programme connects the quadruple helix (policy, research, schools, industry) in short-term, specific projects. This partnership brings academics closer to practice, helps companies develop and test solutions that meet the needs of the field, enables teachers to discover the world of edtech development, and provides the government with insights into critical needs in Flemish schools.

The regional impact is reflected in the steady flow of project submissions from teachers across Flanders, ensuring geographical diversity and involvement from a variety of school types (e.g., community-owned, subsidised public, and subsidised free schools).
The programme also helps strengthen the connections within the Flemish educational ecosystem, allowing lasting relationships between schools, researchers, and companies.

Main success factors

Smart Education at Schools was established in the context of the broader Smart Education Research Programme. By establishing the four layers, it was the aim to cover all key actors of the edtech ecosystem (academics, companies and schools) and all technology readiness levels. In the third layer, the Smart Education at Schools Programme, the focus lies on innovations driven by schools on a relatively high technology readiness level (TRL 6 to 7). This third layer was conceptualised in order to promote teacher entrepreneurship and to be able to develop bottom-up edtech solutions that really match the needs of the educational field.

There are many reasons to maintain the organisation of the Smart Education at Schools programme. First, the **bottom-up aspect of the programme is outstanding** in the sense that there are very few similar Flemish initiatives. Most other project calls focus on company- or research-driven innovation, involving schools only in a later testing stage. The only other Flemish teacher-driven project call is InnoVET[2], but their focus lies solely on Vocational Education and Training. In Smart Education at Schools, teachers from all education levels (primary, secondary and adult education) and programmes (general, technical, vocational and artistic education) can submit an idea. Secondly, the programme team notices that Flemish **teachers remain keen to submit ideas** in the programme. That enthusiasm is reflected in a steady amount of project ideas: In the October 2024 call, the programme received 22 submissions. These submissions reflected a good geographical distribution across Flanders and a good distribution among the different school groups (schools owned by the communities, subsidised public schools and subsidised free

[2] See https://www.onderwijs.vlaanderen.be/nl/innovet-wat-hoe-en-waarom.

schools). Lastly, the programme is an excellent vehicle to **bring together the quadruple helix** in very specific, short-term projects. It allows academics to bring their research closer to practice, companies to quickly develop and test solutions that meet critical needs of the field, teachers to discover the world of edtech development and the government to obtain clear insight into the most critical needs of Flemish teachers. All in all, the SEATS programme is a collaboration tool with connections that last far longer than the project year.

Challenges and mitigation strategies

Smart Education at Schools naturally bumps into several barriers that challenge the programme.

First, it is **a challenging task to balance the involvement of all key players from the quadruple helix**. A company that is overpowering in a project team could discourage teachers to give their honest input. A project that is too teacher-driven might not reach a proper valorisation due to a lack of business expertise. A project that focuses too much on research activities might not be able to deliver a proof of concept at the end of the project year. It is important to keep in mind that all partners involved in the process really want the same thing (impact in the classroom through qualitative edtech tools), but that each of them operates from a very specific perspective. The key is **finding a language that balances all those perspectives together**.

Next to that, it is difficult to **find the right instruments to reach societal impact**. After one year, project teams deliver a promising proof of concept that can be used immediately in schools. Scaling those proofs of concept, however, is challenging. Naturally you want government funding to go towards solutions that are available to all Flemish schools at a low cost, and quite a few project teams have achieved that. However, the dissemination of some tools is difficult without some sort of commercial activity, for example when service costs are too high. The approach for every team and every solution is very different and needs to be thought out carefully.

Conclusions and lessons learned

Over the course of eight years of running the programme, the programme team reports having learned several important lessons. Some of these lessons led to making small or big changes to the programme set-up.

The first lesson: Without **teachers,** there would be no Smart Education at Schools. They are undoubtedly the most important partner in the programme. Over the years, however, the programme team has discovered that they **need guidance and support in a few specific areas**. First, their submitted ideas often show a lack of knowledge of existing technologies and methods. That is why the programme team aims to connect them with domain experts to provide them with state-of-the-art knowledge. Next to that, teachers often do not have the necessary experience with writing and submitting project proposals. Hence, the

programme introduced a dedicated workshop to help them with the planning and writing process. Finally, teachers usually want to take up the didactic expert role within the team and not be responsible for project management. Most of the time, the project management role will be taken up by a different member of the team such as an employee of one of the partner university colleges. After all, in these short but powerful trajectories, a good project manager who keeps everyone aligned is crucial.

Second, valorisation of the project results is not an easy task, and it is something the programme team still struggles with. How do you ensure that the developed technological solution keeps existing, keeping in mind the necessary service, updates and follow-up? Looking at the programme's portfolio, the team distinguishes two main paths of valorisation: **ownership or embedding**. In the ownership scenario, (a part of) the team decides to keep the project running themselves, whether that is in a commercial entity (for example a start-up) or non-commercial organisation (for example non-profit). In the embedding scenario, the team decides to transfer the project results (and thus the Intellectual Property) to an internal or external partner who will ensure the roll-out of the solution. In the programme team's experience, the success of either of these scenarios depends heavily on the team, both their expertise and enthusiasm. At the start of Smart Education at Schools, the focus lied on societal valorisation. This meant that project results had to be spread in Flemish schools at a preferential rate and that commercialisation was not an option. Over the course of eight years, however, the programme team has noticed that not every project is scalable without a commercial business model. This led to **changes in the legal framework**. The main goal remains societal valorisation in Flanders, but commercialisation outside that target group is possible. Next to that, it has become much easier for the project teams to transfer the intellectual property at the end of the project year so that an internal or external partner is able to continue the development of the solution.

Further links

- Smart Education at Schools: www.imec.be/smarteducationatschools
- Imec: www.imec-int.com/en
- KU Leuven: https://www.kuleuven.be/english/
- itec research group: https://itec.kuleuven-kulak.be/

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