



EDUPRENEURS

*Networking and empowering education entrepreneurs
towards a resilient EdTech ecosystem in Southern Africa.*

RECOMMENDATION PAPER

APRIL 2022

Funded by:



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SAIS recommendation paper

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1. The rationale for this recommendation paper

1.1 Foreword



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The world is changing rapidly; globalisation, digitalisation, industry 4.0, disruptive innovations, pandemics and other current phenomena affect all industry sectors creating pressure to change old established practices (Frey 2016). Due to the change, the importance of reactivity, proactivity, flexibility and agile adaptation has grown, not only at individual and organisational (i.e. education institutions, industries, NGOs (etc.) level, but also at the whole society level. New kinds of practices and tools supporting individuals, organisations and the whole society are needed, so these players can cope with the constant change and new challenges.

Although education cannot overcome all challenges, solve all problems, or replace other social development activities, when used properly, education can play a significant role in effecting change and making societal changes sustainable.

However, it must be understood that education does not solve any problems automatically (Bowman 2017; Groeger 2021). Education must be developed based on the needs of society.

From an international perspective, the overall investment in students is highly correlated with the quality of education, especially for countries that still have a low spending level. For instance, up to a level of US\$8 000, each additional US\$1 000 per student is associated with 14 points more in the results of PISA (Programme for International Student Assessment) (Vegas & Coffin, 2015). Recent international studies have shown that pupils from areas with fewer financial resources benefit the most from educational budgets (Jackson, Johnson & Persico, 2016; Hyman, 2017; Lafortune, Rothstein & Schanzenbach, 2018).

Recently, the education sector has been one of the most affected amid the Covid-19 pandemic, with over five million students in the Southern Africa region experiencing significant interruptions to their learning routines. Social distancing measures posed new demands for rethinking the school system, such as increasing the role of online pedagogical tools and the capacity of school staff to use digital solutions. Therefore, education leaders need to integrate education technology (EdTech) solutions to react to the urgent needs of teachers and learners.

However, to make remote education accessible to all learners, three main challenges need to be tackled across Southern African countries:

1. Lack of (digital) infrastructure: It is well known that schools and families still have limited access to good internet connectivity, as well as the needed hardware (computers, laptops, tablets, etc.) and software (Learning Management Systems, Education Resources Management, etc.) to enjoy the benefits of a high-quality remote education.

2. Isolated initiatives and solutions (weak business network): Although there are a few relevant start-up initiatives aiming to provide the needed infrastructure for remote education across the Southern African countries, these projects are isolated and/or provide solutions that do not communicate with each other consistently. Such a lack of connection between these initiatives decreases the potential of scaling up and sharing success cases at a national/regional level.

3. Insufficient personnel with digital competences for education and business: Teachers, managers, and entrepreneurs are struggling to integrate digital tools into their current work processes. Teachers do not know how to apply their pedagogical expertise to available digital solutions, while managers do not know how to take advantage of automatising, integrating, collecting, and processing data virtually. Besides the school context, many entrepreneurs do not have the relevant digital literacy and professional agency to develop digital market(ing) activities and to engage in data-driven decision making.

To tackle these problems, the project *Edupreneurs: Networking and Empowering Education Entrepreneurs Towards a Resilient EdTech Ecosystem in Southern Africa* aimed to develop a digital business ecosystem in Southern Africa able to leverage the EdTech infrastructure and education software development in the region. We believe that such an ecosystem will ultimately transform and improve the efficiency of education processes, supporting decision makers to achieve reliable, up-to-date data from different phases and parties (see e.g. Lagstedt et.al. 2020, Kauppinen et.al. 2020).

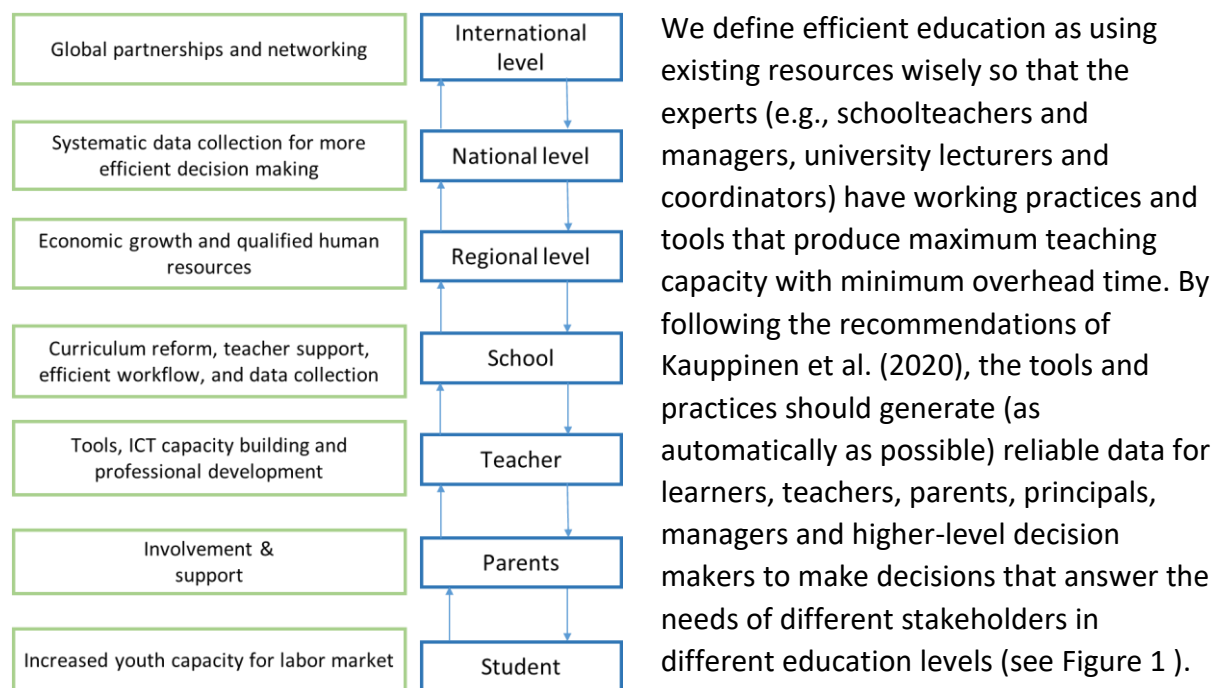


Figure 1. Different education levels

Making education efficient has clear connections to the needs of society, and if optimally organised, educational institutions are in continuous dialogue with other parts of society. Efficient education is not static, but constantly changing, agilely adapting to changes in society, and at the same time resilient and able to cope with exceptional situations.

As in other industries, in education, digitalisation and digital transformation is a good tool to improve efficiency (Frey et al. 2016). Thus, education digitalisation, as well as creating an ecosystem to support it, is essential for societies developing their education. For that, governments must play an active role as catalysts to ensure all necessary parties are committed and help solve the problems of the education digitalisation ecosystem.

1.2 Positioning the paper

This paper aims to share the lessons learned from the project *Edupreneurs: Networking and Empowering Education Entrepreneurs Towards a Resilient EdTech Ecosystem in Southern Africa*, funded by the Southern Africa Innovation Support (SAIS 2) programme. The project aimed to build a robust and resilient education business ecosystem with a bottom-up approach and a broad-reaching strategic partnership network sufficiently competent to deal with possible emerging adversities.

For that purpose, the project engaged on three fronts (objectives) of systematic and groundwork development:

1. Building a digital platform for strategic partnerships to provide a virtual, 24/7 hub for business to business (B2B) and business to customer (B2C) networking, marketing, and content creation in the education and EdTech fields across the whole Southern Africa.
2. Providing capacity building to education stakeholders in order to ensure business sustainability and to maximise the impact of digitising education and business processes.
3. Compiling recommendations for knowledge transfer in order to share best practices and lessons learned about building resilient business ecosystems.

The powerful interplay between practical experience and knowledge creation realised through this recommendation paper (third objective) is a strong innovative factor that is aimed at creating transferability of our results to other business ecosystems beyond the Southern Africa region and even beyond the education field. This paper was written by many hands from different parts of the Southern Africa Development Community (SADC) and Finland, representing the participatory design implemented throughout the whole project, in which all stakeholders collectively tailored our deliverables.

1.3 How to use this recommendation paper / disclaimer

We recommend that this recommendation paper is used only as a baseline, and that the ideas and recommendations herein are discussed case specifically. All recommendations are not applicable in all cases. Following this recommendation paper (or any other) does not relieve any organisation of the obligation to think about what they are, and what they ought to be doing. Hopefully, this recommendation paper offers some food for thought in the areas that are not so familiar for all parties.

As a rather short baseline document, this recommendation paper does not cover all details and aspects of the specific cases. A thick, all-encompassing manual book was considered impractical, and in this constantly changing world, would soon be outdated. The idea is for this document to offer

general guidelines, and case specific details which will be discussed on a case by case basis with relevant experts and organisations.

1.4 Feedback

Because the world is always changing, we expect ecosystem-building ideas and practices to evolve as well. We'd like to hear about your experiences related to ecosystems, and whether this paper has aided (or hindered) ecosystem development. We welcome all feedback: success stories, challenges, failures, improvement ideas or further questions. We are interested in feedback from all different points of view and from actor levels: society, government, academia, industry, institutional /company, and individual level feedback are all welcome.

If you, or your organisation, has comments or questions, please send them directly to:

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2. Executive Summary

Education Technology (EdTech) ecosystem is a mean needed for a sustainable education digital transformation. In the process of building a business ecosystem towards education digital transformation, it is important to understand the whole picture, the key players, how they cooperate and what kind of results we should expect, and demand. In this recommendation paper, we discuss the role of four main players: government, academia, entrepreneurs (industry), and schools.

In general, the functioning of the education digitalisation ecosystem must be understood: what is the keystone organisation's role and how activities, responsibilities and values should be shared in cooperation. Emphasis should be placed on changed management and motivation building. Representatives of government and research institutes (academia) are in new situations as well. It is not automatically certain that government representatives (e.g., suitable ministries) know how to support and facilitate building of the education digitalisation ecosystem, especially if there hasn't been one before, and the same applies to academia. All stakeholders must be considered and engaged, and here, in addition to schools, government, academia and industry are the key players. All of them must contribute with their own roles. Building an ecosystem is like assembling a puzzle, all the pieces are needed to get the whole picture.

For that, we propose the education digitalisation capacity building spiral, which should start in schools where more digital competencies (and pedagogies supporting digitalisation) are needed. This should be done in close cooperation with companies, which in turn need to learn more about ecosystems, and especially about education and its processes, so they can develop user-centred products and solution-oriented processes. Governments should learn how to support and encourage different players to be active in education digitalisation. Academia should also be involved in education digitalisation to find out ways to educate and execute research in the most beneficial way for the learners. Last, but not least, the new ideas of the education digitalisation ecosystem should be presented to NGOs and venture capitalists, and together find out how they can support the building of the business ecosystem.

Project deliverable 1: Launching a digital platform for strategic partnership

Results: The digital platform was launched in June 2021 and can be accessed through the link <https://edupreneurs.ahaa.glowdom.com/#/>. It has so far attracted and networked 64 education institutions, 43 companies in the education business, and nine civil organisations from SADC. We have surpassed our original goal of engaging 100+ players in the education and EdTech sectors. The platform allows not only networking B2B and B2C partners, but also decision-making in the education sector.

Recommendations: The platform needs the support from government agencies across SADC to attract and engage a broader range of stakeholders.

Project deliverable 2: Offering capacity building for education business innovation and digital competences

Results: We have provided high-quality online lectures and workshops in building business ecosystems, applying for funding, identifying business opportunities and in implementing flipped classroom for about 100 teachers, education managers, and Edupreneurs in the SADC region.

Recommendations: Governments could mobilise a "ready-to-go" team to provide support for such capacity-building activities in the future, so the events get more relevance and higher participation rates. In addition, workshops need to be designed and implemented with more engaging activities, so participants actively take part on the discussions online, resulting in a stronger sense of learning, knowledge transferability and application.

3. Introduction

COVID-19 has changed and affected the things that are happening in the global economy. The COVID-19 pandemic is first and foremost a health catastrophe. Numerous nations have decided to close schools, colleges and universities. The crisis created a dilemma for policymakers, who had to decide whether to close schools or keep them open (Simon Burgess, Hans Henrik Sievertsen, 2020). Bringing the latest thinking and cutting-edge research from across our global network, this recommendation paper brings the most pressing business issues to life and describes how leaders can rethink and reinvent their education businesses to succeed and be part of the solution. The challenges covered include digital disruption, diversity and inclusion, workforce and skills – all in the education context of the post-COVID-19 world. In response to significant demand, many online learning platforms offer free access to their services, including platforms like BYJU’S, a Bangalore-based educational technology and online tutoring firm founded in 2011, which is now the world’s most highly valued EdTech company (Cathy Li ,Farah Lalani 2020). To meet the challenges posed by the pandemic, businesses around the world had to react in agile and decisive ways. As we move into the next phase, now is the time for businesses to seek out and seize the opportunities emerging during the recovery. This includes business operations, education and social life. This is also true for other industries. This not only challenges us to look for new ways of operating businesses but also to find new or improved ways of interacting. Not only in Namibia but also at the SADC level. This new way of things means that the innovation ecosystem has changed too. For example, in the education sector, there is a tremendous change in how education is delivered, the needs of the school have changed, and stakeholders - that is government, private sector Edupreneurs, academia and civil societies - are finding new ways to interact with each other. This is exactly why this document was developed.

In the process of building a business ecosystem towards education digital transformation, it is important to understand the whole picture, the key parties and players, how they cooperate and what kind of results we should expect and demand (Frey 2016). In addition, it is important to keep in mind that, as Dee (2020) pointed out, new innovative ways of education digitalisation are not automatically supported. According to him, during the Covid-19 pandemic, venture capitalists have been more interested to invest in later-stage solutions of relative mature companies rather than new, more innovative (and risky) solutions (Dee 2020). From an investor point of view, this brings more security for the investment, but from an education digitalisation point of view, it limits the innovation potential of a business ecosystem.

3.1 The ultimate target: education digital transformation

Digitalisation is a popular buzz-word at the moment, and is used carelessly with various meanings. What it means in this case can be defined with two other terms: business process digitisation and digital transformation; business process digitalisation is between them (Figure 2). To put it simply, in business process digitisation, the intention is to replace paper-based work with information system-based work, without making any big changes to the business process itself. In business process digitalisation, in addition to the information system development, the business process is also developed/re-engineered, so the solution is more than just automating an old process. Digital transformation (in this case) is a higher-level term meaning that the whole business area (or company) is being redesigned, meaning that some processes can be changed, some dropped and some created new. If we use Venkatraman's (1994) classification, we can say that business digitisation is an evolutionary level change, while business process digitalisation and digital transformation are revolutionary level changes.

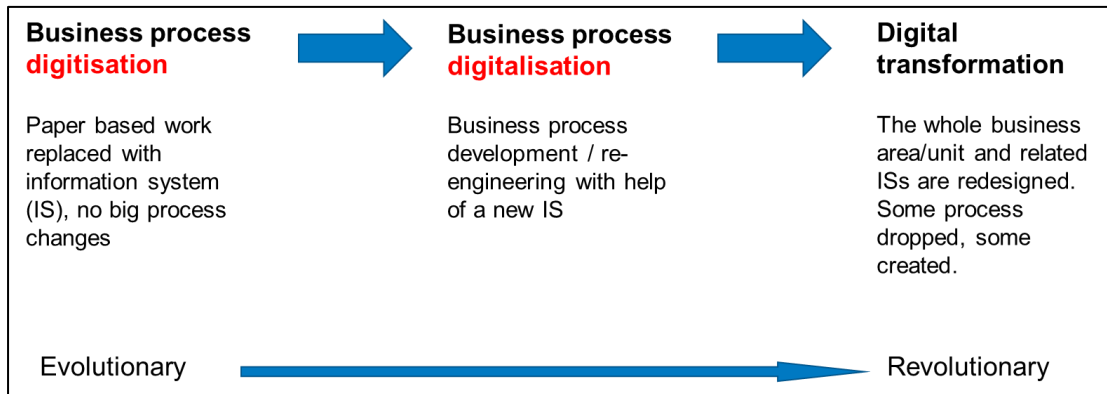


Figure 2. The related concepts

Before an ecosystem that supports educational digital transformation is built, it is important to understand the objectives of digitalisation of education. Building an education digitalisation supporting ecosystem has no value itself, but the ultimate objective must always be the improvement of education quality.

3.2 What are ecosystems?

An education ecosystem is a mean needed for a sustainable education digital transformation. Therefore, it is important to understand what ecosystems are and how they work. Moreover, how we can support their work.

First, it is important to understand the terms “old economy” and “new economy”. *Old economy* refers to traditional manufacturing industries (Rinkinen and Harmaakorpi 2018), where the relationships between companies are rather static and the roles of companies do not change much. In the *old economy*, a company has a certain role and position (for example a subcontractor with a certain market share and an established customer base), and it is very likely that the situation will remain the same for years to come.

This is not the case in the *new economy*. In the *new economy*, there are no static structures or centralised hierarchies; roles of companies may change case by case, today's competitors can be tomorrow's co-operators, and vice versa. In the *new economy* constant change and disruptive innovations are the norm, and it is impossible to predict what the situation is a year or two ahead. To cope with rapidly changing situations, organisations rely on networking and agile business models (see e.g. Rinkinen and Harmaakorpi 2018).

Related to the old and new economy, there are two models, *clusters* and *ecosystems*, to define the cooperation between companies. *Clusters* are relatively static structures with clear subcontracts and supply chains, scoping (locally) to certain industries and related businesses (Figure 3). Since the situation is rather static, the companies in the clusters can have highly specialised (but narrow) knowledge: they can concentrate on their strategic objectives and outsource all strategically unimportant activities. In the old economy, clusters could be preferred, and their formation can be supported, since the situation is rather static. (Rinkinen and Harmaakorpi 2018)

In the new economy there is no room for static subcontracting structures, or unchanged supply chains. As mentioned, in a new economy, the same organisations can be competitors one day and cooperate the next day. This kind of network of organisations with changing roles is called *ecosystems* (Figure 3).

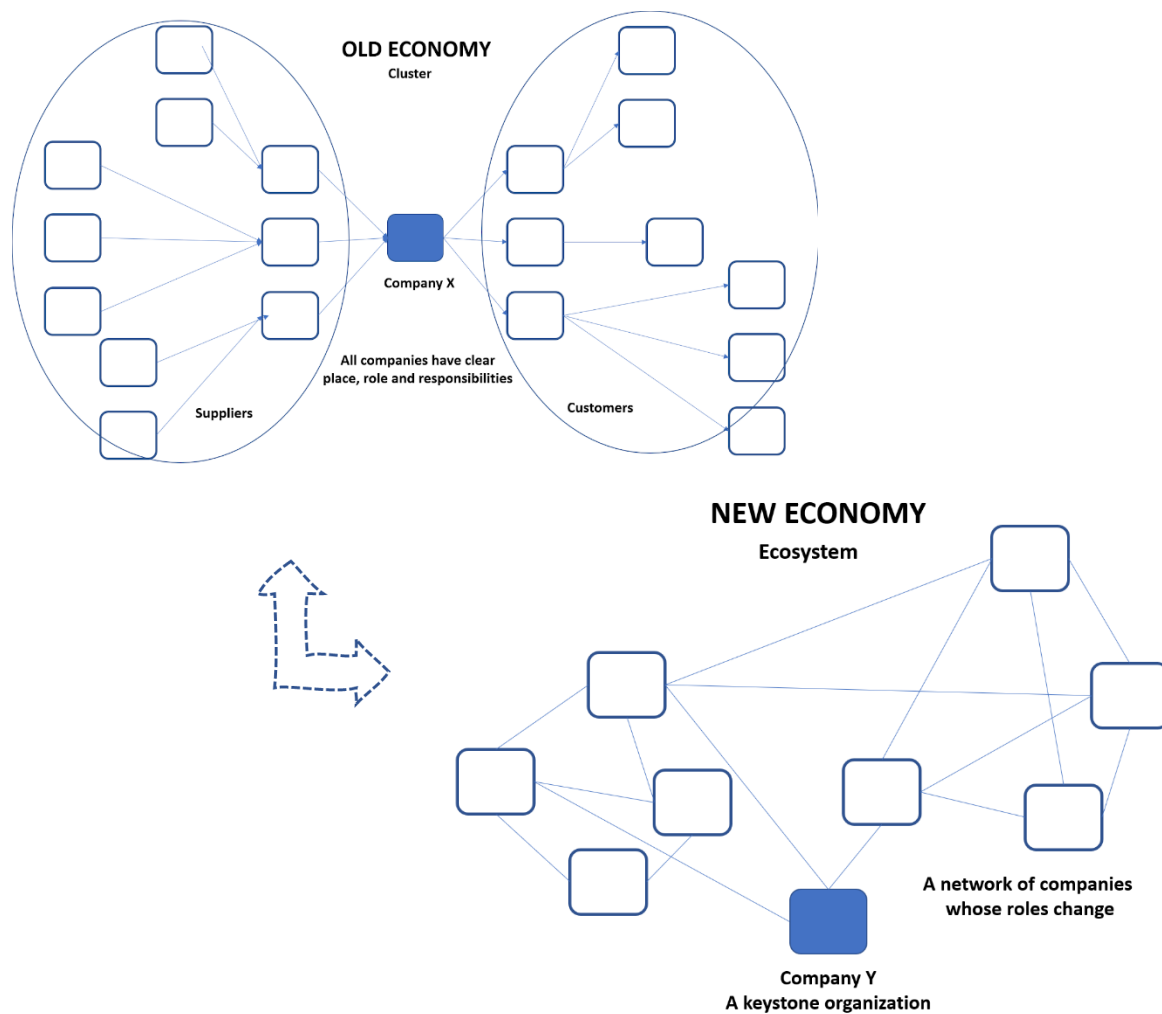


Figure 3. Old and new economy, clusters and ecosystems

In order to be functional, an ecosystem must have some kind of control. Rather often, the role of a leading organisation, or a keystone organisation, is emphasised (Iansiti and Levien 2004; Rinkinen and Harmaakorpi 2018). The idea is that in an *ecosystem*, one dominant organisation is orchestrating the innovation, cooperation, and offerings of the ecosystem. For that, there should be tools and a platform for other members of the ecosystem to utilise when innovating and finding suitable cooperation for specific cases (Rinkinen and Harmaakorpi 2018). Keystone organisations get remarkable advantages from the ecosystem, but there are high requirements for a keystone organisation as well: they must be able to create value efficiently within the ecosystem - for themselves, but for other ecosystem members too (Iansiti and Levien 2004). One way for a keystone organisation to produce value for an ecosystem is to provide the tools and the platform for other members. The value a keystone organisation creates must be crucial for others (Iansiti and Levien 2004). The keystone organisations should also share a vision of future and common goals for all members of the ecosystem to invest in (Rinkinen and Harmaakorpi 2018). One important objective for the ecosystem is that the firms involved invest in a shared future. Common goals bind the ecosystem members together, and the keystone organisation is orchestrating that. However, as ecosystems are constantly changing networks, it is important to understand that there might be conflicts of interest between different members, but also inside companies as well: company success and ecosystem success are not automatically the same thing in all situations (Rinkinen and Harmaakorpi 2018).

As a part of ecosystems' constantly changing nature, ecosystems are not eternal. Companies and their business models, entrepreneurship mindsets, as well as how they see the ecosystem may change, new

companies emerge, old companies disappear, and the whole business domain may change or perish. So, it is also important that ecosystems are flexible and agilely able to address new business domains as well (Rinkinen and Harmaakorpi 2018).

To support the changing situation of ecosystems, Talmar et. al (Talmar et al. 2020) developed an Ecosystem Pie Model. The main elements of the Ecosystem Pie Model are: 1) the resources each company has, 2) the activities that are needed for a business case, 3) the values that each company adds for the case, and 4) the value that each company gets from the case. With these four, it is possible to evaluate who should be involved for a specific case, what kind of value they produce and what is their share of benefits. The aim is to find an optimal combination of actors where all members receive enough value, and the risks are minimised (Talmar et al. 2020). Tools, such as the Ecosystem Pie Model, are important assets for an ecosystem to produce competitive solutions and to get to know each other better. This will be discussed more in Chapter 6.3 where capacity building of entrepreneurs is discussed.

3.3 The main parties and background

When a new education digitalisation ecosystem is built, it is important to understand who the main actors are and what their role is. According to Etzkowitz and Leydesdorff (2000), at a society level, there are three main players, each with an important role: government, academia and industry (see Figure 4)

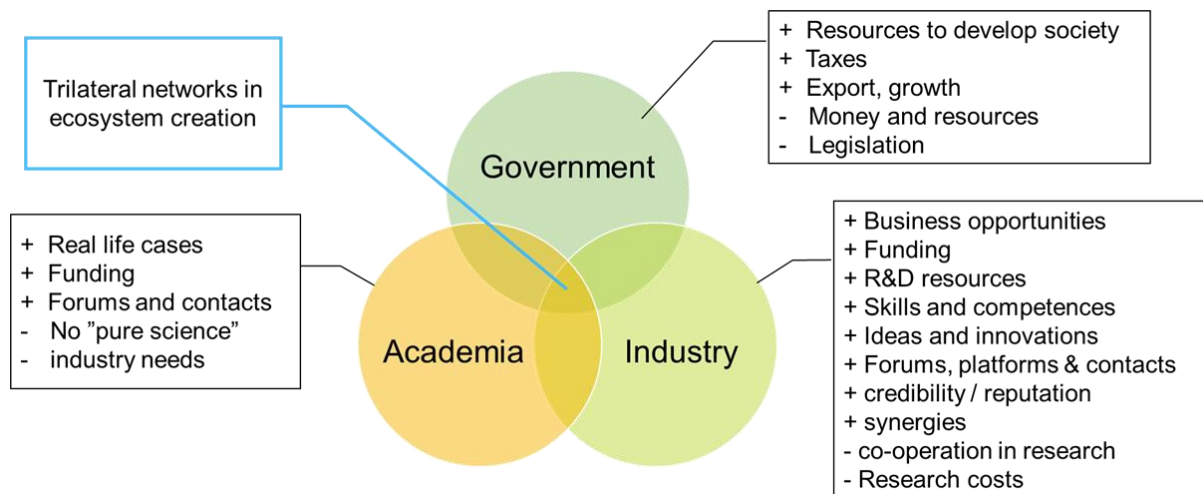


Figure 4. The Triple Helix Model, adaptation from (Etzkowitz and Leydesdorff 2000)

As shown in Figure 4, all these parties benefit from cooperation although they also must give up something. However, the achievable benefits far outweigh the disadvantages. This kind of cooperation does not happen automatically, but each party must actively support and pursue it. Organisations, such as SAIS, supporting different levels of cooperation (between these different parties, as well as between different nations) play a remarkable role here. However, organisations such as SAIS can only be catalysts; they cannot do anything on behalf of government, academia, or industry. Therefore, there is a need for constant cooperation between parties. All parties have an important role to play in ecosystem building. There must be regulations, rules and recommendations, there must be research and training, there must be innovation and entrepreneurship, and all that must be done in cooperation. One concretisation here is the position paper developed by the Edupreneurs project, but more important than that are the functioning processes inside and between the parties.

In addition to the parties presented by Etzkowitz and Leydesdorff (2000), in this case it is important to mention schools, venture capitals and NGOs. Schools, although they are under government guidance and control, play a central role in education digitalisation and should be seen as independent actors to some extent. Schools have big potential, and if everything goes well, they could be community change agents (Leite 2020). However, if teachers do not have enough knowledge about technology, pedagogy, and teaching content, they are not able to utilise the education digitalisation, no matter how good the solutions on offer (Mishra and Koehler 2006). In addition, if principals and headmasters do not see digitalisation as beneficial, nothing will happen. There are also obstacles beyond schools' reach, such as infrastructure challenges that may prevent digitalisation in schools regardless of what the level of readiness or motivation for change would otherwise be.

As Dee (2020) pointed out, financing is important in education digitalisation, and venture capital has an essential role here. According to Dee (2020), it seems that new innovative ways of education digitalisation are not automatically supported. Because of this, government as a policy maker and schools as customers should take an active role and require new, more comprehensive approaches utilised in education digitalisation (see e.g. Kauppinen and Lagstedt 2021). If there is demand, there will also be supply.

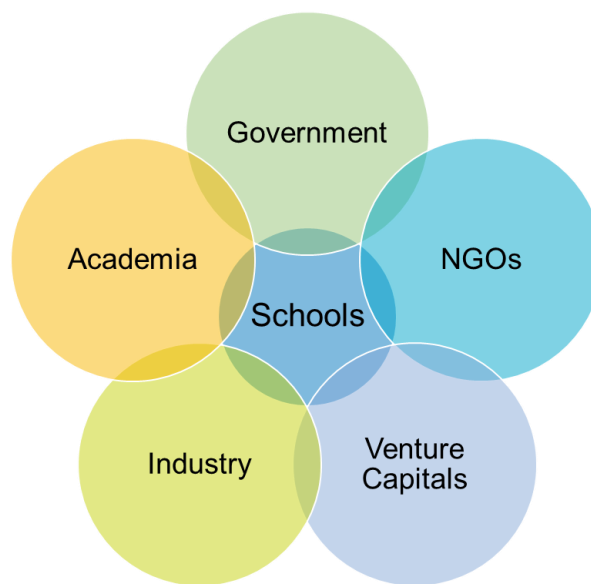


Figure 5. The parties of EdTech ecosystem

Traditionally, NGOs have played a significant role in promoting change in development, and in education digitalisation. They can act as remarkable initiators for new practices. So, it is essential to encourage NGOs to start ground-breaking education digitalisation projects. The results of that kind of pilot project can be evaluated inside the education digitalisation ecosystem and good practices can be disseminated to other schools and countries. These kinds of ground-breaking projects should be conducted together with governments, but also with the members of the education digitalisation ecosystem.

As ecosystem building has elements of research and for-profit business, it is important to understand each member's role and how they can be aligned together. Harmaakorpi and Rinkinen (2020) have classified knowledge, innovation and business ecosystem and their communication, as presented in Figure 5. According to them, knowledge ecosystems are more explorative, emphasising the long-term

benefits of cooperation, while on the other end of the continuum business ecosystems are more exploitative, focusing more on present or short-term activities. They claim that exploration and exploitation are not exclusive features, and the presented ecosystems should be seen as a continuum where the amount of exploration and exploitation carry a different balance in each ecosystem (Harmaakorpi and Rinkinen 2020). Rather naturally, academia is more interested and should be responsible for knowledge ecosystems on one tip of the continuum, while companies concentrate on business ecosystems on the other tip of the continuum. The innovation ecosystems comprehending schools, NGOs and venture capitalists, are an essential link between them and require continuous dialogue and cooperation for all parties to exist.

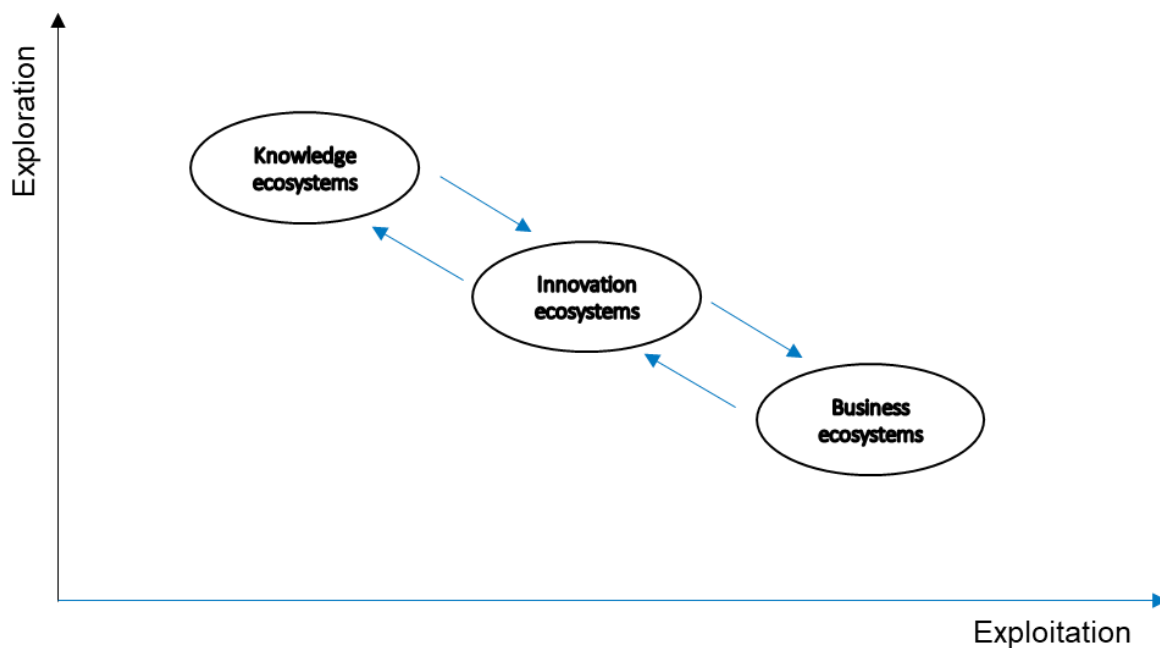


Figure 5. Classification of knowledge, innovation and business ecosystems along exploration–exploitation (Harmaakorpi and Rinkinen 2020)

3.4 Capacity building: all parties involved must learn

Since the education digitalisation ecosystem is a new concept and parties involved do not have earlier experience in building an ecosystem of this kind, the ecosystem needs to increase the capacity of all parties. In short, what we mean by capacity building here is to ensure different parties and players know how to do things right and, more importantly, to do the right things. Since the education digitalisation ecosystem is not yet working properly in SADC countries (and rarely elsewhere either), there is a wide range of needs for capacity building.

It is important to evaluate what kind of capacities different parties already have and what they should learn. Different parties have different kinds of needs to build their digital capacity, and they should be discussed separately. Even in schools, teachers, principals, and managers have different objectives for digitalisation: teachers need support for digital pedagogy while managers might emphasise process improvements. On the other hand, there is a clear need for entrepreneurs to understand education in general, and they should also learn process digitalisation principles and digital pedagogy. In general, the functioning of the education digitalisation ecosystem must be understood: what is the keystone organisation’s role and how activities, responsibilities and values should be shared in cooperation

(Rinkinen and Harmaakorpi 2018). Emphasis should be put on change management and motivation building as well – as said, if there is no motivation, there is no digitalisation either.

Representatives of government, as well as research institutes (academia) are in new situations as well. It is not automatically certain that government representatives (e.g., suitable ministries) know how to support and facilitate the building of the education digitalisation ecosystem, especially if there haven't done so before, and the same applies to academia as well.

All stakeholders must be considered and engaged, and here in addition to schools, government, academia and industry are the key players, and all of them must have their own parts when capacity building is provided. Changes do not happen by themselves, motivated and competent people are needed to make the changes happen, step by step

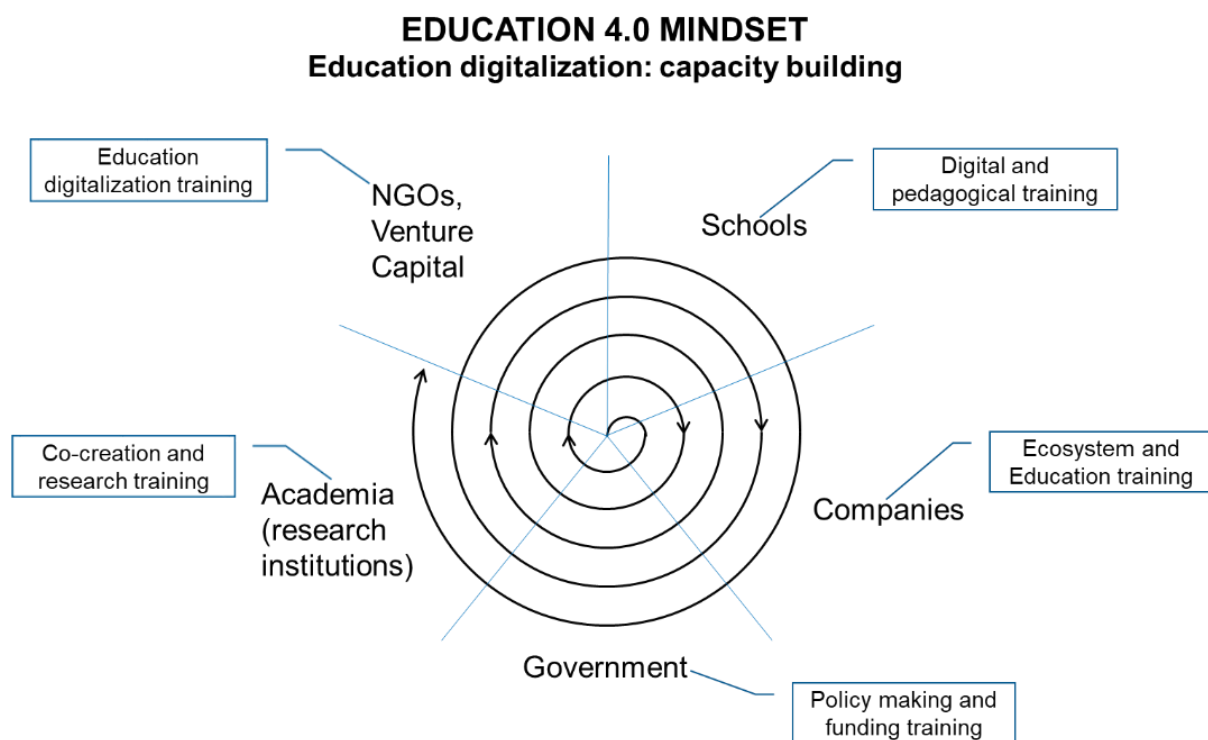


Figure 7. Education digitalisation capacity building spiral (Lagstedt et al. 2022)

In Figure 7, we propose the education digitalisation capacity building spiral. To be successful, capacity building must start in schools where more digital competencies (and pedagogies supporting digitalisation) are needed. This should be done with close cooperation with companies, which in turn need to learn more about ecosystems and especially about education and its processes so they can develop user-centred products and solution-oriented processes. In the text box below, you understand how Glowdom has implemented a capacity-building spiral in Namibia education ecosystem.



GLOWDOM'S PREVIOUS EXPERIENCE IN CAPACITY BUILDING

During 2020, by deploying Eduix/Glowdom digital solutions, we have reached 10 K-12 schools in different regions in Namibia, from rural to urban areas, private and public, and with varying infrastructure and personnel conditions, reaching 168 registered participants (the vast majority being teachers). Thanks to this ecosystem development and the high interest from the education community, we have organised five webinars (ctr+click to follow the link) and consolidated a digital learning community with 90 members.

Governments should learn how to support and encourage different players to be active in education digitalisation. Academia should also be involved in education digitalisation to find out ways to educate and perform research in the most beneficial way for the learners. Last, but not least, the new ideas of the education digitalisation ecosystem should be presented to NGOs and venture capitalists, and together find out how they can support the building of the business ecosystem. The roles and responsibilities of all players are discussed in following chapters.

In order to understand how the participants of the *Edupreneurs project* understand the relevance of partnering, connecting and supporting each other in a business ecosystem building for reaching more resilience and success, we gathered the answers of 20 stakeholders who participated in the kick-off event representing different types of companies and education institutions. See Figure 8 in the next page.

Finally, regarding the capacity-building goals of the *Edupreneurs project*, the project's goals were to provide four workshops (two about business innovation and two about digitising education processes), empowering about 100 players of the education and EdTech sectors. Our project launch event at the end of March comprised a rich forum of education experts', public figures and government representatives covering topics from education, business innovation and digitisation. We had over 130 registrations (the great majority from Namibia and Botswana) - with over 30 synchronous participants. During the project, we provided three (instead of two) workshops about business innovation with over 100 registrations in total. Most participants were from Namibia and Botswana. We offered one workshop about digitising education process, which had 19 registrations, but only four people actually attended. Therefore, we believe we made a correct choice in offering more workshops about business innovations than digitising education processes based on the number of registrations for the events. In general, the capacity-building efforts were a success but we didn't do well on getting *Edupreneurs*, teachers and NGOs from different countries equally, since we had mostly Namibia and Botswana represented.

We have learned that there is, indeed, an urgent demand for capacity building in digital competences for business innovation and education processes. This becomes even more prominent when stakeholders aim to build a digital business ecosystem in education. The competence level varies greatly and should be addressed accordingly. In addition, we learned that online events have much more relevance and registration/participation rate when there is a presence of a government representative. Therefore, we recommend that government organises a capacity-building team to provide support for such events and activities in the future. In addition, workshops need to be

designed and implemented with more engaging activities, so participants actively take part in the discussions online. This was implemented mostly in the workshop for digitising education, for instance, in which participants had to do some tasks before attending the online meeting. In the online meeting, additionally, there was no presentation, but hands-on learning activities. This workshop model is more demanding and consequently, less people tend to participate. However, the feedback from participants is quite strong in the sense of learning results, knowledge transferability and application.

How do you believe other institutions (ex: government, suppliers, research institutions, NGOs etc.) can support your organization in building more business resilience and success in the Southern Africa region?



Figure 8. Stakeholders' expectations on how other institutions can help them achieving business resilience and success

4. Government

4.1 Motivation and main objectives

Governments play a crucial role of taking care of society, organisations and individuals. They must react to new challenges and provide the tools for society to cope with different challenges due to the fast-paced changes in the world (Frey 2016).

One efficient tool to support change is digitalisation, and it is already observed that the role of information systems (IS) has grown more important in organisations, also in business areas that are not normally considered to be IT-oriented (Borg et al. 2018; Fitzgerald et al. 2014). Education is not an exception, even though (or especially) some education processes have a long and rather changeless tradition inherited from as far back as the ancient Greece.

Due to digitalisation, the education sector faces pressure to change (Hussin 2018). As Attuquayefio (2019) pointed out, technology can support learners in several ways by helping them to be more creative, experimental, and connected. With technology, students are able to find information and network outside of the classroom, and digitalisation offers new possibilities for lifelong learning as well (Attuquayefio 2019). However, as Kauppinen and Lagstedt (2021) pointed out, it is not enough to concentrate only on student-teacher-level, but a more holistic picture should be understood in education digitalisation. In their education analysis scope model (Figure 7) seven important levels of education digitalisation are presented that should be taken into account, both in digitalisation, but also in analytics as well (Kauppinen and Lagstedt 2021). One of their main messages is that digitalisation, measurement, and analysis should go hand in hand. Not everything can be done at once, but basic principles and overall objectives must be understood from the beginning. Government as a funder, legislator and policy maker, as well as education sector owner has an important role here.

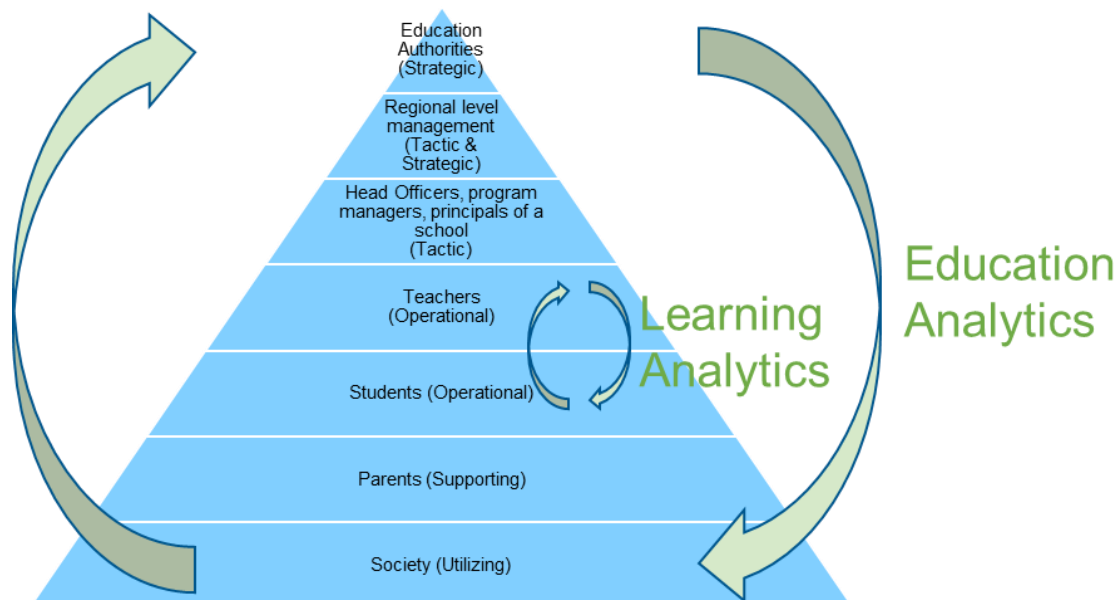


Figure 8. Education analytics scope model (Kauppinen and Lagstedt 2021)

In addition to the megatrends such as globalisation, industry 4.0 and digitalisation, the COVID-19 pandemic has caused a rapidly growing need for new ways to organise remote teaching in schools. COVID-19 has had both positive and negative effects on education digitalisation. As a positive effect,

it has shown the urgency of digital transformation, but it has also forced us to concentrate on remote education levels only, while all other education digitalisation processes were neglected. In addition, in a normal situation, it is possible that only the most interested teachers (innovators, which can act as change agents) would employ new technologies and others would follow later (Goh and Sigala 2020). However, in the prevailing COVID-19 times, many schools have been forced to change to remote teaching in a very short time, and there is no room for laggards; all teachers must change their processes at once. This has made the change management more challenging, which in turn requires strong involvement from the government to ensure the success of the change.

It is obvious that the government cannot (or should not) conduct the actual research producing new education digitalisation innovations or start a new EdTech or digitalisation organisation to create new kinds of education products, services, and solutions. As already pointed out in previous chapters, the ecosystem based on for-profit companies is a good solution to execute the education digital transformation, and governments should support the ecosystem by creating funding opportunities, developing legislations and ordinances, and compiling education digitalisation guidelines and frames.

4.2 Main responsibilities

We see the government having two main responsibility areas: financing and regulation.

4.2.1 Financial responsibilities

Education digital transformation is not cost free. It may pay for itself in the long run, but at the beginning, the government must be ready to fund the transformation to some extent. It is important to notice that, although change in schools is at heart of the education digital transformation, financing schools is not enough. Companies need to be funded and encouraged to join the ecosystem, otherwise there is a risk schools just buy global off-the-shelf solutions, and no local ecosystem is built, nor does real digital transformation happen in schools either.

The responsible discussion on public expenditure on education is essential when thinking of a national strategy for educational policies. There can be no dichotomy in the debate between "increasing spending" and "improving the management" of education resources, nor can we ignore the urgent need to reduce inequality in educational investment, especially between urban and rural areas when we address the issue of building a digital education ecosystem (TODOS P. E., 2020a).

It is important to remember that education communities with greater challenges are also those with fewer resources. Therefore, there is always space for improving the financing mechanisms, making them more efficient, redistributive, and inductive for education quality, aiming to guarantee basic conditions for education provisions in all spheres.

Such questions aim at sensitising government and administrative spheres to concretise the following three principles of education administration:

- 1) invest more per student;
- 2) manage the investment more efficiently (i.e. invest in what matters for student learning) taking possible local cases as references; and
- 3) distribute the investment and resources depending on local needs to equalise education opportunities.

These principles are based on the experiences of other countries from the Global South which also aim to improve their national education system (TODOS PELA EDUCACAO, 2020). They aim to provide predictability in the resources that are to come and monitoring of investment, as well as reduction of inequalities.

However, it is not enough to raise efficient investments and distribute them better. Mechanisms are needed to induce improvements in efficiency and advances in results. This is because advances in education require high dedication of political effort, while it is common to see low incentive for government officials in developing countries to act politically toward education. In other words, the political cost of not dedicating to education is still seen by government officials as low and the benefit of promoting structural changes is not perceived as a guarantor of electoral fruits (TODOS, P. E., 2020a). It is necessary, then, to rebalance this issue through financial induction programs.

One illustrative example is to introduce mechanisms to encourage collaborative practices between the administrative spheres towards improving quality of teaching via financial and tax incentives. Positive international examples of distributive financing worldwide (Loureiro & Cruz, 2020) have shown that collaborations such as distributive financing can be a powerful tool of induction, increasing the political benefits of improvements in the quality of education and bringing a robust and sustainable impact towards building education quality and systematic change (TODOS P. E., 2020a).

A World Bank study (Loureiro & Cruz, 2020) used a Brazilian case from the state of Ceará as a reference model of distributive financing via tax financing that brought the state of Ceará from one of the lowest education performers in 2005 to second in the country in 2017. In 2007, the state government of Ceará, one of the poorest regions of Brazil, established that the distribution of the tax on goods and services (TGS) as a resource for municipalities would be based on the performance that the schools of the municipalities would achieve in the national education test. Therefore, the municipalities with the best performance in the national test would have more resources and freedom to define how this “extra” resource of funding coming from the TGS would be used, including areas such as infrastructure, health and education. Before the financial reform, TGS was received by municipalities independently of education results and it had to be used on education expenditures, such as payment of teacher wages. With the reform, municipalities would receive more or less resources, depending on the education result, and now they could choose what to spend it on. This financial mechanism included education in the agenda of politicians and mayors eager to use more resources more freely. In the case of Ceará, it is also important to mention that this was not the only factor that contributed to a significant increase in the quality of education in the region. Another relevant factor that potentialised the education reform was the fact that schools with good performance, which chose to provide technical assistance to other schools with lower performance, were financially rewarded with the objective to improve the education network and community as a whole.

Finally, it is of fundamental importance to guarantee transparency of the distribution of resources in all administrative spheres by improving the information tools for data collection, analysis, and continuous monitoring of changes.

4.2.2 Regulative responsibilities

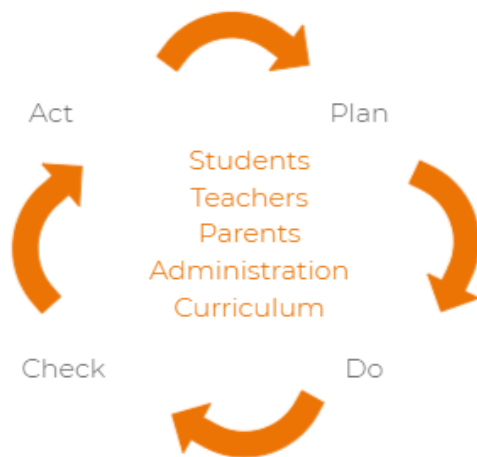


Figure 10. Adaptation of Demin's PDCA cycle for development process of education digitalisation (Chakraborty, 2016)

As presented in Figure 10, development is a continuous activity. In education digital transformation, the question is not only about acquiring information systems, but the related processes also have to be updated and the developed systems must be taken into efficient use. Government can choose and buy the needed information systems to schools nationwide, but digital transformation must be done locally inside the schools. Although the objectives for schools are the same, each school has a different situation with infrastructure, teachers' technical and digital pedagogical skills, preferences and the online tools teachers have already in use. In addition, teachers as experts should have some autonomy to organise their work and prefer different kinds of solutions (Lagstedt et al. 2020). So, fully centralised solutions and schedules are challenging, and at least some freedom of action must be

left to schools and teachers. On the other hand, if schools are totally free to choose whatever solutions they want, it easily leads to chaos of incompatible education information systems where each school has different systems, systems are not connected, and no usable data is generated for decision-makers. So, a fully decentralised model is not good either.

We recommend having a combination of these two where the government plays a strong role identifying the central needs of the systems, deciding on the main architecture of education systems, backend systems (data storages etc.), and interfaces and standards everyone must apply. Government should take care that the upper-level system architecture covers all levels presented in Figure 7, and backend systems, such as databases, support all the levels as well. Schools should take care of local level digital transformation, i.e. how education processes are changed, how training is organised, who the change agents are and in which order the change is implemented. Schools may have the right to acquire learning/teaching information systems based on their needs, but they have to follow the guidelines given by the government. Locally acquired systems must comply with the national architecture, standards and other requirements, and there must be connections to backend systems. Such process is represented in Figure 11. Below

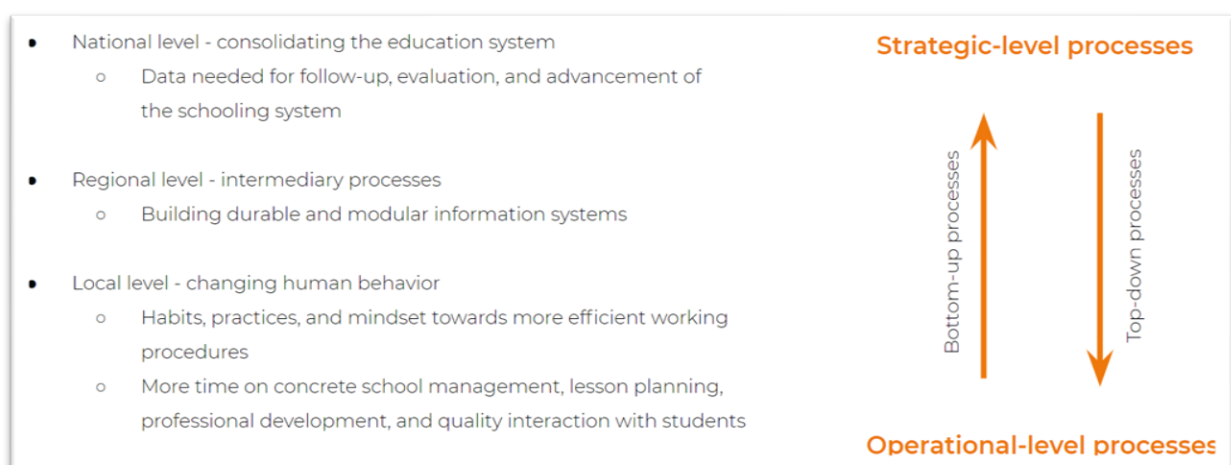


Figure 11. Digitalisation at different levels

When government has defined the national level education system architecture, data storages (with suitable data protection aspects), backend systems, guidelines and standards to be used, companies in the education ecosystem have clear frameworks in which they can operate. These frameworks can be implemented as legislation, policies, recommendations, and guidelines.

Although these frameworks are important, it does not mean that there should be a heavyweight top-down specification project, where all aspects down to the smallest detail have been thought through with extreme care, before any information system can be implemented. On the contrary, we recommend that these frameworks are developed iteratively with small operative-level pilot projects, having bottom-up and top-down discussions going on at the same time. The developed frameworks should not be carved in stone preventing further development, but there should be a mechanism to maintain and update the policies, recommendations, and guidelines.

Therefore, to develop a national level system architecture, it is important to highlight the relevance of systematically managing the network of government agencies (education authorities and regional management instances) and social players (schools, companies, NGOs etc.). That means organising the responsibilities of different administrative spheres in education, in order to ensure greater articulation between them and to support the improvement of the management of the education Secretaries/Departments (TODOS P. E., 2020b). For that, the following principle and subsequent strategies can be undertaken:

Principle: Clearly define the responsibilities of the administrative spheres in education and create norms for them to act in an articulated and joint way. In order to achieve a clear articulation and joint action between administrative entities, it is important to:

1) Provide various essential elements for education quality in an articulated manner for optimising the allocation of resources and qualifying the offer of these services. As examples of essential elements, we mention the articulation of demands and the supply of local services; supervision and provision of educational, technical, and financial assistance; and supervision of the application of financial resources in public/private education.

2) Establish policies with a due agreement between administrative spheres at different levels in order to achieve a standardised way in which the entities will interact to guarantee the quality of the education offer during all stages and modalities of education.

3) Arrange and encourage consortia and local development between entities at the local level through creation of project collaborations that support dialogue to establish joint solutions for a territory.

The existence of institutional spaces (either virtual or physical) for negotiation and agreement between the administrative entities is an indispensable condition for the proper functioning of mutual articulation and for the success of educational public policies. In addition, the legislation should be aligned with the objectives of education digital transformation

4.3 Capacity building

As there is no functioning education digitalisation ecosystem, the funding instruments supporting that kind of ecosystem are insufficient or non-existent. However, as pointed out above, no change will happen without money. If education is valued, it is also invested in.

However, at the start, where no funding instruments exist, it is crucial for government officers to increase their knowledge about different possible ways to proceed with funding instruments.

Different kinds of models and examples exist in various countries, some more successful than others. Officers planning new instruments should be aware of the possibilities and cause-effect relationships related to them. For that, capacity-building workshops should be organised for those government officers who plan funding instruments for education digitalisation. These workshops could be organised in collaboration with all involved governments. Before the workshops, a benchmark of the existing funding solutions other societies have and how well they have supported the education ecosystem building so far, should be undertaken.

In addition, it must be evaluated if the needed skills to develop national level system architecture and other technological policies and guidelines are available. If not, some capacity building is needed here as well. And in any case, it is important to also benchmark what is done or going on in other countries.

4.4 Open questions

Critical evaluation questions should be systematically asked for financial and regulative improvement, such as:

- How efficient is the current investment on education?
- How can we compare [Namibia, Tanzania, Botswana, South Africa, Zambia ...] to other countries in the SADC region in terms of investment/students and student learning?
- Are there local positive experiences that show that it is possible to achieve better education results with the same level of the current investment?
- Is there inequality in the financial distribution of resources as well as how the current financing distribution aims at reducing current inequalities?
- Is the current education investment proportional to the socioeconomic local context (i.e. those who have better socioeconomic resources get more financing) or proportional to the actual needs of the local context (i.e. those who have worse socioeconomic resources get more financing)?
- Who is responsible for the development of funding policy, and development of funding instruments applied here?
- Who is responsible for nationwide software (education) architectures and guidelines?

4.5 Ensuring sustainability

Governments should, by legislation, regulations, policies, guidelines, and funding ensure the start and sustainability of the ecosystem. As already stated, governments are more like catalysts here, they must be in the right place with funding to get the system working, and they should plan necessary regulations to ensure it's running.

In addition, it is essential that governments are committed to the education digital transformation, and the commitment is clearly visible for all stakeholders. The government support was essential for giving relevance to the project and attracting stakeholders from all of the SADC. In practice, the presence of government officials was critical for the project to reach hundreds of registrations at the Edupreneurs launch event. Therefore, government representatives have a crucial role in participating and promoting ecosystem building initiatives such as the Edupreneurs project to give traction to project leaders in networking the ecosystem stakeholders.

5. Academia

5.1 Motivation and main objectives

When a new education digitalisation supporting ecosystem is built, academia (higher education institutions and research centres) play four important roles:

1) Innovating new products and services, in partnership with companies, to offer to schools. Research institutions can develop, test, evaluate and suggest improvements for solutions or ideas that companies have. By utilising the expert resources research institutions have, companies do not need to recruit all necessary expertise by themselves, at least not in the very beginning. On the other hand, research institutions have access to interesting development projects as researchers, and researchers are able to apply their theoretical knowledge about development in practice and produce innovative and societal impactful research papers.

2) Conduct studies about processes and practices, not only how new products should be developed into the new market, but what kind of organisational structures should be preferred, what the main challenges and needs of customers (education institutes) are, how the ecosystem is working, and how it can be improved. As a result, research institutions generate recommendations and propositions not only for companies, but also for governments about different supportive actions as well as information on the effects of the actions taken. It should be noted that this education digitalisation ecosystem building is a very interesting and vital research project for local researchers and funding these kind of studies pays back when the ecosystem is further developed, or new kinds of ecosystems are developed.

3) Serving as one communication hub/forum for different stakeholders. With different research projects, seminars, panel discussions, webinars and lecture series, research institutions build and maintain communication networks between different partners.

4) Developing and supporting teachers' digital skills and technological capabilities related to their pedagogical competences.

5.2 Main responsibilities

Academia is responsible for:

1. Launch co-development and co-research projects with education digitalisation companies to study the potential approaches and identify optimal solutions.
2. Based on the studies, create recommendations for both government, as well as industry, on how to support the ecosystem in the most efficient way. Also benchmarking solutions from other societies.
3. Organise seminars and other discussion forums for different parties to meet, innovate and cooperate, and find funding channels for digitalisation projects.
4. Update teacher education training to support the digital transformation of education, and also to provide tailored courses and training sessions for those teachers who need capacity building and support in their work.

5.3 Capacity building

It is very likely that basic capabilities already exist. However, with new research, teaching needs become more precise, and it is important that the new knowledge is applied as broadly as possible.

For example, there should be processes to update teacher education flexibly when new information emerges according to the education demands and fast-paced changes. So, the agile mindset is important in academia as well.

5.4 Open questions

Critical questions that address the education ecosystem should be systematically asked for innovative research cooperation, such as:

- Are there existing processes to start new participatory development research (action research or similar)?
- What kind of seminar organisation traditions HEIs and research centres already have? What are the demands for new types of research dissemination events?
- What are the current processes related to teacher training curriculum update processes? How agile is curriculum reform to meet the education demands?
- What is the extent that the academia ability has to offer tailored training sessions to teachers based on the competence needs?

5.5. Ensuring sustainability

It is not a coincidence that the Namibia Business Innovation Institute (NBII) is the project coordinator of Edupreneurs, an initiative to build a digital education business ecosystem in the SADC. NBII is the Namibian national leader in research, entrepreneurship, and innovation. They operate through three main pillars, namely:

- (a) Innovation Marketplace (I'M): spur idea creation and entrepreneurship mindset;
- (b) Entrepreneurship and Incubation (E&I): support entrepreneurs with ideas to kick-start business;
- (c) Research and Development (R&D): advancing product and process innovation as well as mobile application, software and, social media development.

Thanks to this background, NBII was the key Edupreneurs partner that guaranteed our solutions reach the whole Southern Africa region with the purpose of consolidating and scaling up our ecosystem. NBII was also responsible for providing relevant capacity building towards business innovation and resilience to the project stakeholders.

In addition, significant parts of the Edupreneurs project and deliverables were undertaken by academic researchers, such as PhD students, principal lecturers, and teachers. For example, the Edupreneurs project was ideated by an early-stage researcher who works both in the academia world (i.e. university projects and education international consortia) and in the business world (i.e. an education software development company). The launch event and capacity-building workshops were mainly facilitated by researchers and lecturers. The continuous research and monitoring of the Edupreneurs project, as well as the iterative reflection of the work progress and data collection were also mainly undertaken by research practitioners. Therefore, the role of academicians in building, connecting, researching, and making sense of building a digital business ecosystem in education cannot be over-emphasised.

6. Entrepreneurs

6.1 Motivation and main objectives

Companies are self-evidently at the centre of ecosystem building. It is important that companies in the new ecosystem closely cooperate with research institutes and governments. In that way companies will obtain funding, frameworks, and guidelines (from government), business opportunities, research and development resources (from research institutions and partners), skills and competences (from research institutions, partners and by learning while doing), access to various co-operation forums and platforms, and build reputations and credibility. It is obvious that companies involved in an ecosystem are in a much better position than those trying to operate completely independently, especially when academia and government are actively supporting the ecosystem.

Of course, none of this comes for free. Companies must be ready to take risks, be ready for real cooperation with research institutions, and allocate resources for research and development. It is possible that some funding is available from the government or other organisations, but companies must commit to funders' terms, reporting practices and other bureaucracy. Companies should not simply try out this type of business lightly to see how it feels; instead, it is important to understand that this is a significant change in their business model that requires serious commitment. If the ecosystem building is successful, some companies will succeed, but very likely, there also will be some companies which fail to adapt to new business models.

6.2 Main responsibilities

To be successful the involved companies must understand and comply with ecosystem principles:

1) Agility: ecosystems are networks that evolve all the time. Concepts and co-operation must be considered case by case—today's competitors can be tomorrow's partners. The objective is to find the best combination for each case. There is no stable market share or position, everything can be different in the next case. In addition to that, it is important to understand that the cases are not consecutive, but they might be parallel as well. All this requires mental agility from company's decision makers; being part of an ecosystem is much more challenging and dynamic than being part of a cluster. If companies are not ready for this kind of agility, they are not suitable members of an ecosystem.

2. Keystone organisations: in order to be functional, an ecosystem must have some kind of control. In practice, this is normally organised with a "keystone" organisation, which ensures that the common goals bind the ecosystem members together. In practice, one dominant organisation orchestrates the innovation, co-operation and offerings of the ecosystem (Furr and Shipilov 2018). For that, there should be tools and a platform for other members of the ecosystem to utilise when innovating and finding suitable co-operation for specific cases (Rinkinen and Harmaakorpi 2018).

3. Commitment: in an ecosystem, companies are more dependent on others than very independent actors are. In addition, the ecosystem reduces their flexibility to make changes in their business models. The members of ecosystems must be committed and reliable, so that the keystone organisation and other members can trust each other in current and future cases.

4. Cooperation: cooperation is not only receiving usable, competent resources from other members of the ecosystem whenever they are needed. It is also sharing knowledge, business cases and contacts, even for potential competitors.

5. Risks: there are several risks in this kind of dynamically changing cooperation. For example: a) unrealism, some actors are willing to do much more than they can; b) unreliability, not all partners fulfil their promises every time even if they could; and c) unwillingness, some partners are not willing to contribute in a specific situation. Understanding the risks of the ecosystem is important, as well as taking care not to pose risks to others.

6. Value: each participant must take care that they capture value from the ecosystem in each case they participate. In most cases, value means money, but it can mean some new competences, contacts and reputation as well. There should be a balance between the risks and value in each case, and also the warrant actions should be planned.

In the text box below, you understand how the Edupreneurs project's keystone organisation, Glowdom, has deployed a networking digital platform in order to facilitate stakeholders' engagement on the six main responsibilities mentioned previously.



The Edupreneurs digital platform was launched in March 2021 in order to provide a virtual, 24/7 hub for business to business (B2B) and business to customer (B2C) networking, marketing, and content creation in the education and EdTech fields across the whole Southern Africa. The digital platform has so far attracted 64 education institutions, 43 companies in the education business (Edupreneurs) and nine civil organisations, such as NGOs. Considering our project's original goal of networking 100+ players of the education and EdTech sectors in SADC.

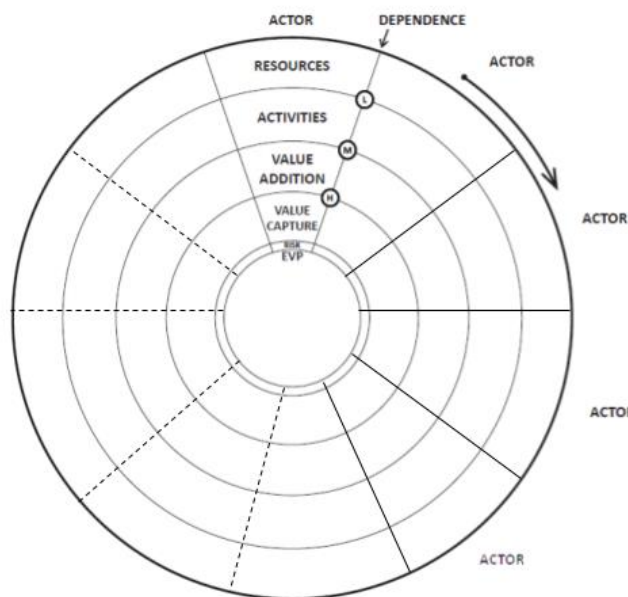
6.3 Capacity building

Four different skills and competence areas must be covered in capacity building of companies:

1. Entrepreneurial skills and competences. Although the basic assumption is that the involved companies already have the basic skills and competencies needed to run a business, it is important that it is ensured before the companies are accepted into cooperation projects. To measure the competence, we recommend a type of starting test and short courses for those companies who fail the test.

2. Ecosystem skills and competences. As the education digitalisation ecosystem concept is new for participants, it is important to learn and study how communication and cooperation is organised in this specific ecosystem, and what it requires from companies involved. It is important that the basic

ideas of ecosystems are worked through with the potential members of the education digitalisation ecosystem.



In addition, as the roles of ecosystems change case by case, it is important to have common tools and practices to evaluate each situation and value proposition of all potential cooperation partners. To support the changing situation of ecosystems, Talmar et al. (2020) have developed an Ecosystem Pie Model (Figure 7), which can be used when each case and the value proposition is evaluated. We see that this Ecosystem Pie Model is an efficient and easy to use tool for the members of an education digitalisation ecosystem. When companies' ecosystem skills and capacity are built, this tool is a good starting point.

Figure 12. Ecosystem Pie Model, adaptation from (Talmar et al. 2020)

The main elements of the Ecosystem Pie Model are: 1) the evaluation of resources a company has, 2) activities that are needed for a case, 3) the value that a company adds for the case, and 4) the value that a company gets from the case (Figure 8). With these four, it is possible to evaluate who should be involved, what kind of value they produce and what is their share. The aim is to find an optimal combination of actors where all members get enough value and the risks are minimised (Talmar et al. 2020). More information and guidelines of the Ecosystem Pie Model are available at the developers' web page: <https://ecosystempie.com/>. When the tool is used, it is good to remember that there is not just one right value generating combination; different options and combinations should be discussed, after which it is possible to select (with the help of the keystone organisation) the most optimal one for the case. In capacity-building sessions this should be practiced in imaginary cases.

3. Education skills and competences. Although companies are not going to replace teachers, they must understand the most important aspects of pedagogy, digital pedagogy, and education processes in general. Otherwise, they are offering solutions, which, from their own perspective, look excellent, but are useless in practice.

4. Digitalisation. Digitalisation is more than buying new software. To be meaningful and beneficial, digitalisation should change the processes and workflows as well. The goal is to improve education quality, and that must be kept in mind in all projects. In digitalisation, three interrelated aspects should be stressed:

1. usable and helpful tools for end users,
2. data for decision makers and
3. process improvements

All three have their own good practices and it is important that involved companies get enough knowledge and understanding from all these aspects. It is highly possible that not all companies offer solutions covering all these three, but they must be able to cooperate with companies who are.

As already mentioned, companies should not join the ecosystem light-heartedly. When they join, they must commit to cooperate and share with other members of ecosystem. The essential question is how this cooperation and sharing should be organised.

6.4 Open questions

Critical questions that address the education ecosystem should be systematically asked for building a digital education business ecosystem, such as:

- To what extent have start-up schools and incubators supported building a business ecosystem in the SADC countries? How efficient has it been and what needs to be improved?
- How to find and support the entrepreneurs (companies) willing to act as keystone organisations in a business ecosystem in the SADC?
- How can the government support such keystone organisations beyond only funding?

6.5 Ensuring sustainability

To understand what the main internal and external challenges for the participants of the *Edupreneurs project* are in achieving business success, we collected the answers of 20 stakeholders who participated in the kick-off event representing different types of companies and education institutions (see Figures 13 and 14).



Figure 10. The most central internal business challenges of 20 Edupreneurs stakeholders

The keystone organisation of the Edupreneur ecosystem was Glowdom. Besides networking and connecting with high-level decision makers from the government and entrepreneurship fields, Glowdom also built, with the technical support of Eduix, a digital platform for strategic partnership, in which education institutions and entrepreneurs collect and process data about potential customers and suppliers across the region. Therefore, the platform supports networking with relevant stakeholders (Business to Business and Business to Customer) as well as promoting stakeholders' services and products (visibility and marketing).

During 2020, Glowdom reached 10 K-12 schools in different regions in Namibia, from rural to urban areas, private and public, and with varying infrastructure and personnel conditions, reaching 168 registered participants (the vast majority being teachers). Thanks to this ecosystem development and the high interest from the education community, Glowdom has the capacity to play as keystone organisation of the ecosystem, to strengthen relationships with international and local research and innovation partners, technology and industry partners, regional partners and local partners. Furthermore, Glowdom built a network of educators from all around the world engaged with products and digital training. There was also a need to expand and consolidate the Edupreneur ecosystem by connecting schools and HEIs, education suppliers, and the whole community for a higher quality education.



Figure 11. The most central external business challenges of 20 Edupreneurs stakeholders

Among the critical success factors for the sustainability of the Edupreneurs project, we highlight the need to provide the digital infrastructure for Ministry of ICT to collaborate with Ministry of Education for collecting and processing relevant data about education institutions across countries of the SADC. With accurate and robust data, Glowdom has potential to continue leading the education ecosystem able to implement data-driven decisions with a more long-term and relevant impact for education development. The ultimate goal is to consolidate the ecosystem to support countries to collect and process relevant data for evidence based and impactful decisions.

As the keystone organisation of the Edupreneurs ecosystem, Glowdom realised the importance of considering right from the onset the issues of sustainability and maximum impact. To this end, keystone organisations need to provide professional development for teachers, administrators, and software developers on digitalising education processes. In addition, knowledge transfer and collective knowledge building are the essential scalability elements that should be used by the keystone organisation of the ecosystem across the regions. Another critical element is to collaborate with expertise from different parts of the world, connecting educators, researchers, and entrepreneurs alike.

Once the Edupreneur ecosystem is consolidated, Glowdom recognised the need to have more capacity and resources to tailor and develop further solutions as fast as needed by customers and partner networks. However, in most countries in the region, the capacity and resources are inadequate. Therefore, there is a need for enabling policies and funding support from the Ministries of ICT and Education as well as development partners in order to expand qualified teams and deliver the needed digital infrastructure together with capacity building in a more efficient and effective manner.

In general, there is low accessibility to the needed infrastructure in some areas (e.g. rural and remote regions). This is still a relevant threat for implementing the most needed digital solutions. Although most governments and non-governmental organisations in the region are busy developing offline/intranet alternatives, there is still a need for further collaboration with the industry and more resources in order to maintain and expand the Edupreneur ecosystem, which during the pandemic became more critical to collaborate with strategic partners in the region.

7. The schools

7.1 Motivation and main objectives

It is easy to say that schools, teachers, and students are the biggest winners of education digitalisation, but it is important to understand that they bear the greatest burden as well. They are the ones who must radically change, and the change must be done without disrupting the basic ongoing work of schools.

In addition, in the initial situation, the readiness for change is completely different for different people. Of course, there might be big differences with available infrastructure and experiences, but there are differences between people as well. As Rogers pointed out in his diffusion of innovation theory, there are always people who are ready to test and adopt new solutions and people who are not so ready (Goh and Sigala 2020). In practice, it must be understood that while some of the teachers (and principals) have good competences and are eager to try new solutions, there are always the laggards who use new solutions only after the majority already uses them. This must be considered in education digitalisation projects. To minimise the lagging, it is important that capacity building is provided for schools as well.

7.2 Main responsibilities

Schools have responsibilities related to education, of course, but also to review, test, and validate new EdTech solutions that are being offered in the market. Schools should be committed partners in education digitalisation. As already stressed, digitalisation is not only about acquiring a new information system or application, but it also means process changes. Research institutions might know what kind of theories or previous studies can be applied, and companies might have good ideas for solutions, but the best expertise about current teaching and education processes comes from schools. Schools must be involved; they are the ones who really implement the changes in their everyday practices. And schools must be active and take the responsibility to participate actively in the education digitalisation projects. This responsibility cannot be left to individual teachers to bear.

When we focus the investigation on how education digitalisation should be done, there is no widely accepted (and scientifically valid) model for it, especially how the change should be managed both at organisational (school) and individual (teacher) levels. There are, however, several well-known independent theories and approaches regarding the phenomenon of integrating technology at work and, specifically, in educational settings, such as the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003), the technological pedagogical, content knowledge (TPACK) (Mishra and Koehler 2006), and the expert-oriented digitalisation (EXOD) model (Lagstedt, Lindstedt & Kauppinen 2020).

These and other previous works were revised by Leite and Lagstedt (*accepted paper, in press*) and compared to their conceptual Collective Integration of Technology (CIT) model. The CIT model supports schools in digitalising their teaching, primarily to make remote education possible due the COVID-19 pandemic. It considers the collective process of knowledge building of a group (teachers, Heads of Office, principals, etc.) and how the learning culture of the organisation can support (or hinder) EdTech integration into school practices. The CIT model stresses the fact that technology integration in education cannot be considered at only one or two levels (organisation and individual),

but needs to take into account the interactions between the levels of change, as well as different human dimensions of change (social, emotional, behavioural and cognitive).

When schools consider changing their learning culture taking into account the CIT model, a few considerations can be made according to the main processes the school payers go through in each state of the model:

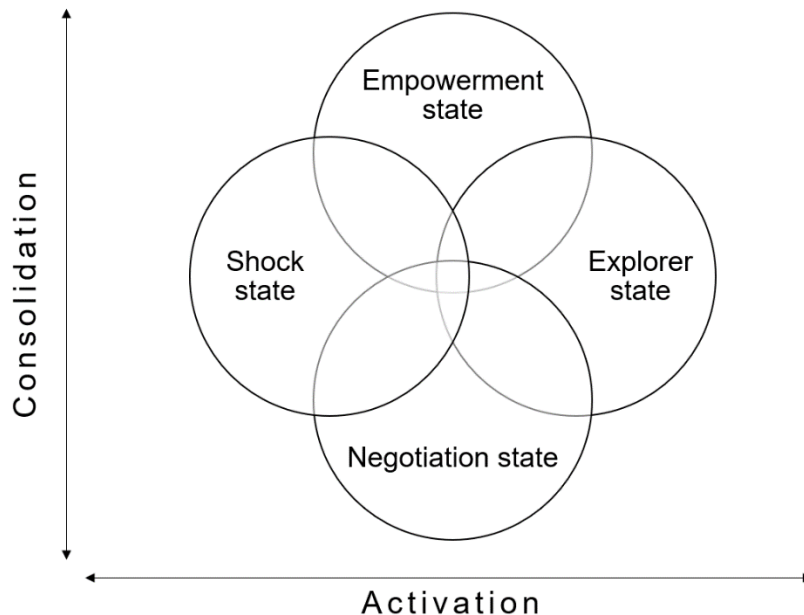


Figure 12 The main states of the CIT model

SHOCK STATE

- Main technology users (i.e. teachers and administrators) go through intensive learning and remodelling of their attitude towards technology.
- Users have work routines disrupted by technology.

How can schools promote an efficient and supportive learning culture?

This state demands intense support of the technology trainers and the school leaders regarding users' attitudes towards technology. Trainers need to be aware of how users feel about the technology - and if the infrastructure and time needed for investing on learning about the technology are available.

Concrete strategies to put into motion:

1. Open at least two different channels for users to ask questions and share their feelings/thoughts in a safe environment. This can be through virtual (e.g. school WhatsApp group, hotline chat with zoom etc.) and physical (e.g. time within the school weekly meeting with teachers) channels.

2. It is important to give immediate feedback on users' questions, doubts, and progress during this stage, so they can be engaged as much as possible to learn. While giving feedback, it is important to praise users for their attempt at learning, trying and failing on the use of the technology. Praising should be focused on the effort itself (time and energy spent on learning something). Therefore, this praise is directed to both people who are succeeding with the learning right away, but also for those who are trying but failing. So, the ones who are failing get the message that they just don't know how to do it YET, but they will get there if they persist.

3. In case the users are going through an intense shock and feel too afraid, anxious, and insecure about using technology, consider developing an initial empowerment workshop in which new users are intensely exposed to tech devices, so they stop feeling afraid of technology and start feeling confident in trying it out, pressing buttons, making mistakes, debugging the mistakes etc.

NEGOTIATION STATE

- Users get familiar with the new technology and go through two types of negotiation processes:
 - o Negative negotiation: users negotiate with their pre-conceptions of technology in a way that they feel they are losing time and energy with it.
 - o Positive negotiation: users negotiate with their pre-conceptions of technology in a way that they feel they are winning by investing time and energy on using the technology now, which will be compensated in the future.

How can schools promote an efficient and supportive learning culture?

In this state, the trainers must be very attentive to which kind of negotiation the users are engaging in. Concrete strategies to put into motion:

1. Through the communication channels and by evaluating the learning assignments of the users using the new technology, the trainers should identify if the users are engaging with a negative or positive negotiation.

2. It is important that the trainers act on what they have identified immediately.

- For negative negotiation: trainers should try to change the users' perceptions regarding how the technology can enhance their work practice by showing them the actual benefits of the technology and how to use it properly.

- For positive negotiation: trainers can suggest how the automatisisation process can speed up the work even more, meaning that this is just the start of reducing time/energy on processes that can be done more efficiently.

It is important that all users go through the positive negotiation phase in this stage.

EMPOWERMENT STATE

- Users feel confident in experimenting with the technology by themselves.

How can schools promote an efficient and supportive learning culture?

Trainers can focus on identifying the users who are in this state and invite them to support other learners who are lagging. Therefore, empowered users can become change agents. It is important to create collaborative solidarity, and serving leadership culture at this point, so the empowered users feel motivated to support their peers - and are valued for doing so. Concrete strategies to put into motion:

1. The trainers can arrange specific and concrete learning organisational targets with the school leaders and, if all the teachers achieve them, they receive some of a shared reward. And the ones who help others (change agents) also receive rewards for supporting others. For instance:

1.a. The school establishes groups of cooperative learning in which there is at least one change agent (empowered user) acting as the tech-reference teacher of the group, to teach the others when they are facing difficulty in learning.

1.b. The school establishes milestones that the groups of cooperative learning should reach. The change agent would be the main motivator and supporter of this process. When all the teachers of one group reach a milestone, they should be recognised for this achievement in a school meeting.

1.c. Finally, when all groups of teachers in the school reach the milestone, the school can organise a social event to recognise all the teachers' achievements. All the teachers, individually and those who are in groups, are motivated to do something that they are interested in if the learning milestone is achieved as a shared process.

1.d. Additionally, every time a teacher helps another to learn about the new technology, they can reference the change agent teachers, and the change agent teacher who helped the most can receive a reward delivered at the school event. This could be a "competition" between the teachers who helped, for instance.

EXPLORER STATE

- Users feel the need to expand the features of the new technology.

How can schools promote an efficient and supportive learning culture?

In this state, trainers should create an effective forum for users to share their ideas and opinions on how the technology can be improved. The new users should feel that their opinions are truly heard and implemented in the software development. A concrete strategy to put into motion is to activate the users who are in the explorer state to collect, review and provide feedback on the EdTech solutions, as well as suggestions on how to make them better. A forum is a relevant channel for explorers to feel that they contribute to product development, as well as for the companies to improve products according to the most valuable customers and end users.

7.3 Capacity building

According to Mishra and Koehler (2006), the teachers' professional knowledge consists of content knowledge, pedagogical knowledge, and technological knowledge. These three types of knowledge can be combined in dyads or can be merged into one when teachers are implementing different activities to promote student learning. Here we see it is important to concentrate on capacity building for boosting digital pedagogy and teaching process digitalisation.

A concrete example of professional development for supporting teachers' content pedagogical technological competences is for schools (and universities) to implement workshops about Flipped Classroom.

The Flipped Classroom approach differs from a traditional classroom in order to celebrate the pedagogical human encounter. It aims at optimising both the individual and collective time of students and teachers, in which students first receive an introductory understanding of the theory at their own pace with the **support of EdTech solutions** – before they meet their teachers. Only then, teachers and students come together for the students to apply and test what they have learnt previously with the support of education digital tools.

In the Flipped Classroom methodology, teachers are not the gatekeepers of the knowledge, and their role is not to transfer information anymore. On the contrary, teachers act as expert mentors in the classroom by indicating the best pathway that students can take to better understand and apply a theoretical concept. This type of teacher role enhances student learning by supporting the students on how to navigate in a world in which they will be responsible for their own professional development as well. By shifting teachers roles from transferring knowledge to mentoring learning with the support of EdTech solutions, teachers are more aligned with students' future professional needs, and more capable to personalise teaching and scaffold student professional learning skills.

Student roles also change in Flipped Classroom. They do not come to the classroom to passively listen to theoretical concepts (many times detached from their own realities). In this approach, students are actively engaged in all the moments of their learning. First, they are responsible for directing their introductory learning with the support of EdTech tools. Such digital solutions scaffold student learning by providing them with more autonomy for choosing their own time and space for learning something new. And when students come to class, they can apply what they have learnt with their peers and the support of the teachers in collaborative work that is meaningful to their own context and future professions.

7.4 Open questions

Critical questions that address how education digitalisation increases learning and promotes equity should be systematically asked for building a digital education ecosystem, such as:

- Are companies addressing the needs of schools which do not have Internet accessibility?
- How are SADC governments tackling the digital divide, especially between rural and urban areas?
- Why is there not so much on offer for offline EdTech solutions to facilitate the EdTech integration when internet becomes available?
- Are EdTech solutions being developed in close alignment with the actual needs of the schools, teachers and learners? Are the solutions considering short- and medium-term impacts?

7.5 Ensuring sustainability

The readiness of education stakeholders for education digitalisation varies a lot. Some have already used different kinds of virtual tools, but a big portion of them is not capable of taking any complicated e-learning and resource planner platforms to use. Therefore, it is essential that EdTech solutions support teachers' and admins' work, while being simple enough to be useful with minimal (or non-existent) training.

In a short-term perspective, such a selective process of EdTech products allows schools to position themselves as active centres towards change in their community. By concentrating most of the education stakeholders that will use the digital solutions, schools condense the power to demand reliable, easy-to-learn, and curriculum-based EdTech services that will guarantee a concrete implementation of a high-quality education digitalisation. Meanwhile, virtual tools also become strong facilitators of school transformation, since their use requires changes on teaching methodologies, increases the access of children in remote areas to education, allows teachers and administrators to continue working remotely, breaks the strict divisions between the inside and outside of a classroom, etc.

In the medium-term perspective, schools can become reference centres for other education agencies that also need technological solutions. COVID-19 disruptions demand local, regional, and national decision makers to strongly consider digitisation and digitalisation of education management as a key player. Now is the time for governments, NGOs and other civil organisations to think of ways of implementing not only short-term measures to deal with the routine duties of teachers and learners, but to rethink the organisation of managing education processes.

In summary, schools are finally witnessing an intense (and forced) reform that, if well administrated by its leaders, can reposition schools from a 19th century model to a globally connected, locally engaged 21st century paradigm.

8. Discussion & Conclusions

This document was developed to explain the journey that Namibia University of Science and Technology (NUST) through the Namibia Business Innovation Institute (NBII), Glowdom and Eduix has embarked in developing a resilient Edupreneurs ecosystem in SADC as a pilot project. Each partner had a role to play online with their mandate: NUST-NBII as an institution operating in the academic realm; Glowdom as a start-up that is emerging as a successful ICT and keystone company with a special focus on education and digitalisation; Eduix as a technical and education expertise support for the whole journey.

The main purpose of the Edupreneurs project was to develop a resilient EdTech ecosystem by 1) developing a digital platform to network B2B and B2C education stakeholders, 2) providing capacity building for digitalising education processes, and 3) sharing lessons learned and best practices on the process. Bringing the latest thinking and cutting-edge research from across our global network, this recommendation paper aimed to bring the most pressing business issues to life, and described how leaders can rethink and reinvent their businesses to succeed. The challenges covered included digital disruption, diversity and inclusion, and workforce and skills – all in the context of the post-COVID-19 world.

To meet the challenges posed by the Covid-19 pandemic, businesses around the world had to react in agile and decisive ways. As we move into the next phase, now is the time for businesses to seek out and seize the opportunities emerging in the recovery. This does not only challenge us to look for new ways of business operations in the education sector, but also to come up with new or improved ways of interactions, such as building a resilient EdTech ecosystem. Not only in Namibia, but also at SADC level.

Building an innovation EdTech ecosystem has challenges. There is a tremendous change on how education is being delivered, the needs of the schools have changed, and stakeholders, e.g. government, private sector and Edupreneurs, academia and civil society, are finding new ways to interact with each other. Getting the support of government entities appeared as one of the greatest barriers to give traction and sustainability to the project. It is our understanding that ecosystem development requires an integrated approach to hosting events for capacity building and knowledge transfer in order to reach a permanent impact.

The recommendations in this document will help different parties to understand the EdTech ecosystem construction and their own role and responsibilities in building it. Nothing happens by itself; activity and success is everyone's responsibility.

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Annexes

The Edupreneurs platform

<https://Edupreneurs.ahaa.glowdom.com/#/>

The purpose of our project was to develop a digital business ecosystem in Southern Africa able to leverage the EdTech infrastructure and education software development in the region. Such an ecosystem, aimed at solving challenges, rose due to the lack of digital infrastructure and personnel with digital competencies, even more exacerbated by the Covid-19 pandemic. To build a robust and resilient start-up ecosystem, we developed a bottom-up, functional and far-reaching strategic partnership network sufficiently competent to deal with possible emerging adversities. Therefore, the project consortium leveraged the business ecosystem for education technology in Southern African countries by engaging two fronts of systematic and groundwork development:

1. The digital platform for strategic partnership, which provides a virtual, 24/7 hub for B2B and B2C networking, marketing, and content creation in the education and EdTech fields across the whole of Southern Africa. Through the portal, education stakeholders from K-12 schools to HEIs will have access to efficient and secure solutions for remote education, as well as access to a broader market range beyond national borders. In addition, a variety of education suppliers and EdTech start-ups will be able to promote their services and products on the digital platform. By engaging enterprises that complement each other's services and products, we strengthen the business ecosystem among stakeholders and guarantee education services tailored to the local needs.

2. Capacity building offered through the platform to ensure sustainability and maximum impact. During the project, we provided professional development for education stakeholders, software developers, and EdTech entrepreneurs on digitising processes and business innovation. We gathered expertise from different parts of the world, connecting educators, researchers, and entrepreneurs from Brazil, Finland, and the Southern Africa region.

These two fronts of work development are concretised through the Edupreneurs platform, in which education institutions, companies and civil organisations can:

- collect and process data about potential customers and suppliers across the region;
- network with relevant stakeholders (B2B and B2C);
- promote their services and products (visibility and marketing);
- and get to know opportunities for capacity building about digitising education processes and business innovation.

The innovativeness of our platform is reflected in the participatory design implemented throughout the whole project, in which stakeholders have contributed collectively to develop our solutions. We have undertaken activities and processes that reflect the co-innovation paradigm as described by Peter et al. (2019) and represented in Figure 9.

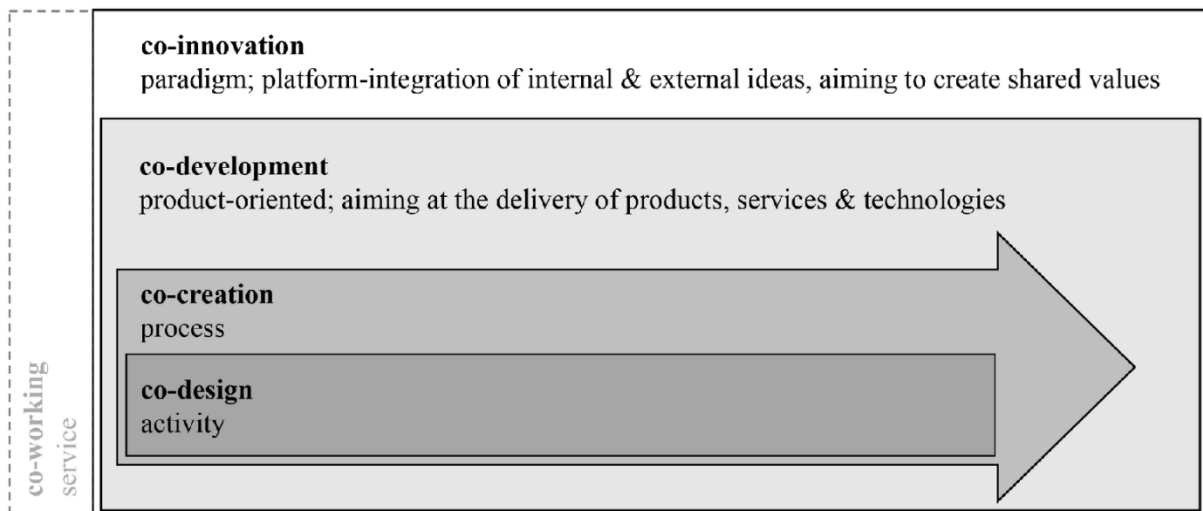


Figure 9. Relevant forms of collaboration, which are applied in open innovation partnerships (Peter et al. 2019)

Since the project launch in March 2021, we have gathered stakeholders' suggestions for how the project could meet their demands. We collected their suggestions through three main methods:

1. A needs assessment workshop, in which participants shared their life history focused on their engagement with education and what their organisations need to thrive and develop resilience.
2. Continuous feedback forms throughout the whole project period, in which participants were invited to share their suggestions for platform development.
3. Individual meetings to engage stakeholders on the platform, in which the benefits of registering were clarified and stakeholders had the opportunity to suggest how they would like the platform to be.

From the start of the project, we realised that some organisations did not have their own website to promote their actions, and the platform supports them by providing this kind of digital infrastructure and marketplace for their activities. In other cases, families were having difficulties in finding the most appropriate education institution for their children, companies needed more infrastructure to market and promote their services and products, and civil society needed better channels to voice their needs. Now, through the Edupreneurs platform, these actors can fill in their information through Formjack, and their organisations will be automatically displayed on the Edupreneurs platform. From this moment, organisations and enterprises can search and find each other based on their needs.

1. Platform's main features

The platform deploys Eduix's online form, workflow software and electronic service platform: Access Formjack: (<https://forms.glowdom.com/introduction/>). Formjack is based on PHP scripting language and MySQL database service. Connections between internet and service are secure, implemented by https and protected by firewalls. The software gives means to organise and handle any kind of data.

The virtual hub was designed from the point of view of three main stakeholders and end-users from SADC: 1) education institutions (from K-12 to higher institutions), 2) business enterprises (entrepreneurs) focused on the education sector, 3) civil organisations that work in the third sector to support education quality. In addition, families who are looking for education institutions and resources are also end-users of the platform and directly benefit from it. In the top menu of the platform, users see the following options:

1. search for partners
2. register here
3. blog
4. about platform
5. feedback

Next, we detail how each of these stakeholders and end-users can benefit from each of these features.

1. SEARCH FOR PARTNERS



Schools using the platform might:

1. Look for education suppliers, such as an internet cable provider, computer provider, school management software, office materials etc.
2. Looking for education services, such as teacher training in Flipped Classroom, private tutors to provide extracurricular activities, internet cable provider, computer provider, school management software provider etc.

Entrepreneurs using the platform might:

Look for customers for their services/products (schools, education centres, other education providers).

Civil organisations using the platform might:

Look for partners to plan and implement education projects that complement schooling through informal and non-formal education activities.

Families using the platform might:

1. Look for a school for their children. They want to select a school that is suitable for them and satisfies the educational needs of their children.
2. Looking for private tutors. The platform will give them different options of private tutors describing their services according to different criteria.
3. Looking for education resources, such as open education resources, apps to download on their mobile devices to help their children to learn etc.

In addition, the platform has an advanced search feature that gives all stakeholders different options of education categories that describe what kind of products and services all these stakeholders might require and offer to the community.

advanced search

School type

min:

max:

School Location

Address:

Education Categories

- K-12 School
- Kindergarten
- Primary Education
- Secondary Education
- Upper Secondary Education
- High School
- University
- Special Needs Education
- Bilingual Institution
- Psychopedagogy Support
- Extracurricular activities
- Extra Classes

City:

Country:

The education categories were organised as follow:

1) Categories that users might use when looking for education institutions:

K-12 School	Private Tutoring	Thematic Spaces
Kindergarten	Accessibility	Learning Management System
Primary Education	Universal Design	Education Management System
Secondary Education	Active Learning Methodologies	Education Apps
Upper Secondary Education	Flipped Classroom	Wifi Connection
High School	Hybrid Learning	Computer Lab
University	Foreign Language	Lab Classes
Special Needs Education	Education Games/Toys	Robotics
Bilingual Institution	Gamification of Education	Programming
Psychopedagogy Support	Sports and Hobbies	Maker Space
Extracurricular activities	Playground	Digital Books/Library
Extra Classes	Swimming Pool	Other

2) Categories that users might use when looking for companies:

Building	Extracurricular activities	Digital Books/Library
Infrastructure/Furniture	Sports and Hobbies	Video Lessons
Classroom	Sports Materials	Food Providers
Infrastructure/Furniture	Educational Toys/Games	Funding
Computer and Similar Devices	Playground	Educational Book Publishers
Office/School Materials	Swimming Pool	Consultancy
Didactic Materials/Books	Thematic Spaces	Insurance
Accessibility Infrastructure	Educational Carpets	General Maintenance
Special Needs Educators	Learning Management System	Cleaning Materials
Psychopedagogy Support	Education Management System	Legal Advice
Active Learning Methodologies	Education Apps	School Uniform
Trainers	Internet Infrastructure	Photoshoots
Flipped Classroom Trainers	ICT Support	Marketing
Hybrid Learning Trainers	Lab Equipment	Financial System
Subject Teachers	Robotics Materials/Courses	Other
Extra Class Teachers	Programming	
Pedagogical Training/Coaching	Materials/Courses	
Foreign Language Teachers	Maker Space Infrastructure	

3) Categories that users might use when looking for civil society organisations:

Classroom Infrastructure	Psychopedagogy Support	Sports and Hobbies
Computer and Similar Devices	Psychotherapy	Sports Materials
Office/School Materials	Extra Class Teaching	Educational Toys/Games
Didactic Materials/Books	Pedagogical Training/Coaching	Playground
Accessibility Infrastructure	Teacher Training	Swimming Pool
Special Needs Education	Extracurricular activities	Meeting place

Thematic Spaces
 Educational Carpets
 Education Apps
 Internet Access
 ICT Support
 Computer Lab

Lab Equipment
 Robotics Materials/Courses
 Programming
 Materials/Courses
 Maker Space
 Digital Books/Library

Video Lessons
 Food Providers
 Funding
 Consultancy
 Legal Advice
 Other

As more stakeholders register on the platform and share their information, families have better chances to find a suitable school for their children, and more companies can find clients for their services, while more social actors can participate in the development of education quality in their region. The advanced search functionality on the platform provides users improved resources to find the exact match of services and products that they are looking for.

2) REGISTER HERE

In this section, the three main stakeholders (education institutions, entrepreneurs, and civil society) can register their organisations on the platform via a form. Right after they submit the form, the information provided is automatically featured in the platform.

1. Contact information listing education categories and what they offer and need.
2. Detailed descriptions of the organisation, their products and services.
3. Testimonials about who benefited from the organisation.

3) BLOG

The Edupreneurs blog works as an open forum for all stakeholders to voice their opinions and contributions to enhance quality education in the SADC. Any person can contribute to the blog. The users only need to fill out a form that instructs them how to write a blog post tailored to the platform. The blog can work as a content marketing platform for any organisation involved with education in the SADC, as well as for a platform to share experiences, expertise and capacity on how to consolidate the digital education ecosystem in Shouthern Africa.

Selected Content



Using technology to decolonise the Namibian education curriculum.

The Ministry of Education, Arts, and Culture (MoEAC) has the mandate to change the education system in Namibia through policy reforms and other interv...

[find out more](#)



How to navigate the Edupreneurs platform

The Edupreneurs project will offer during June and July a weekly hotline chat for those who want to have a short demonstration on how to navigate in t...

[find out more](#)



How we developed the Edupreneurs digital platform

The purpose of our project is to develop a digital business ecosystem in Southern Africa able to leverage the edtech infrastructure and education soft...

[find out more](#)

4. ABOUT THE PLATFORM

It is a simple section describing the main objectives of the Edupreneurs project.