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How to accelerate the platform economy in the education sector? Three challenges and solutions

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Abstract

This policy brief focuses on the challenges of innovation and growth in the platform economy in the education sector. By the education sector, we refer to early childhood education and care, pre-primary education, basic education, secondary education, higher education and liberal adult education. We make recommendations related to innovation policy aiming to accelerate the development and growth of the platform economy in the education sector. The key themes of the recommendations are cooperation, common rules and openness. To ensure the favourable development of platform-based solutions, significant changes will be needed in the roles and operating models of private and public actors in the production of teaching content and learning tools. The challenges and recommendations are derived from the results of the Policy Rationales in the Shift to Digital Platform Economy research project funded by Business Finland.

Challenges and recommendations

Challenges

Challenge 1. Only few platforms are created in the field of education

Challenge 2. Undeveloped and incomplete data markets

Challenge 3. Little sharable digital teaching and learning goods are created

Policy recommendations

Recommendation 1. A future vision aiming for coherence should be created for the the education sector platform economy, interoperability should be developed, and investments should be made in co-development

Recommendation 2. Performance of the data market in the education sector should be improved through common rules

Recommendation 3. The sharing of digital goods and their use in teaching should be developed

Keywords: Platform economy, innovation policy, education, teaching, digital platforms
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Introduction

The platform economy challenges traditional operating models, innovation activities, and competitiveness in the field of education. Digital platforms enable individual and customised learning solutions and service models as well as resource-efficient, optimised and safe learning and learning data and teaching material use. Platform solutions can significantly reduce production and publishing costs (Qiu & Zhang, 2012). Digitalisation and platforms diversify and modify teaching methods, creating new opportunities for interaction between teachers and pupils or students. The student can progress at their own pace, the progress of learning can be supported, tailored and monitored in real time, and learning challenges can be intervened in as they arise. On digital platforms, a wide range of actors can also participate in innovating and producing the best possible solutions. Digitalisation and platforms also provide the prerequisites for realising the educational and cultural rights associated with education services defined in the Constitution of Finland. Digitalisation and platforms offer new ways to fulfil the obligation of ensuring public access to teaching and the realisation of the principle of equality, for example through open online courses. The production and scaling of language versions can be enhanced with digital platform-based solutions. In fact, education sector actors have developed a wide range of open content solutions, such as opetus.tv, freed.com, and the recently established aoe.fi. In addition, a great deal of open learning material (YouTube videos, etc.) has been developed by teachers, but these resources have not yet been scaled to extensive use.

Digitalisation and platforms bring new challenges to the production of teaching services, particularly in municipalities. The right to basic education free of charge provided for in the Constitution of Finland is a challenge for municipalities in terms of continuously developing digital education services and the increasing need for digital resources. Consequently, the digital development of learning services has been launched in broader groups of actors, including the DigiOne project led by the City of Vantaa.

The platform economy also challenges traditional publishers of learning materials by facilitating access to the field for new digital service providers, including Studeo, FourFerries, Freed and Edute, and by disrupting the traditional form and use of learning materials (textbooks and exercises) (Bailey et al., 2014; Qiu and Zhang, 2012). Despite this, learning material publishers have maintained their established position as producers and distributors of these materials. Their established position has been achieved through long-term cooperation with teachers, publishers and official teaching bodies (Tavia, 2020). Cooperation between these parties has ensured that the content is pedagogically correct and compatible with the curriculum (Sewall, 2005). Large publishers have had sufficient resources to ensure the quality and versatility of their content. The market position of teaching material publishers is difficult to challenge in the current situation, in which publishers have also rapidly developed their own digital learning services for schools and teachers.

Material and methods

This report is based on the results of the Policy Rationales in the Shift to Digital Platform Economy research project funded by Business Finland. The innovation and growth challenges for the platform economy identified in the report are based on a synthesis of a comprehensive literature analysis of over 100 research articles, books and policy reports (Aalto, Gustafsson & Lipiäinen, 2020). The challenges and recommendations identified in the field of education were derived from the results of an expert workshop on the education sector. A preliminary survey was conducted for the workshop, and a background document analysing the challenges was produced. The workshop included representatives of Finland's leading experts in the areas of platform economy, digital learning solutions and education in the private and public sectors.

Results

Challenge 1. Only few platforms are created in the field of education

Few public and commercially scalable platform-based solutions are created in the field of education. Digital platforms require a sufficient number of participators – users (students, teachers, parents, coaches, schools, municipalities), developers and producers (companies, teachers, parents, coaches and students) – to create value for the other participants and/or parties on the platform. An adequate number of participants makes involvement in the platform attractive and thus also accelerates the growth of the platform.

- **Schools, teachers, and small actors lack incentives and resources for participating in and developing open, platform-based learning solutions.** In Finland, the field of education is a socially networked community in which the members help each other and share free resources but in which there is little competition for being the best school (cf. private international schools). However, schools and teachers do not have sufficient incentives and resources for participating in the development of open platforms, production of open learning material, development and maintenance of functionality, and processing and dissemination of pedagogical innovations. On the other hand, many teachers work together with the current publishers to produce learning materials (books, digital learning materials, videos) that are behind paywalls and require identification for access. However, large publishers have no interest in promoting interaction between teachers in the development and distribution of learning materials. Consequently, while schools and teachers could play a much more central role in the creation of platform-based multi-party production models for teaching content and pedagogical solutions, their inputs will not be sufficient to make this happen.

  Current incentives and closed platform-based solutions do not promote direct and smooth cooperation between teachers in the development of teaching materials and new pedagogical solutions, or the smooth sharing and continuous improvement of learning exercises. In addition, cooperation with companies may be seen as something negative, and municipalities lack the knowledge of its legal conditions. The municipalities do not have clear knowledge of which activities are permitted by the Act on Public Procurement and Concession Contracts, the EU General Data Protection Regulation and the Data Protection Act. This is why teachers' expertise is not used optimally, nor are teachers encouraged to play an active role in developing the education sector platform economy. Small creative actors lack the resources for developing innovative learning services and the ability to attract parties (teachers, students, providers of learning materials and pedagogical solutions) to their platforms.

- **A siloed market prevents the growth of platforms.** Municipalities do not work together to develop platform-based learning solutions, and they do not have sufficient incentives for this. This results in several learning platform ecosystems that are neither scalable nor compatible with each other. On the other hand, the Finnish market is too small for some business actors, and developing a tailored national platform may not be of interest to them. The siloed nature of the market is apparent in both companies and municipalities, and no big picture of the development has emerged. Developing joint solutions is challenging as each actor concentrates on their own area; municipalities, for example, focus on solutions specific to them. Municipalities invest in development in different ways, and the challenge lies in how the limited resources should be allocated to development work. Municipal decision-makers do not know enough about the requirements and possibilities of platform-type teaching services. This leads to the development of fragmented systems with no guidance to achieve a uniform structure. Attempts have been made to link different services into 'single sign-on' solutions, but implementing the links is labour-intensive, and their commercial benefits for small actors do not materialise quickly enough. This makes developing new innovative operating models for teaching provision difficult and such development is rarely undertaken, with the exception of the DigiOne project, the Tiera Edison and Tiera Vesseli models developed by the municipalities, and the platform development project of medium-sized and large cities, including Helsinki.

  The production and sharing of teaching services on a platform are demanding (as there are no standards), and their development requires major investments. The lack of common standards, for example for authentication and log-in, hampers the development of learning solutions and interaction between platforms. Educational platforms must be pedagogically consistent, in line with each country's curriculum, objective and accurate. The development and deployment of platforms suitable for municipal services requires expertise.

- **The current legislation, funding model and data protection restrict innovation.** The regulation of education sector actors' tasks, incentives and competence is inconsistent. For example, the municipalities are obliged to provide teaching, the use of student and learning data is regulated, learning materials are subject to certain requirements, and the procurement procedure directs the use of learning solutions. In the current regulatory environment, publishers lack incentives to build open learning solutions and environments. On the other hand, schools lack incentives provided by legislation to participate in developing innovative platform-based learning and teaching services and solutions. There is no common vision of the aims and goals. The field of education lacks a shared vision and goal for developing digital platform solutions, definitions for the roles of different actors, and clear conditions for developing open and closed platform-based solutions.

  The current legislation and funding models do not encourage the development of innovative, platform-based learning solutions, and the value creation mechanisms of the platform economy (including volume, diversity, variation, complementarity and accumulation) are not developing favourably. The determination of the municipalities' tasks, the funding system and the budget of public/local government finances limit the scalability of platforms in Finland. Becoming involved in the development of education solutions is difficult as the activities are directed by so many parties (Finnish National Agency for Education/education provider/school or educational institution/teacher). Procurement and GDPR issues, on the other hand, slow down the deployment of many individual services and the development of effortless deployment. In addition, some of the platforms have been closed to third parties, or accessing them has been made difficult.

Recommendation 1. A future vision aiming for coherence should be created for the the education sector platform economy, interoperability should be developed, and investments should be made in co-development

A future vision aiming for national unity should be created for the education sector platform economy, at the core of which is promoting interoperability. Coherence and interoperability will improve the ability of all actors to deliver high-quality learning and effective teaching. In order to develop the platform economy in the field of education, current and new actors will need architecture, standards and rules to improve the interoperability of services and to develop data-based and platform-based innovations and solutions.

- **The roles, rules, and operating models of actors should be developed based on a common vision of the future.** The actors that regulate and steer the field of education should jointly formulate a desirable vision of platform economy in the field of education. These actors should also identify the old structures and roles that will be abandoned and the new responsibilities and structures that would be essential in order to build and create value through new platform-type solutions. Expertise from other sectors with more experience in digitalisation (ICT, marketing communications, audiovisual production, service design) should be tapped for this, as digital service production sets a very high standard for solutions. For example, it will be necessary to seek an understanding of ways of mobilising data, of the ethical principles of digital solutions, and of the development of innovative procurement models. Innovation policy must support a new perspective in which policy measures targeting companies, municipalities and development projects in the field of education aim to address the challenges related to the growth threshold of platforms.
- **Broader cooperation in the development of platform-based learning solutions should be introduced.** Co-creation is important, and coherence in the municipal field will enable rapid scaling. Developing platform-based learning solutions is long-term work that should be carried out through experimentation and iteration. Finding suitable scalable targets for development is important. The platforms must be compatible with the products and services of actors of different sizes. The activities could be facilitated by national models, such as login templates. The threshold for participation could be lowered by such means as co-creation or selecting a neutral actor to implement the platform. Effective incentives and financing and business models that benefit both private and public actors are a prerequisite for co-creation. The projects should have a sufficiently long term, and they should take national interests into account.

Challenge 2. Undeveloped and incomplete data markets

No well-functioning data market has emerged in the field of education. No operating models have been found in which the public and private sectors would exploit the full potential of data in eduction. This is partly explained by a skills gap but also by legislative challenges. A well-functioning data market would be particularly important for data accumulation. To create smart learning solutions, innovators need enough data derived from multiple sources.

- **The rules for data utilization are inadequate for the production and use of learning services.** The lack and ambiguity of standards and rules lead to data silos of different parties. For example, the Ministry of Education and Culture and the Finnish National Agency for Education have been wary of changing existing rules or creating new common rules, such as requirements for common information models and interfaces. To develop platform-type teaching solutions, rules that would increase the potential for using data would be needed, such as rules on 1) what data could potentially be used for, 2) what kind of teaching data could be shared and what would be privately owned, 3) who is the owner of the data, 4) who has the right to use the data, and 5) who supervises the sharing of the data. For example: if a user profile is created for a student, who owns the data, with whom may it be shared, and can anonymised data be shared freely or is a permission required?

  Additionally, there is no clear division between data concerning students, learning, teaching and learning materials. The use of student data is governed by privacy and data protection regulation, for example. Similarly to health data, learning data is also sensitive. From the perspective of the public sector, sharing them involves risks for the data provider (protection of the individual). On the other hand, learning data can provide indications of competence levels, suitable learning methods and objects of interest. Teaching data are managed by both the private and the public sector. The private sector sees teaching data as a factor of its competitiveness. The data are closely linked to the learning solution offered by an actor, which means that actors are not willing to share them. While similar restrictions do not apply to learning materials, no effective business models or services have emerged for the reuse of learning materials. For example, teaching data related to a specific course may include behavioural data as well as information on solutions that do or do not work, and optimisation of the level of difficulty. Similarly, data concerning teachers can be used to promote teacher development, and teaching portfolio data can be used for the planning and management of teaching. The quality of data and its regulation is also an important factor. For example, teaching content must be linked to the curriculum, be up to date and be objective. The rules for combining different data are also inadequate. For example, can learning data be combined with other behavioural data? Data protection and information security practices need to be clarified.

- **Unwillingness to share data and be open.** The data in the education sector have become siloed and do not move between different services. As regards the public sector, data sharing is hindered by concerns about information security and data protection, the fear of private actors, avoiding dependency on suppliers, and regulation/legislation. In addition, no centralised data repository exists in this sector resembling the Kanta repository of the health care services. While legislation has rightly been passed on the use of data, rather than owning an individual's data, the authorities only manage it reliably. Publishers, in particular, are at an advantage in managing learning material data because of their copyrights, even if the materials were acquired using public funds. Other business actors, including Google and Microsoft, have a competitive advantage based on retaining part of the data for themselves. Innovators do not have the same access to student, teacher and material data as established actors.

Recommendation 2. Performance of the data market in the education sector should be improved through common rules

- **A common data roadmap for the field of education and rules for the use of data should be created.** At national level, a joint plan for sharing and using data, including standards and good practises, should be created for public and private actors in Finland. The data roadmap will clarify the development stages of defining the data and information sharing architecture, including rules for sharing data concerning students, learning material and teaching, and the roles related to maintaining the data and information architecture. The rules must take a stand on who owns the data, who has access to them and who monitors the sharing of data. The data needs of start-ups should also be taken into account when creating rules. Platform-type solutions, including Udemy, Coursera, opetus.tv, aoe.fi and Freed, make it possible for anyone to produce and distribute learning materials for the use of others. The roadmap should support the finding of an overall solution for developing the data market in the education sector, rather than only different parts of the chain (data concerning students, learning, teaching and learning materials). This development could be supported by educational data brokers, whose role should be clarified: for example, the practices for sharing data in the Koski data reserve or the Wilma system with those creating complementary systems. Finding overall solutions can also be promoted by modifying the conditions of funding systems (e.g. joint applications by several municipalities).

- **Responsibility for managing learning data should be assigned to the individual, and a minimum level of learning data to be shared should be determined.** Learning data describes the fundamental characteristics of a person and their learning path. Everyone should be allowed to decide how their learning data are managed and shared. However, in order to clarify the rules of sharing data, a framework based on common rules should be defined. It is best to avoid ecosystem structures in which all learning data must be shared by default when using the service, or in which the learning data are always linked to an individual/identity. This framework should be jointly built by producers of learning solutions (both large companies and start-ups), municipalities and the Finnish National Agency for Education. If the data were generated in a directly usable format, a more comprehensive view could be obtained of the student and their entire learning path (how they learn best, their use of digital content). The data could, for example, be used to develop curricula and better algorithms related to learning technology, and to identify early indicators for learning difficulties. Google already possesses a more comprehensive picture of Finnish adolescents than Finnish learning solution providers. To create smart learning solutions, innovators need enough users and data and the possibility of combining data from different sources. Experience gained from MyData pilots can be used to manage learning data and pedagogical data. By combining learning data with data concerning hobbies, mobility and health, increasingly targeted and useful services could be offered. When developing smart learning solutions, the individual's responsibility for managing learning data should be addressed. Data ownership, data analytics and the use of artificial intelligence in learning involve continuous setting of ethical boundary conditions – particularly when the data concerns minors.

Challenge 3. Little sharable digital teaching and learning goods are created

Public actors in the education sector and the current market do not generate sufficiently open or shared digital goods. Digital learning and teaching goods include learning materials (videos, electronic books, podcasts, websites), pedagogical tools, online courses, educational solutions, data interfaces for teaching services and solutions, search engine interfaces, personal data, and digital tools related to the planning, organisation and development of learning and teaching. These goods may also be open (so-called public goods), which means that they can be easily transmitted, duplicated and reused.

- **The current market and incentives do not work.** The field of education is exceptional in the sense that goods are available both for open use and for restricted use (behind a paywall and requiring strong identification). The best pedagogical solutions are not shared or used sufficiently, or they are behind paywalls. There is no well-functioning market for shared digital goods, and they cannot be easily integrated. Municipalities comply with their statutory obligations, which lack incentives to produce, use and maintain open and distributable digital goods. Sharing digital goods can promote the realisation of educational and cultural rights and the principle of equality. Up-to-date skills and knowledge are strongly linked to the well-being and competitiveness of the economy and society.

- **Lack of guidance and national platform-type solutions.** There are no commonly defined standards or rules in place for learning solutions to guide the development of sharable digital goods. The concentration of existing solutions at the municipal level instead of the national level is a challenge to coordination and results in incomplete or closed platforms to which it is difficult to import digital goods. On the other hand, providing access to individual systems through interfaces also increases the number of integrations needed without necessarily helping to make the services more accessible. There is no centralised solution, however, that would gather data to a single depository for the use of several education sector actors. Consequently, data and materials are not accumulated as goods that are equally accessible to everyone. In addition, development funding is strongly project-based, which means that there is no continuity in the creation and maintenance of platform-type solutions.

Recommendation 3. The sharing of digital goods and their use in teaching should be developed

- **Preconditions should be created for sharing and integrating digital goods.** It is particularly important for the Finnish National Agency for Education and the Ministry of Education and Culture to clarify the types of digital learning goods and the conditions for producing them. Goods can, for example, be classified into closed and open transaction-based goods, co-developed (crowd-sourced) and openly developed goods (such as Wikipedia, in which the knowledge base can be enriched) and open source commodities, where parallel versions can be made and further developed (forking).

  The prerequisites for sharing and integrating digital goods in the education sector should be promoted by developing digital infrastructure through jointly agreed data models and pilot experiments with Mydata models. The data models should be uniform, even if the digital learning goods built on them differ from each other and are thus competitive. Learning services should be understood as part of ecosystem service chains, which are easy to integrate into. To assist developers, documentation should be created that includes information on joint assessment, pedagogical and other practices. Similarly, the actors' incentives and earnings models should be taken into account in such activities as the production of semi-open commodities (cf. applications in application stores) or open commodities (cf. royalty payments for content producers) and in the development of business models.

- **Incentives for openness and sharing should be provided in the development of digital goods.** Innovation policy should focus on creating open and shared digital goods for those areas of the education sector where they are not created naturally or adequately. Innovation policy should also promote the creation and development of open learning solution platforms, where actors could participate with a low threshold, for example by producing and sharing learning materials and pedagogical methods. In this case, quality assurance mechanisms for the learning material (crowdsourced quality assurance or quality assurance actors) and efficient targeting of the learning material should also be addressed. However, this does not mean that all learning solutions and learning materials should be open public goods or shared digital assets. Business actors should be allowed to innovatively integrate sharable and non-sharable (proprietary) digital goods in their solutions. Businesses' incentives for sharing their digital goods should be developed, for example through suitable business models.

  Open digital goods in the field of education could also include smart and consent-based networking channels, in which actors could find the information or development partners they need for their solutions. As necessary, many types of data concerning individuals (the perspective of learning) and teachers (perspective of teaching) could be collected in the education sector in a solution similar to the Kanta services and made available to innovators. Innovation policy should primarily support the accumulation of data and sharing of pedagogical solutions. For example, platforms targeted at teachers can generate significant forward leaps in pedagogical solutions. Consequently, the conditions of public funding could include transparency requirements and sharing obligations. The terms of use should also be defined to support the emergence of a healthy market and to reward such actors as teachers for producing open and shareable goods.

- **The use of teaching resources should be optimised by means of platform-type solutions.** Digitalisation will enable more efficient management of the resources used in teaching when an intelligent algorithm helps match the resources and needs. Different actors' ability to create digital goods and their unwillingness to share them with others are a significant obstacle to the overall optimisation of resource efficiency. Efficient management of resources is not only a cost issue but also related to learner mobility, teacher development and a more agile offer of teaching. A precondition of intelligent resource management is that facilities, materials, equipment, personnel and other resources are identified and coded in the systems in a machine-readable format. The capabilities created by the resources must also be identified in order to match them to an identified need. The technical prerequisite for full optimisation is the sharing and matching of resource data according to the agreed specifications. Digitalisation extends intelligent resource management beyond the school environment. In addition to distance learning, methods for evaluating content and solutions based on crowdsourcing can be a faster and more comprehensive way of operating than the traditional evaluation model.

Conclusions

The platform economy challenges the current operating models and roles within the education sector. In this report, we present three policy recommendations that can contribute to the favourable development of the platform economy in the education sector through innovation policy, while supporting the principles of equality and fairness in education and industrial policy. Our recommendations aim to meet the challenges of the platform economy in the field of education from the viewpoints of the growth threshold of platforms, data markets and digital commodities. The key themes of the recommendations are cooperation, common rules and openness.

Finland's innovation policy should tackle the challenges and grasp the opportunities of the platform economy with increasing determination and precision. Innovation policy measures should, in particular, focus on measures that promote open commodities and innovation which seeks to establish rules for public and private actors. A precondition for the favourable development of platform-based solutions in the field of education is significant change to the models of producing (1) existing learning materials, (2) pedagogical solutions, (3) learning and (4) teaching. The Finnish government should reassess the role of private and public actors in these four areas and strive to develop their regulation. The regulation should promote co-developed and open platform-type solutions, the development of sharable digital goods in the education sector, and conditions for competition that would support data-based and platform-based innovations. Predictability is important in the implementation of policy measures. It should also be ensured that all education providers have the capabilities for digitally assisted operation and delivering pedagogy in which digitalisation is appropriate regarding the objectives of learning.

A more in-depth examination of these topics would require broad-based discussions with education sector actors. The topics covered in such discussions should include identifying which digital goods are subject to competition and which are open, and how they should be managed. Additional research is also needed to understand the potential uses and benefits of data in the education sector. The prerequisites for promoting the platform economy in the education sector are consistent policy planning and close cooperation between innovation policy funders, the Ministry of Education and Culture, the Finnish National Agency for Education and the Ministry of Economic Affairs and Employment aiming to implement the recommendations. In addition, the funding providers for innovation policy and the Ministry of Education and Culture should work together to promote the standardisation and regulation of the platform and data economy in the education sector actively and ambitiously, ensuring that the development work results in lasting improvements in learning and teaching.

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