

Universities and Unicorns project

Report 4 of 4

Methodological Handbook for Phase 1

Authors: Janja Komljenovic, Sam Sellar and Kean Birch.

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1. About this report

This Handbook offers a detailed explanation of our methodological approach for analysing the education technology (edtech) landscape and financial investment in edtech in the Higher Education (HE) sector. It is provided as an accompanying explanatory text to the quantitative analysis (Report 2).

We have downloaded data on the edtech companies, investors, and investment deals active in HE from Crunchbase (CB). However, identifying and downloading relevant data was not straightforward, and multiple steps were needed to clean the data and finalise our databases. We manually reviewed 11,958 companies and our final databases include information on: 2,012 companies, 1,120 investors and 1,962 investment deals (that include 825 companies). We developed our own classification with four categories to better understand edtech companies' work to digitalise HE. Finally, we complemented CB's data with our own classification scheme.

This Handbook proceeds as follows. After defining edtech, we present our classification scheme. We continue by describing in detail the steps that we took in gathering and processing CB's data. Finally, in appendices, we attach definitions of key categories.

2. List of abbreviations

APAC	Asia-Pacific
ASEAN	Association of Southeast Asian Nations
B2B2C	Business to business to consumer
B2C	Business to consumer
B2C2B	Business to consumer to business
B2C2C	Business to consumer to consumer
CB	Crunchbase
edtech	education technology
ENT	Enterprise
EU	European Union
GCC	Gulf Cooperation Council
HE	Higher education
HEI	Higher education institution
HQ	Headquarters
IND	Individual
LAC	Latin America and the Caribbean

LLL	Lifelong learning
MOOC	Massive Open Online Courses
OECD	Organisation for Economic Co-operation and Development
OPM	Online Programme Management
T&L	Teaching and Learning
UK	The United Kingdom
USA	The United States
UU	Universities and Unicorns

3. Defining edtech in HE

A general definition of edtech is provided in the UK strategy published by the Department for Education in 2019:

Education technology (EdTech) refers to the practice of using technology to support teaching and the effective day-to-day management of education institutions. It includes hardware (such as tablets, laptops or other digital devices), and digital resources, software and services that help aid teaching, meet specific needs, and help the daily running of education institutions (such as management information systems, information sharing platforms and communication tools) (Department for Education, 2019, p.5)¹.

For the purpose of the UU project, we have adapted this definition of edtech in the following way:

- First, we focus only on digital products and services offered by edtech companies and exclude hardware from our analysis. Although we agree that hardware should be included in the broad definition of edtech, the UU project is focused on software and digital data.
- Second, we expand the definition to include digital products and services targeting not only education institutions but also enterprises and individuals.
- Third, we limit ourselves to the HE sector.
- Finally, we include not only platforms supporting teaching and learning, and management of institutions, but all processes within HE, including research and academic networking. In other words, all digital platforms that support processes within HE are considered edtech.

We conceptualise the HE sector to include all knowledge production and dissemination processes at a post-secondary level, including those processes supporting knowledge production and dissemination. Our logic is to follow everything relating to post-secondary lifelong learning (LLL), professional training, employee development and new forms of knowledge production, dissemination and sharing. However, we do not include processes at the lower levels of education (such as tutoring for children), knowledge that would not be provided by HE

¹ Department for Education. (2019). Realising the potential of technology in education: A strategy for education providers and the technology industry. London.

institutions alone or in partnership (such as language learning) and personal support not related to LLL (such as coaching).

We manually reviewed 11,958 edtech companies that we found using CB's industry categories "edtech" or "e-learning". We created the following exclusion and inclusion criteria that we used when reviewing companies:

We included companies that offered digital products and services in the areas of:

- Higher education content and support processes
- Vocational training content and support processes
- Professional training content and support processes
- Individual knowledge sharing content and support processes (except hobbies)
- Any processes supporting post-secondary learner life
- Any processes supporting post-secondary learner recruitment

We excluded companies that offered digital products and services in the areas of:

- Content and support relating to secondary level education and below
- Language learning
- Tutoring – unless explicitly targeting university students
- Coaching
- Mentoring
- Consulting companies
- Compliance training
- Competitive exam preparation
- Soft skills training (including platforms using virtual reality for this purpose)
- HR recruitment (however, we kept those HR recruitment platforms that also offered learning management systems)
- E-books subscriptions, unless they target HE institutions' libraries or HE institutions' students explicitly
- Websites²

² A digital platform is a sociotechnical intermediary and business arrangement. It is constructing multi-sided markets, coordinating human and non-human actors and determining the rules of operation (Langley and Leyshon, 2017). A website is a collection of webpages without an active construction of multi-sided markets and coordination of actors. Websites are built on digital platforms. While website implies a static collection, a platform is a dynamic framework.

- Companies that build custom software or learning platforms acting as more of an outsourcing service than an established platform. They do not offer a platform per se, but rather provide custom service or software.
- Platforms focused on driving and music training (if not linked to the formal qualification)
- Platforms focused on hobbies

We used these inclusion and exclusion criteria to manually review the long-list of edtech companies and created a short-list of 2,474 edtech companies. The short-list was coded according to the Universities and Unicorns (UU) classification scheme developed for this research project, discussed in the following section. This resulted in the further exclusion of 462 companies that did not meet our inclusion criteria. The remaining 2,012 companies make out the companies database. The companies database includes CB data which is complemented by the UU classification scheme.

Second, we extracted a list of top investors associated with the selected edtech companies using the companies database. This yielded a list of 1,120 investors that was then searched in CB for additional information, which was downloaded. The list was populated with additional geographical information about the investors to generate the investors' database.

Finally, an additional search was conducted on CB to identify investment deals associated with any of the 2,012 edtech companies from our first database. This yielded a list of 1,962 investment deals spread across 825 companies. Associated CB data was downloaded.

4. The UU classification of edtech companies

CB is a generalist database that holds information on companies across all economic sectors, which means that information available through the database is not sector-specific to education or HE. To better understand what kind of digital products and services existed, we developed our

We found websites that offer searches of HE institutions' courses provided by other websites or platforms. These websites could target either national or international students. We excluded all these websites because they simply pull the information together and do not allow any active user engagement or programming.

own UU classification scheme consisting of four key dimensions: primary offering, service model, customer, and end-users (Table 1).

Table 1: The four UU-dimensions with brief definitions

The four UU-dimensions	Brief definition
Primary offering	The main type of product or service offered via the digital platform.
Service model	The main type of intermediation that platforms institute between customers, users, and other businesses.
Primary customer	The key customer type, paying for the use of the primary offering.
End users	The user type(s) who engage with the platform and leave data traces.

Primary offering refers to the variety of digital products and services offered via digital platforms by each edtech company on our list. It consists of seven sub-categories:

- *Software Foundation* includes platforms that are in the function of institutional digital backbone. They often take the form of software as a service. Examples are virtual learning environments (such as Blackboard), learning management systems (such as Canvas LMS) and business software.
- *T&L Content (Teaching and Learning Content)* is defined as digitally delivered content. Content refers to any programmes, modules, Massive Open Online Courses (MOOCs), knowledge sharing, microlearning, and other forms of content. This category also includes assessment and accreditation within content delivery.
- *Bootcamps* are delivered on platforms that offer content as a specific service provided for a shorter and limited period. Most often, these are digital skills or training Bootcamps, but they can cover other areas too. Sometimes universities partner with companies to provide this service or content. Only Bootcamps that are delivered online are included in this category. This sub-category could be a part of the T&L Content, but we left it separate since it is proving to be a fast-growing and distinctive market segment.

- *T&L Support (Teaching and Learning Support)* includes tools used to support and complement teaching and learning purposes, such as quizzes, games, proctoring, and virtual reality. These services can be used in teaching and learning processes but are not primarily focused on content delivery. These platforms might target institutions or individual teachers.
- *Learner Service* includes digitally delivered learner or student support, as well as lifelong learning. The former relates to services such as career advice, socialising and connecting learners, mentoring, engagement, marketplaces, social networks, admission support and HEI information.
- *Analytics* include various digital data products. This sub-category is only used when an edtech's company's main business involves data analytics products. The category does not apply if analytics is part of other products or services that would be 'primary'. Thus, this category does not apply if an edtech company delivers supplementary analytics on core offerings such as Content or Software Foundation.
- *Financing* includes various kinds of tuition fees and financial loans to students.

We noted in all cases where primary offerings were augmented and depended on “data-rich” solutions that generated an added value from digital data. Examples include artificial intelligence, machine learning, blockchain technology, cryptocurrency, and cybersecurity.

We made a separate note for ‘Bootcamps’ and ‘T&L Content’ if the content and training focused solely on digital skills. Programming, coding, DevOps, and software training are all examples of digital skills training.

We also noted companies that are influential in the HE sector but could not be categorised in their primary offering due to subsidiary plurality. These companies are called Company Group, such as Seek, Pearson, and Learning Technology Group. In this case, other categories are not coded; but their presence is noted.

The service model refers to the intermediation that platforms enable between customers, users, and other businesses. This refers both to the type of data intermediation firms construct between different entities and how these constructions are made profitable (i.e., who pays for the product or service that the company is selling). In the management literature, scholars will discuss sales models: how and to whom does a company sell its products and services? That has become a pertinent issue in the digital economy where the relations between service providers, users, and paying customers have become opaque. This is of particular importance for digital education platforms. The sub-categories below outline six service models we identified. They all consist of

one or more Businesses (B), Costumers, Clients, or Consumers (C) that can be combined in eight different ways. The first B in each combination always refers to the edtech company being categorised. Trailing Bs can refer to any HE institution or other enterprise.

- *B2B (business to business) models* directly target institutions (either HE institutions or enterprises). In these cases, a platform offers a service or a product to the institution, which then uses it with its constituents. An example is virtual learning environments.
- *B2C (business to customer) models* directly target customers. In these cases, a platform would target individuals directly and offer a service to them. Most often, individuals pay various kinds of subscription fees.
- *B2B2C (business to business to customer) models* target institutions to build service further and connect with customers. Costumers can, for example, be reached through the edtech company's platform, whether that is run independently or in partnerships with the institution. MOOCs and Online Program Manager platforms are well-known users of the B2B2C model.
- *B2C2C (business to customer to customer) models* target a group of individuals to access other individuals. For example, content sharing platforms, such as Udemy, offer content to customers produced by individuals who are not platform employees. The content customers pay a subscription or a fee to the platform, which in turn, after taking a share, pays the content producers or other service providers.
- *B2C2B (business to customer to business) models* target individuals to reach other companies. There is only one such company in our database (Courseography).
- *B2B2B (business to business to business) models* target businesses in order to reach other businesses. There are only two such companies in our database (Learnerbly and Learninghubz).

Primary customer refers to the entity or person who pays for the use of the product, service, or platform. An edtech company's primary customers can differ from its end-users. For example, if a university pays for services used by its students, then the primary customer is the university and the end-user is the student. We distinguish between three sub-categories:

- *IND (individuals)* are individuals not associated with an institution and/or using a platform in their personal capacity and personally paying any subscriptions or fees.
- *HEI (higher education institutions)* are post-secondary educational institutions such as universities, colleges, and vocational schools.

- *ENT (enterprises)* are non-HEI enterprises (companies as employers). Examples include edtech companies providing learning management systems for employee or staff training and development, as well as content for said training and development.

End users is a category that refers to the end-user who engages with the platform and leaves data traces. These are individuals who either have a relationship with an HEI or an ENT or are otherwise targeted by an institution. The possible sub-categories are:

- *HEI Students* are students that are officially associated with HEIs.
- *HEI Academics* are academic employees of HEIs.
- *HEI Professionals* are administrators and leaders of HEIs. This group includes individuals who are not students, not in an academic role and not teachers.
- *ENT Employees* are employees of an enterprise (most often, the platform would offer staff development and training paid by employers).
- *ENT managers* are the leadership of employers/enterprise, administrators or human resources managers at employers.
- *IND* are individual members of the general population (if the platform targets individuals directly).

It often happens that digital-platform companies offer services across the sub-categories in each category. For example, a company might offer services not only to HE institutions as their primary customer but also to enterprises or even individuals. Or a company might offer products that work across T&L Content, T&L Support, and Learner Services. Our classification, however, refers to the core service or product only. In other words, we assigned a primary role to each company for analytical reasons, although companies might work across different offerings and other categories.

4.1 Creating the UU classification

The UU classification was created from the data to gauge the companies' services or products. After reviewing all companies, the Principal Investigator (PI) and the Co-Investigator (CI) of the UU project constructed an initial classification. They each applied it to the random set of 20 companies for inter-coder consistency and finalised the scheme. The Research Assistant (RA) then coded the companies using the classification. We conducted inter-coder reliability checks throughout the coding process, with the PI and CI making random checks of RA coding. Moreover, the research team held continuous coding discussions to align our understanding of the classification scheme.

5. Steps in creating the UU databases

In this section, we describe our approach step-by-step in terms of finding, downloading and cleaning data.

We began by conducting pilot searches of companies using the Industries as specified in Table 2.

1. We first created a list of HE relevant edtech companies using CB Industries (see Appendix 1).
2. We then manually checked the list and removed any companies based on our inclusion and exclusion criteria (see above). In addition, we removed all public universities that appeared on our list.
3. We checked the list and looked for key companies that might be missing (for example, Coursera).

While the number of companies that we found was of a manageable size, we found that some key companies were missing from this list. It would not be systematic if we randomly added companies. We therefore needed to apply a broader systematic search strategy.

We aimed to find a strategy that would allow us to gauge a larger pool of relevant companies but would still be manageable to review manually. We therefore used edtech and e-learning as industries for search.

The steps were the following:

1. Create search lists with broad keywords (edtech or e-learning), which produced 11,958 results.
2. We manually checked all 11,958 companies against our inclusion and exclusion criteria. We read short and long descriptions on CB. Where descriptions were not clear or detailed enough, we checked the company's webpage. We selected 2,474 companies as potentially fitting our criteria. Our approach was generous and, in case of doubt, included borderline cases because there was a second quality check of entries.
3. We downloaded basic information and descriptions of these 2,474 companies and coded them using our classification. The process of coding was the second qualifying check of the companies against our inclusion and exclusion criteria. We removed 462 companies. Please see below for more information on our decision making.

4. We ended up with 2,012 companies, for which we downloaded all CB information.
5. After all the data was downloaded, we further processed the companies' database:
 - a. We added a column with the HQ country
 - b. We added a world region based on UN classification
 - c. We added a world sub-region based on UN classification and adapted it based on our knowledge of edtech and literature review (for example, China is its own sub-region, as well as the USA and UK due to their strong position in the edtech market; EU level was added to the European sub-regions). Please see Appendix 4 for more information.
 - d. We added the UU classification scheme

In this way, we created and finalised our companies database. We then used the companies database to generate the other two databases in the following way:

6. We took "top 5 investors" from the companies' database, which is one of CB's data points for each company. Based on this, we created a list of investors in edtech companies active in HE.
7. We uploaded the lists back to CB to collect data about them. We then downloaded the list of investors with all CB data that was available.
8. After all the data was downloaded, we further processed the investors' database:
 - a. We added a column with the HQ country of the investor
 - b. We added a world region based on UN classification
 - c. We added a world sub-region based on UN classification and adapted it based on our knowledge of edtech and literature review (for example, China is its own sub-region, as well as the USA and UK due to their strong position in the edtech market; EU level was added to the European sub-regions). Please see Appendix 4 for more information.
9. We then uploaded the final list of companies back onto CB
10. We searched for investment deals based on the lists of companies.
11. We identified 1,962 deals and downloaded all the CB data on these deals. In addition, we added information about the investee companies from our companies database (region, sub-region and UU classification).

CB has a limit of 1,000 entries when downloading data. So in each of the above steps, where the upload or download of companies, investors or deals to CB happened, we needed to break down any lists that contained more than 1,000 entries. We then merged these lists after downloading them back into coherent databases.

In the above step 3 (removing companies while coding with the UU classification), we deleted companies in the following cases:

- Suspicion of not a genuine company: the description provided from the database and the named website of the company offers information that raises doubt and is not deemed reliable. Often, the websites would issue virus warnings.
- Not a company in the HE sector: the companies reviewed that were targeting K12 education level or offering job placements, individual professional websites, internships websites, general information websites not related to HE, or social networks sites not related to HE.
- Not enough information: reflects the lack of information available either from the description offered by the database or by the website. Also, it considers any inability to access the company's website to find more information.
- Not online: companies that primarily do not work online or offer edtech.
- Coaching only: a private form of service that is not educational technology.

We also made note of suspected companies offering potentially unethical services, such as essay or dissertation writing.

6. Reflections on using Crunchbase as a data source

When we started using CB classifiers, we felt there was a certain internal logic to the CB platform. However, it took us a couple of months of trial and error to discover how to best use the CB classification. What we thought would be our main and final search turned out to be only a pilot.

Constructing lists of companies, investors, and investor deals on CB always depends on CB's classifications of industry groups, industries, geographical tags and other search criteria. We felt that perhaps these tags are not always consistently applied. It is not clear to us based on what the industry and other tags are added to companies and other actors in the CB database. It might happen that some edtech companies classify themselves as 'software', and consequently, we might have missed identifying it as relevant for the UU project.

Our final list of companies seems to include primarily teaching and learning related platforms and infrastructure platforms. Therefore, it seems we might have missed some companies active in other areas of the HE sector, such as research or management of institutions. This might have been due to the CB classifiers and the way they are applied to companies or our understanding and use of them. Therefore, the search could be broadened to include also other relevant industry groups and industries, such as "software" or "information technology". However, this would yield an even longer initial list of companies to manually review, which might not be feasible. Conducting such a search is always a question of how to balance scope with feasibility. Nevertheless, we are confident that our approach is systematic and broad enough to provide insights into potential trends in HE edtech.

While CB offers a great deal of data about companies, deals and investors, data is missing for a substantial number of actors and events. The consequent analyses might be less rigorous. We also felt that there is a considerable variety in the depth and length of companies' descriptions. While some companies added in-depth descriptions, others had very sparse descriptions or lacked them entirely. Furthermore, it seems that not all data on all companies is correct. Some companies, particularly those that seemed questionable, held information as if they were established 100 years ago, which was clearly not true.

We felt that CB's geographic focus is very much USA-centric. For example, a number of countries are entirely missing in CB's classification when checked against the UN's classification of world countries. Moreover, Africa is not added as a region. Yet, when we used Africa in our search and other countries that were missing in the CB's lists, our search still yielded results. This suggests that there are companies in CB's databases, but not all countries seem to be properly classified.

Thus it seems there is a mismatch between CB's search terms and the explanations of their classifications.

Since we reviewed a large set of companies manually, we may have made mistakes. For example, we may have removed a company that should not have been removed or kept those that should not have been kept. The latter is less likely since we had multiple checks.

Companies often work across offering categories or cater to several groups of customers at once, and thus classifying them under one "primary" category is always reductionist. We assigned the primary category based on each company's description and website. We checked how the company promotes itself, its price structure and products and made decisions on what we felt was their key market.

On a more technical note, we would have appreciated it if CB allowed downloading data for more than 1,000 entries on the list. This caused extra work for slicing lists on CB, downloading and merging manually.

7. References

Department for Education. (2019). Realising the potential of technology in education: A strategy for education providers and the technology industry. London.

Langley, P., & Leyshon, A. (2017). Platform capitalism: the intermediation and capitalisation of digital economic circulation. *Finance and Society*, 3(1), 11–31.

8. Appendix 1: CB Industries used for pilot search

CB classifies companies by the ‘industry group’³. Each group has a number of ‘industries’. In other words, industries are sub-sets of industry groups. CB states that it organises companies’ data using keywords of 700+ Industries and 40+ Industry Groups. It states: “Groups are broader subjects that encompass multiple industries. Industries are more specific market segments”⁴. For example, the industry group Education contains 22 Industries, including College Recruiting, E-Learning, EdTech, Higher Education, MOOC, ...

We identified the industries from the Education Industry Group that were deemed relevant for the UU project. We also checked other Industry Groups and identified those Industries that might produce relevant companies (Table 2). This did not yield appropriate results, and consequently, we narrowed the search down to the education industry group.

We conducted the search using the following CB classifiers:

- Industries group “education”, which was at the end left empty as the number of results was the same as using only industries as sub-sets of education
- Industries: “edtech” or “elearning” and
- Industries: “alumni”, “higher education”, “mooc”, “college recruiting”, “vocational education”, “universities”, “corporate training”, or “continuing education”

The number of results was 1,026. We checked the list manually and excluded those that haven’t matched our criteria. We were left with 756 companies.

As we discovered some substantial companies were missing (e.g. Coursera), we treated this as a pilot exercise and refined our search strategy.

CB Industries selected for pilot search:

- Chosen as primary interest
 - Alumni
 - Career planning

³ CB categorisation: <https://support.crunchbase.com/hc/en-us/articles/360043146954-What-Industries-are-included-in-Crunchbase->

⁴ How are industries organised on CB: <https://support.crunchbase.com/hc/en-us/articles/360043671353-How-are-industries-organized->

- College recruiting
- Continuing education
- Corporate training
- EdTech
- Education
- Entertainment
- Edutainment
- E-Learning
- Higher Education
- Knowledge Management
- MOOC
- Skill Assessment
- STEM Education
- Universities
- Vocational Education
- Chosen as a secondary interest
 - Employment
 - Impact Investing
 - Language Learning
 - Millennials
 - Recruiting
 - Social CRM
 - Social Impact
 - Test and Measurement
 - Textbook
- Chosen in addition from CB industries list
 - Personal Development
 - Training
 - Tutoring

9. Appendix 2: CB Industries, geographies and steps of search

We applied a broader search using the following CB classifiers:

- Industries: “edtech” OR “e-learning”

This produced 10,895 on 16.4.2021. Companies' headquarters' region was used to break the list down to lists of 1000s due to CB's limit of 1,000 entries for downloading. If regions provided too many results, they were further broken down by countries. This happened in the cases of USA, EU and APAC.

When broken down per region and country, the total sum of companies was 10,202. This means that 693 companies were lost in the process, which might also be due to some duplicates of sub-region searches. The reason might be a mismatch in regional and sub-regional classification on CB. In addition, in the cases of India and East Coast USA, the number of companies exceeded 1,000, so those above 1,000 were left out of our manual review.

A break-down of results is the following:

Table 2. Geographical breakdown of companies' search on CB as of April 2021.

Search terms	CB Geographical scope	Number of results
EdTech and e-learning	ASEAN 279	279
EdTech and e-learning	Latin America	588
EdTech and e-learning	Southeast Asia (duplicate of ASEAN)	279
EdTech and e-learning	Australasia	255
EdTech and e-learning	Central America	12
EdTech and e-learning	GCC	60

Search terms	CB Geographical scope	Number of results
EdTech and e-learning	UK	704
EdTech and e-learning	EU minus Germany and France	978
EdTech and e-learning	Germany and France	392
EdTech and e-learning	APAC minus India, China, Japan	786
EdTech and e-learning	India	1054
EdTech and e-learning	China and Japan	920
EdTech and e-learning	USA: San Francisco Bay Area, Greater Los Angeles Area, Greater Chicago Area	988
EdTech and e-learning	USA: Greater New York Area, Dallas/Fort Worth Metroplex, Greater Atlanta Area, Greater Baltimore-Maryland Area, Greater Boston Area	819
EdTech and e-learning	USA: Greater Denver Area, Greater Detroit Area, Greater Houston Area, Greater Miami Area, Greater Minneapolis - Saint Paul Area, Greater Philadelphia Area, Greater Phoenix Area, Greater San Diego Area, Greater Seattle	770

Search terms	CB Geographical scope	Number of results
	Area, Inland Empire, Tampa Bay Area, Washington Metro Area	
EdTech and e-learning	USA: East Coast of the United States	1318

As CrunchBase does not have Africa as a region, we did a search of adding “Africa” to the HQ location field. On 9.6.2021, this produced 220 results that were added to our list.

On 15.6.2021: We compared the UN list of countries and compared to the CB countries that were present in the region allocation + Africa. We discovered that CB does not have all countries in the region allocated. Consequently, we added 33 countries to our search using the same keywords for industries: Afghanistan, Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Iceland, Iran (the Islamic Republic of), Iraq, Israel, Jamaica, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Liechtenstein, Monaco, Montenegro, North Macedonia, Norway, Republic of Moldova, Russian Federation, Serbia, Suriname, Switzerland, Syrian Arab Republic, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yemen. On 15.6.2021, this produced another 510 companies that we added to our long list.

While the list of companies was now above 10,000, we found that some key companies were still missing. We consequently checked the list of Edtech unicorns from HoloniQ⁵ as of 23.6.2021) and added those relevant to HE, but missing from our list. We also checked the most popular MOOCs and OPMs and added those that were missing. From this step, we added: Iversity, Cognitive Class, Kadenze, FutureLearn, Apply Board, Handshake, Huike and Wiley education services.

⁵ <https://www.holoniq.com/>

10. Appendix 3: CB definition of regions

We took CB's regions and countries⁶ when searching for companies between April and June of 2021. At that time, CB defined the regions as follows:

Table 3. CB's geographical classification at the time of our search.

Region	Countries and territories
San Francisco Bay Area	San Francisco, Palo Alto, San Jose, Mountain View, Sunnyvale, Santa Clara, Menlo Park, San Mateo, Redwood City, and more. View the full list here.
Greater New York Area	New York, Brooklyn, Manhattan, Jersey City, Newark, Edison, White Plains, Parsippany, Melville, Hoboken, Long Island City, and more. View the full list here.
Greater Los Angeles Area	Los Angeles, Santa Monica, Irvine, Beverly Hills, Lucerne Valley, Pasadena, Newport Beach, West Hollywood, Culver City, El Segundo, and more. View the full list here.
Greater Chicago Area	Chicago, Evanston, Schaumburg, Naperville, Northbrook, Skokie, Oak Brook, Deerfield, Lisle, and more. View the full list here.
Dallas/Fort Worth Metroplex	Dallas, Plano, Irving, Fort Worth, Richardson, Addison, Frisco, Arlington, Carrollton, and more. View the full list here.
Greater Atlanta Area	Atlanta, Alpharetta, Norcross, Marietta, Duluth, Roswell, Kennesaw, Lawrenceville, Suwanee, and more. View the full list here.

⁶ <https://support.crunchbase.com/hc/en-us/articles/360010018153-How-are-regions-in-Crunchbase-defined->

Region	Countries and territories
Greater Baltimore-Maryland Area	Baltimore, Columbia, Annapolis, Owings Mills, Towson, Hunt Valley, Hanover, Laurel, Lutherville Timonium, and more. View the full list here.
Greater Boston Area	Boston, Cambridge, Waltham, Burlington, Woburn, Newton, Lexington, Wellesley, Framingham, and more. View the full list here.
Greater Denver Area	Denver, Boulder, Englewood, Greenwood Village, Littleton, Broomfield, Centennial, Aurora, Westminster, and more. View the full list here.
Greater Detroit Area	Detroit, Troy, Southfield, Farmington Hills, Bloomfield Hills, Birmingham, Livonia, Rochester Hills, Auburn Hills, and more. View the full list here.
Greater Houston Area	Houston, Sugar Land, Spring, Katy, Kingwood, Stafford, Conroe, Texas City, Cypress, and more. View the full list here.
Greater Miami Area	Miami, Fort Lauderdale, Boca Raton, West Palm Beach, Miami Beach, Coral Gables, Hollywood, Pompano Beach, Delray Beach, Palm Beach Gardens, Coral Springs, Aventura, Boynton Beach, Deerfield Beach, Weston, Hialeah Gardens, Jupiter, Doral, Hallandale, Davie, Lake Worth, Pembroke Pines, Miami Lakes, Palm Beach Shores, Palm Beach, North Palm Beach, Plantation, Oakland Park, Homestead, Key Biscayne, Dania, Sunrise, North Miami Beach, Tamarac, Opa Locka, Miami Springs, Royal Palm Beach, Lauderhill, Coconut Creek, Port Everglades, Wilton Manors, Carol City, Hialeah, Canal Point, Loxahatchee, Pahokee, Bryant, South Bay, Lantana, Belle Glade, Lake Harbor

Region	Countries and territories
Greater Minneapolis - Saint Paul Area	Minneapolis, Saint Paul, Minnetonka, Eden Prairie, Plymouth, Eagan, Maple Grove, Bloomington, Burnsville, and more. View the full list here.
Greater Philadelphia Area	Philadelphia, Wilmington, Wayne, King Of Prussia, Malvern, Conshohocken, Newark, Radnor, West Chester, and more. View the full list here.
Greater Phoenix Area	Phoenix, Scottsdale, Tempe, Chandler, Mesa, Gilbert, Glendale, Peoria, Avondale, Arizona City, Surprise, Fountain Hills, Goodyear, Maricopa, Paradise Valley, Cave Creek, Queen Creek, Tolleson, Carefree, Sun City, Litchfield Park, Wickenburg, Anthem, Laveen, Sun City West, Superior, Coolidge, Wittmann, Gold Canyon, Apache Junction, Higley, New River, Palo Verde, Rio Verde, Red Rock, Waddell, Stanfield, Tortilla Flat, Bapchule, Cashion, Arlington, Aguila, Fort Mcdowell, Sacaton, San Manuel, Tonopah, El Mirage, Picacho, Florence, Youngtown, Eloy, Morristown, Kearny, Mammoth, Oracle, Gila Bend, Chandler Heights, Valley Farms, Buckeye, Casa Grande
Greater San Diego Area	San Diego, Carlsbad, La Jolla, Encinitas, Poway, Solana Beach, Del Mar, San Marcos, Vista, El Cajon, Chula Vista, Oceanside, Escondido, Rancho Santa Fe, La Mesa, National City, Coronado, Ramona, Santee, Valley Center, Imperial Beach, Boulevard, Fallbrook, Lemon Grove, Bonsall, Pala, Julian, Lakeside, Alpine, Bonita, Spring Valley, San Ysidro, Borrego Springs, Jamul, Campo, Lincoln Acre, Tecate, Descanso, Guatay, Palomar Mountain, San Luis Rey, Pine Valley, Camp Pendleton, Ranchita, Pauma Valley, Potrero, Dulzura, Mount Laguna, Santa Ysabel, Warner Springs
Greater Seattle Area	Seattle, Bellevue, Redmond, Kirkland, Bothell, Tacoma, Issaquah, Everett, Woodinville, and more. View the full list here.

Region	Countries and territories
Inland Empire	Lucerne Valley, Riverside, Temecula, Corona, Murrieta, Rancho Cucamonga, Palm Springs, Palm Desert, San Bernardino, and more. View the full list here.
Tampa Bay Area	Tampa, Clearwater, Largo, Palm Harbor, Oldsmar, New Port Richey, Brandon, Lutz, Wesley Chapel, Spring Hill, Plant City, Holiday, Riverview, Brooksville, Safety Harbor, Port Richey, Dunedin, Seminole, Saint Petersburg, Tarpon Springs, Pinellas Park, Hudson, Lithia, Belleair Beach, Land O Lakes, Clearwater Beach, Indian Rocks Beach, Saint Leo, Apollo Beach, Sydney, Valrico, Istachatta, Ruskin, Thonotosassa, Dade City, Dover, Sun City Center, Seffner, Zephyrhills, Gibsonton, Sun City, Mango, Ozona, Trilby, Wimauma, Lacochee, Balm, San Antonio, Durant, Nobleton, Crystal Springs, Bay Pines, Aripeka, Crystal Beach, Elfers, St. Petersburg, Odessa, St. Pete Beach
Washington Metro Area	Washington, Reston, Arlington, Bethesda, Rockville, Alexandria, Herndon, Vienna, Gaithersburg, and more. View the full list here.
East Coast of the United States	Florida, Delaware, Maine, Virginia, Maryland, South Carolina, Rhode Island, Connecticut, Massachusetts, Georgia, New Jersey, North Carolina, New York, New Hampshire
ASEAN	Indonesia, Philippines, Singapore, Myanmar, Thailand, Malaysia, Cambodia, Vietnam, Brunei Darussalam, Laos
Asia-Pacific (APAC)	New Caledonia, Fiji, Palau, Tuvalu, South Korea, Indonesia, Tokelau, Sri Lanka, Norfolk Island, Kiribati, French Polynesia, Solomon Islands, Northern Mariana Islands, Maldives, Philippines, India, Mongolia, Christmas Island, Cocos (Keeling) Islands, Nepal, New Zealand, North Korea, Hong Kong, Singapore, Myanmar, Marshall Islands, Thailand, Papua New Guinea, Nauru, Malaysia, Australia, Pakistan, China, British Indian Ocean Territory, Japan, American Samoa, Bangladesh,

Region	Countries and territories
	Cambodia, Vietnam, Taiwan, Niue, Tonga, Cook Islands, Guam, Bhutan, Pitcairn, Timor-Leste, Brunei Darussalam, Macau, Hawaii
Australasia	New Zealand, Papua New Guinea, Australia
Central America	Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama
European Union	Ireland, Spain, Austria, Portugal, Croatia, Greece, United Kingdom, Finland, Belgium, Cyprus, Bulgaria, The Netherlands, Czech Republic, Poland, Sweden, Hungary, Denmark, Malta, Slovakia (Slovak Republic), France, Italy, Romania, Slovenia, Germany, Estonia, Latvia, Lithuania, Luxembourg
GCC	Qatar, United Arab Emirates, Oman, Saudi Arabia, Bahrain, Kuwait
Latin America	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guiana, Guadeloupe, Guatemala, Haiti, Honduras, Martinique, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Barthelemy, Saint-Martin (France), St. Pierre and Miquelon, Uruguay, Venezuela
Southeast Asia	Timor-Leste, Indonesia, Brunei Darussalam, Philippines, Christmas Island, Cocos (Keeling) Islands, Singapore, Myanmar, Thailand, Malaysia, Cambodia, Vietnam, Andaman and Nicobar Islands, Laos

As already mentioned, CB's classification is missing Africa as a region and also particular countries. So we added these to our searches as described above. Moreover, it seems that CB has taken the UK out of the EU region, which we assumed based on the numbers of companies if the UK is included or excluded from the search. But at the time of our search, CB has not yet

updated the list above. Perhaps this was due to Brexit. Consequently, our strategy was to take the list as it was and search for UK based companies separately.

After downloading all relevant data for the UU project, we used the UN definition of regions. In addition, we adapted the UN sub-region classification for our needs. We present this in the following appendix.

11. Appendix 4: UN definition of regions and sub-regions

We used the UN classification of regions and subregions with a few tweaks. The UN classification⁷ was downloaded on 6 July 2021. We used the first and second levels of classification. We called them region and subregion. The UN classification is:

Table 4. UN classification of regions and sub-regions.

Region	Sub-region	Country
Africa	Northern Africa	Algeria, Egypt, Libya, Morocco Sudan, Tunisia, Western Sahara
	Sub-Saharan Africa	Burundi, Comoros, Djibouti, Eritrea, Ethiopia, French, Southern Territories, Kenya, Madagascar, Malawi, Mauritius, Mayotte, Mozambique, Réunion, Rwanda, Seychelles, Somalia, South Sudan, Uganda, United Republic of Tanzania, Zambia, Zimbabwe, Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome and Principe, Botswana, Eswatini, Lesotho, Namibia, South Africa, Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Saint Helena, Senegal, Sierra Leone, Togo
Americas	Latin America and the Caribbean	Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bonaire, Sint Eustatius and Saba, British Virgin Islands, Cayman Islands, Cuba, Curaçao, Dominica, Dominican

⁷ <https://unstats.un.org/unsd/methodology/m49/>

Region	Sub-region	Country
		Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Puerto Rico, Saint Barthélemy, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French Part), Saint Vincent and the Grenadines, Sint Maarten (Dutch part), Trinidad and Tobago, Turks and Caicos Islands, United States Virgin Islands, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Argentina, Bolivia (Plurinational State of), Bouvet Island, Brazil, Chile, Colombia, Ecuador, Falkland Islands (Malvinas), French Guiana, Guyana, Paraguay, Peru, South Georgia and the South Sandwich Islands, Suriname, Uruguay, Venezuela (Bolivarian Republic of)
	Northern America	Bermuda, Canada, Greenland, Saint Pierre and Miquelon, United States of America
Asia	Central Asia	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
	Eastern Asia	China, China, Hong Kong Special Administrative Region, China, Macao Special Administrative Region, Democratic People's Republic of Korea, Japan, Mongolia, Republic of Korea
	South-eastern Asia	Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia,

Region	Sub-region	Country
		Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam
	Southern Asia	Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka
	Western Asia	Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen
Europe	Eastern Europe	Belarus, Bulgaria, Czechia, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, Ukraine
	Northern Europe	Åland Islands, Guernsey, Jersey, Sark, Denmark, Estonia, Faroe Islands, Finland, Iceland, Ireland, Isle of Man, Latvia, Lithuania, Norway, Svalbard and Jan Mayen Islands, Sweden, United Kingdom of Great Britain and Northern Ireland
	Southern Europe	Albania, Andorra, Bosnia and Herzegovina, Croatia, Gibraltar, Greece, Holy See, Italy, Malta, Montenegro, North Macedonia, Portugal, San Marino, Serbia, Slovenia, Spain
	Western Europe	Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland

Region	Sub-region	Country
Oceania	Australia and New Zealand	Australia, Christmas Island, Cocos (Keeling) Islands, Heard Island and McDonald Islands, New Zealand, Norfolk Island
	Melanesia	Fiji, New Caledonia, Papua New Guinea, Solomon Islands, Vanuatu
	Micronesia	Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, Northern Mariana Islands, Palau, United States Minor Outlying Islands
	Polynesia	American Samoa, Cook Islands, French Polynesia, Niue, Pitcairn, Samoa, Tokelau, Tonga, Tuvalu, Wallis and Futuna Islands

For the purpose of the UU project, we made the following adaptations (Table 6):

- In the case of the Americas, we used the sub-regions as regions. The reason was the dominance of the USA in the edtech industry, which we wanted to capture and record it.
- In the case of Europe, we added the EU layer and kept the UK separate. The reasons were first, the UK’s dominance in the region in edtech, and second, the EU political drive for edtech investment and innovation.
- In the case of Asia, we kept China separate, and we added EU Western Asia (i.e. Cyprus). The reason was China’s dominance in edtech that we wanted to record. And we added the EU layer to Cyprus for the same regions as before.

Table 5. UU geographical classification (adapted UN classification).

Region	Sub-region	Country
Africa	Northern Africa	Algeria, Egypt, Libya, Morocco Sudan, Tunisia, Western Sahara
	Sub-Saharan Africa	Burundi, Comoros, Djibouti, Eritrea, Ethiopia, French, Southern Territories, Kenya, Madagascar, Malawi, Mauritius, Mayotte, Mozambique, Réunion, Rwanda, Seychelles, Somalia, South Sudan, Uganda, United Republic of Tanzania, Zambia, Zimbabwe, Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome and Principe, Botswana, Eswatini, Lesotho, Namibia, South Africa, Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Saint Helena, Senegal, Sierra Leone, Togo
Latin America and the Caribbean	Latin America and the Caribbean	Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bonaire, Sint Eustatius and Saba, British Virgin Islands, Cayman Islands, Cuba, Curaçao, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Puerto Rico, Saint Barthélemy, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French Part), Saint Vincent and the Grenadines, Sint Maarten (Dutch part), Trinidad and Tobago, Turks and Caicos Islands, United States Virgin Islands, Belize, Costa Rica, El Salvador, Guatemala,

Region	Sub-region	Country
		Honduras, Mexico, Nicaragua, Panama, Argentina, Bolivia (Plurinational State of), Bouvet Island, Brazil, Chile, Colombia, Ecuador, Falkland Islands (Malvinas), French Guiana, Guyana, Paraguay, Peru, South Georgia and the South Sandwich Islands, Suriname, Uruguay, Venezuela (Bolivarian Republic of)
Northern America	Canada	Canada
	United States of America	United States of America
	Northern America - Other	Bermuda, Canada, Greenland, Saint Pierre and Miquelon
Asia	China	China
	Central Asia	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
	Eastern Asia	China, Hong Kong Special Administrative Region, China, Macao Special Administrative Region, Democratic People's Republic of Korea, Japan, Mongolia, Republic of Korea
	South-eastern Asia	Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam

Region	Sub-region	Country
	Southern Asia	Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka
	Western Asia	Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen
	EU Western Asia	Cyprus
Europe	EU Eastern Europe	Bulgaria, Czechia, Hungary, Poland, Romania, Slovakia
	EU Northern Europe	Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden
	EU Southern Europe	Croatia, Greece, Italy, Malta, Portugal, Slovenia, Spain
	EU Western Europe	Austria, Belgium, France, Germany, Luxembourg, Netherlands
	Non-EU Eastern Europe	Belarus, Republic of Moldova, Russian Federation, Ukraine
	Northern Europe excl EU&UK	Åland Islands, Guernsey, Jersey, Sark, Faroe Islands, Iceland, Isle of Man, Norway, Svalbard and Jan Mayen Islands

Region	Sub-region	Country
	Non-EU Southern Europe	Albania, Andorra, Bosnia and Herzegovina, Gibraltar, Holy See, Montenegro, North Macedonia, San Marino, Serbia,
	Non-EU Western Europe	Liechtenstein, Monaco, Switzerland
	UK	UK
Oceania	Australia and New Zealand	Australia, Christmas Island, Cocos (Keeling) Islands, Heard Island and McDonald Islands, New Zealand, Norfolk Island
	Melanesia	Fiji, New Caledonia, Papua New Guinea, Solomon Islands, Vanuatu
	Micronesia	Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, Northern Mariana Islands, Palau, United States Minor Outlying Islands
	Polynesia	American Samoa, Cook Islands, French Polynesia, Niue, Pitcairn, Samoa, Tokelau, Tonga, Tuvalu, Wallis and Futuna Islands