



METAARI

Advanced Learning Technology Research

The 2020-2025 Worldwide Mobile Learning Market

*Learning in the Bright 5G Air: Revenues
Surge to Over \$42 Billion by 2025*

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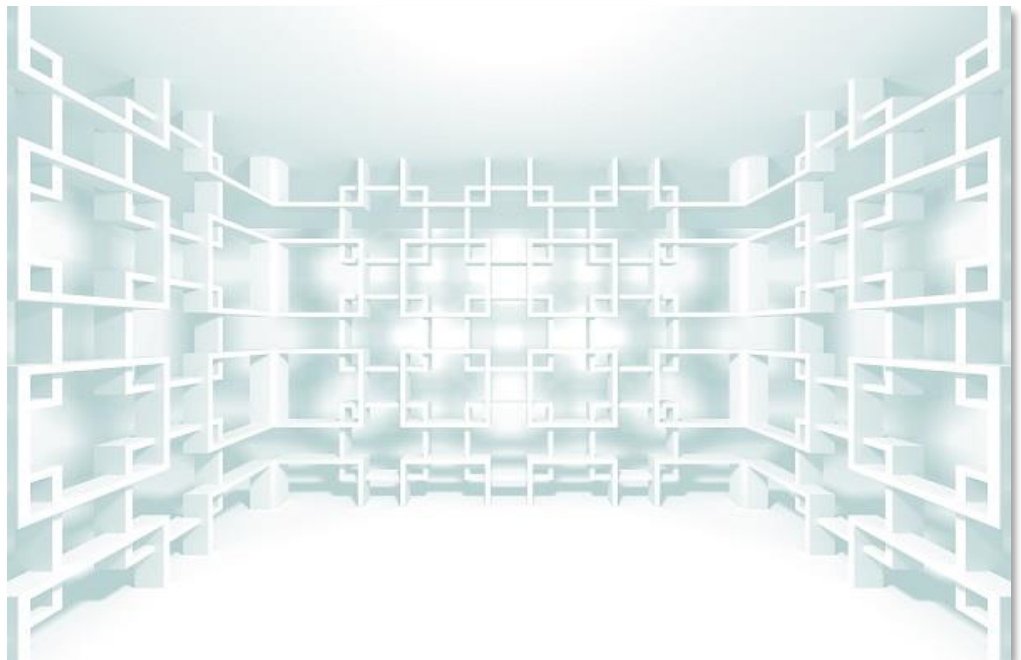


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Metaari's Organizational Enterprise Licensing Model

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Executive Overview: 5G is a Game Changer

The global Mobile Learning market reached \$18.3 billion in 2020. The five-year compound annual growth rate for Mobile Learning is a robust 18.5% *and revenues for Mobile Learning products and services will surge to well over \$42 billion by 2025*. This report includes five-year revenue forecasts for eight buying segments, seven international regions, and for 61 countries within those regions. They are the top-buying countries in the world.

The US will be the top buying country across the forecast period. In the 2020 market, China was the second-largest buying country. By 2025, Indonesia will be the second-largest buying country followed by India. China will drop to fourth place. The five-year compound annual growth rate (CAGR) for Mobile Learning in the US is 20.6%. In stark contrast, the growth rate in China is 5.4%. For a variety of socio-economic reasons (particularly regulatory uncertainty), revenues for Mobile Learning in China will start to decline during the forecast period.

There are a number of factors inhibiting the market for Mobile Learning in China. The primary inhibitor is the growing number of regulations being imposed by the government including the laws limiting screen time for children and laws prohibiting unapproved apps in the schools. There are also strict guidelines on the type of digital content allowed in the country. It is virtually impossible for a foreign company to gain traction in the country without a distribution agreement with a licensed domestic company.

Over 1,500 suppliers operating in 126 countries are cited in this report to help international suppliers identify local partners, distributors, resellers, and potential merger and acquisition (M&A) targets.

- Game developers must get government approval and obtain a license to sell products in China. The government has made it quite difficult for developers to get to market. In fact, they fined a gaming company \$100,000 in December 2019 for selling an unlicensed game. This is the first time they have fined a developer.
- In September 2019, the Chinese government mandated that educational app developers needed to register their apps with the Ministry of Education. "Eight government departments, including the ministry, have jointly issued a directive to regulate the use of educational apps in schools. The government will develop a database of educational apps and step up supervision over their content and operation." China has a national education system and the federal government buys any apps used in the schools. The new mandate prohibits the developers from charging students or parents for the apps and the apps cannot contain ads. Developers are also

required to get a guardian permission to collect personal data from minors.

This report includes five-year forecasts for 61 countries. They are the top Mobile Learning buying countries in the world and they are broken out by region. The revenue threshold to make it in the top rankings is \$20 million in annual expenditures in the 2020 market.

The demand is high in many other countries but the revenues are below \$20 million, usually due to low populations. That said, a general analysis is provided for each region that provides a good snapshot of the buying behavior in the other countries in the region.

Consumers account for the majority of revenues in the 2020 market due to the near insatiable demand for early childhood learning apps, language learning apps, and cognitive fitness products. Spending by corporations will be on par with consumers by 2025. The spike in revenues in the corporate segment is due to the high demand for pre-employment assessment apps, field-based performance support, and remote expertise apps.

One of the most significant trends that emerged in 2019 was the pivot away from consumer markets and a move to the business sectors. Magic Leap is the most notable example. After burning through funding and experiencing dismal headset sales in the consumer segment, they pivoted to the business segment in late 2019. They now have dozens of reseller partners (mostly content developers) that compete in the corporate segments across the planet.

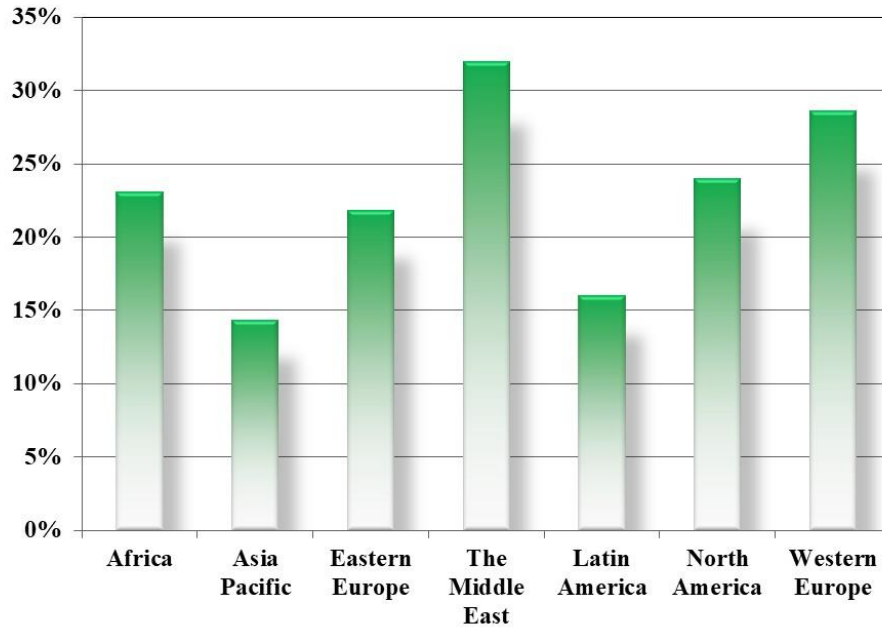
In November 2019, Microsoft stated in the press that the three most popular uses of the HoloLens device were "remote assistance (such as helping a field worker install or repair equipment with help from a faraway expert), visualizing complicated 3-D environments (such as checking out how a life-size virtual model of a new HVAC system would fit into a real-world warehouse), and employee training."

The global Mobile Learning market is being driven by a tailwind of innovations including the roll out of very fast 5G wireless networks, next-generation location-based technology, smartphone-enabled virtual reality, mobile augmented reality, and artificial intelligence-based apps. ***The rollout of commercial 5G networks is having a dramatic impact on the global Mobile Learning market; 5G is essentially a new delivery platform.***

This report identifies the countries with the highest revenues in each of the seven regions. It also identifies the major buying segments and the types of products they buy.

In terms of growth, the Middle East, Africa, and Eastern Europe will have the highest growth rates throughout the forecast period. Venezuela is the only country in the world with a negative growth rate and it is quite steep at -10.8.

Figure 1 - 2020-2025 Worldwide Mobile Learning Five-year Growth Rates by Seven Regions



The OECD reports that "Poland, Slovenia, Chile, Portugal, Turkey and Mexico were the fastest growing countries in mobile broadband penetration with growth rates ranging between 22% and 12%."

Except for Venezuela, *all of the low growth countries have very high revenues*. The countries with the lowest growth rates are early adopters and the most mature markets in the world and they account for the highest revenues. A low growth rate in a mature market means that revenues will remain steady over the forecast period.

The countries with very high growth rates are nascent markets with low baseline revenues at the start of the forecast period. The growth rates will slow over the forecast period in emerging markets as adoption takes hold, yet revenues will double in any country with a growth rate over 15%.

Most of these high-growth countries have healthy, fast-growing developing economies. Except for a few urban areas, they are also largely rural. Mobile Learning is now being embraced as an essential strategy to deliver education in these dynamic economies. Many of these countries

are mobile-only countries and Mobile Learning is the de facto dominant learning technology.

The CAGRs have slowed over the last ten years in the early adopter countries, which is a clear indication that Mobile Learning is now a mature learning technology type in those countries. Mobile Learning is now mainstream in early adopter countries like the US, Japan, South Korea, Singapore, and all of Northern Europe.

In July 2019, the Organization for Economic Co-operation and Development (OECD) reported that the 35 countries that belong to OECD each had a 99% wireless broadband penetration rate. "Eleven countries – Japan, Finland, Australia, the US, Denmark, Sweden, Estonia, Korea, Iceland, New Zealand, and Ireland, in descending order of mobile subscriptions per capita – now lie above the 100% penetration threshold, up from nine countries a year ago."

Primary Catalysts Driving the Global Mobile Learning Market

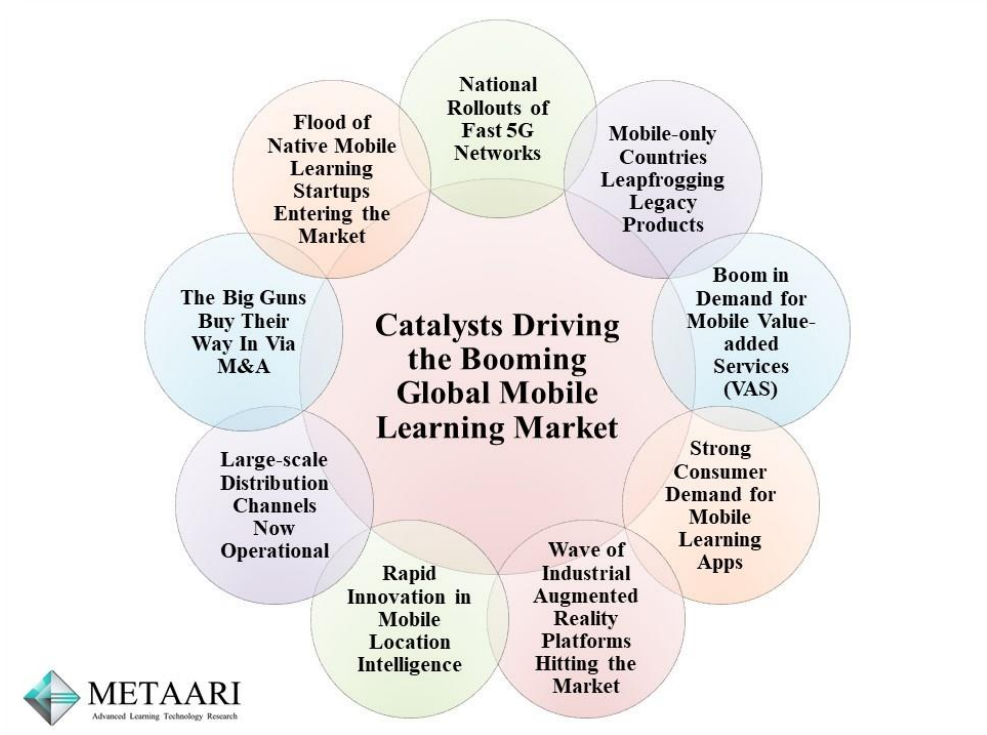
While the catalysts for Mobile Learning are different for each country and region, there are global trends that are now clearly evident. The primary catalysts in the global Mobile Learning market include:

- Blindingly fast 5G networks reinvent the learning landscape
- Mobile-only countries leapfrogging legacy learning
- Boom in demand for Mobile Learning as a Service (MLaaS)
- Strong consumer demand for Mobile Learning content
- Wave of industrial augmented performance support products hitting the market
- Rapid innovation in new Mobile Learning products that integrate VR, AI, and location intelligence
- The launch of large-scale distribution channels
- The surge in merger and acquisition (M&E) activity as the large global tech companies "buy their way in" to the Mobile Learning market
- The flood of startups developing native Mobile Learning products entering the market

There are catalysts that are specific to particular countries and they are discussed in the analysis of those countries. For example, in countries with low credit card usage, direct carrier billing arrangements between the commercial app stores and the mobile network operators (MNOs) are major catalysts for app sales.

A host of new commercial Mobile Learning products are now on the market including smart Location-based Learning apps, industrial augmented mobile decision support products, and more recently, smartphone-enabled virtual reality education apps. These next generation products are altering the competitive landscape and represent significant new revenues for content suppliers.

Figure 2 – The Primary Catalysts in the Booming 2020-2025 Worldwide Mobile Learning Market



Corporations are adopting pre-employment evaluation games across the planet. New suppliers continue to come on the market at a rapid pace and they are attracting a significant amount of investment capital.

The launch of Apple's ARKit and Google's ARCore SDKs in 2017 is a major catalyst for Mixed Reality Learning going forward. ***There will be billions of phones with native AR support in just 2-3 years.***

Until recently, corporations were slow adopters of Mobile Learning, largely because there was no business need in companies that employ information workers. Self-paced eLearning is still the dominant learning technology type used to train information workers; they spend the bulk of their day on computers.

Mobile Learning has finally gained traction in the corporate segments across the planet due in large part to the growing adoption of augmented mobile performance and decision support products in particular industrial

verticals like warehousing, manufacturing, energy, aviation, automotive, and in clinical and field-based companies.

For example, assembly workers at Airbus wear smart glasses as they install the interiors of planes. "The head-worn technology features a camera to scan barcodes so the user can see the specific cabin plans and information based on individual customer requirements, as well as view the marking zone. The glasses also feature an offset screen that displays several navigation icons and items in augmented reality. In addition, when the mark has been made, the tool checks its location to validate the operation."

Each of these catalysts are analyzed in great detail in the body of the report. Since distribution is always a challenge for developers, eleven global distribution channels are analyzed in great detail in the catalyst section. The report identifies the types of companies entering into distribution agreement and the types of Mobile Learning companies they are most interested in.

Yet, it is the advent of the new blindingly fast 5G networks that will alter the Mobile Learning landscape forever. Of all the catalyst, 5G will dramatically alter the competitive landscape over the forecast period. Ericsson predicts that by 2024, "5G subscriptions will reach 1.9 billion, and that coverage could blanket up to 65% of the world's population." In February 2019, the GSM Association forecast that "5G is on track to account for 15% of global mobile connections by 2025 and will contribute €1.94 trillion (\$220 trillion USD) to the worldwide economy over the next 15 years."

The trade association predicted that there would be at least 1.4 billion 5G subscriptions by 2025. They predicted that half of all subscriptions in the US and 30% in China would be 5G by 2025. "We will connect more than a billion new people to the mobile internet over the next few years, spurring adoption of mobile-based tools and solutions in areas such as agriculture, education and healthcare."

One major catalyst driving the market is the steady flow of Mobile Learning startups coming into the market. These startups are flooding the market with amazing innovations and customer demand has been robust. The startups are also attracting large amounts of private investment providing clear evidence of the strength of the market. These startups and their investment totals are identified in every section of this report.

What You Will Find in This Report

There are four sections in this report: a detailed analysis of the market catalysts, a demand-side analysis by eight buying segments, a demand-side analysis by region (including a detailed forecast for the top-buying countries in that region), and a supply-side analysis by four products and services types. It also includes a breakout by nine distinct types of content. The seven regions analyzed in this report include:

- Africa
- Asia Pacific
- Eastern Europe
- Latin America
- The Middle East
- North America
- Western Europe

In the demand-side analysis, a detailed breakout of revenue forecasts is provided for 61 of the top buying countries across the regions. The worldwide supply-side analysis *combines* all the global Mobile Learning market revenues and breaks out revenues by four product and service types. Revenues for

Over 1,500 suppliers competing in specific countries across the planet are cited in this report. This will help international suppliers identify local partners, distributors, resellers, and potential merger and acquisition (M&A) targets.

This report only has a brief overview of the US Mobile Learning market. A detailed analysis of the US Mobile Learning market is provided in the stand-alone report called "*The 2020-2025 US Mobile Learning Market*" published in December 2019.

- The report has 214 pages, 24 tables, and 10 charts. The organizational site license for the report can be purchased for \$1,475.00 USD. Elearning! Magazine is the exclusive reseller of Metaari's 2020-2025 US Mobile Learning Market report. The free Executive Overview and purchasing information can be found here: <http://www.2elearning.com/research/>

This report does include revenues for training and education content for handheld devices, wearables, and untethered headsets. It does not include revenues for content designed for tethered devices. Revenues for hardware devices are not included in this report.

Africa has the fastest growing middle-class demographic on the planet. This means there is a growing amount of discretionary spending in the region.

Where are the Buyers?

Metaari tracks the learning technology markets in 126 countries across seven regions. While there can be similarities in buying behavior across countries, they are usually confined to a particular buying segment. In general, however, the buying behavior is quite different in each country.

Table 1 - The 126 Countries across the Seven Regions Tracked by Metaari

Number of Countries Analyzed in Each Region	Countries Analyzed in this Report by Region
30 Countries in Africa	Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, Côte d'Ivoire (The Ivory Coast), the Democratic Republic of Congo (DRC), Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Tunisia, Uganda, Zambia, and Zimbabwe (<i>Metaari has suspended analyzing Zimbabwe during the current socio-economic turmoil in that country.</i>)
21 Countries in Asia Pacific	Australia, Bangladesh, Cambodia, China (including Hong Kong and Macao), India, Indonesia, Japan, Laos, Malaysia, Mongolia, Myanmar (Burma), Nepal, New Zealand, Pakistan, the Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Thailand, and Vietnam
15 Countries in Eastern Europe	Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Serbia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.
18 Countries in Latin America	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Perú, Uruguay, and Venezuela (<i>Metaari has suspended analyzing Venezuela during the current financial crisis in that country.</i>)
12 Countries in the Middle East	Bahrain, Egypt, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Turkey, and the United Arab Emirates (UAE) (<i>Metaari has suspended analyzing Yemen during the current political crisis in that country</i>)
2 Countries in North America	Canada and the United States
28 Countries in Western Europe	Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland, and the United Kingdom

This report provides five-year forecasts for Mobile Learning products for seven regions: Africa, Asia Pacific, Eastern Europe, Latin America, the Middle East, North America, and Western Europe.

All of the 30 countries that Metaari tracks in Africa can be categorized as mobile-only countries. The overwhelming method of Internet access in every country in the region is via mobile devices. Mobile Learning is the only viable learning technology delivery channel in mobile-only countries.

The Sixty-One Top Buying Countries in the World

This report includes five-year revenue forecast for 61 countries. They are the top buying countries in the world. The demand is often high in many other countries but the revenues are quite small usually due to low population totals. The top buying countries by region include:

Table 2 – The Sixty-One Top Mobile Learning Buying Countries by Region:

Region	Top Buying Countries in Each Region
9 Countries in Africa	Algeria, Angola, Kenya, Morocco, Nigeria, Rwanda, South Africa, Tanzania, and Uganda
10 Countries in Asia Pacific	China (including Hong Kong and Macao), India, Indonesia, Japan, Malaysia, Myanmar (Burma), South Korea, Taiwan, Thailand, and Vietnam
7 Countries in Eastern Europe	Azerbaijan, Bosnia and Herzegovina, Georgia, Kazakhstan, the Russian Federation, Serbia, and Ukraine,
9 Countries in Latin America	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, and Perú
7 Countries in the Middle East	Egypt, Israel, Jordan, Lebanon, the Kingdom of Saudi Arabia (KSA), Turkey, and the United Arab Emirates (UAE)
2 Countries in North America	Canada and the United States
17 Countries in Western Europe	Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Iceland, Italy, Norway, Poland, Portugal, Romania, Spain, Sweden, and the United Kingdom

The revenue threshold for a country to be included in the top buying rankings is \$20 million in the 2020 market. Customers in each of the countries included in this analysis spend over \$20 million a year on Mobile Learning products and services.

Who are the Buyers?

There are eight Mobile Learning buying segments analyzed in this report: consumers, three academic sub-segments (preschools, primary schools, and secondary schools), tertiary & higher education institutions, federal government agencies, state/& local government agencies, and corporations & businesses.

In terms of aggregated global revenues, consumers, academic buyers, and government buyers will dominate the worldwide market throughout the forecast period. That said, buying behavior in each country is different.

Consumers dominate most of the countries in this report. Corporations in the US (and across developed countries) are adopting Mobile Learning at a rapid rate due in large part to the rapid uptake of new pre-employment assessment apps, mobile performance support apps, and device-enabled (handhelds and wearables) decision support products (also called expertise assistance apps) designed primarily for industrial and field-based verticals.

The PreK-12 segments are broken out by the three sub-segments because the buying behavior and the user demographics are quite different in each cohort. The breakout in sub-segments provides precise insights for developers.

The types of Mobile Learning apps and games used in the primary and secondary sub-segments are very different as they map to scaffolding curricula. For example, STEM games are more common in middle school and high school programs. Language learning apps and games are in wide use in language learning programs.

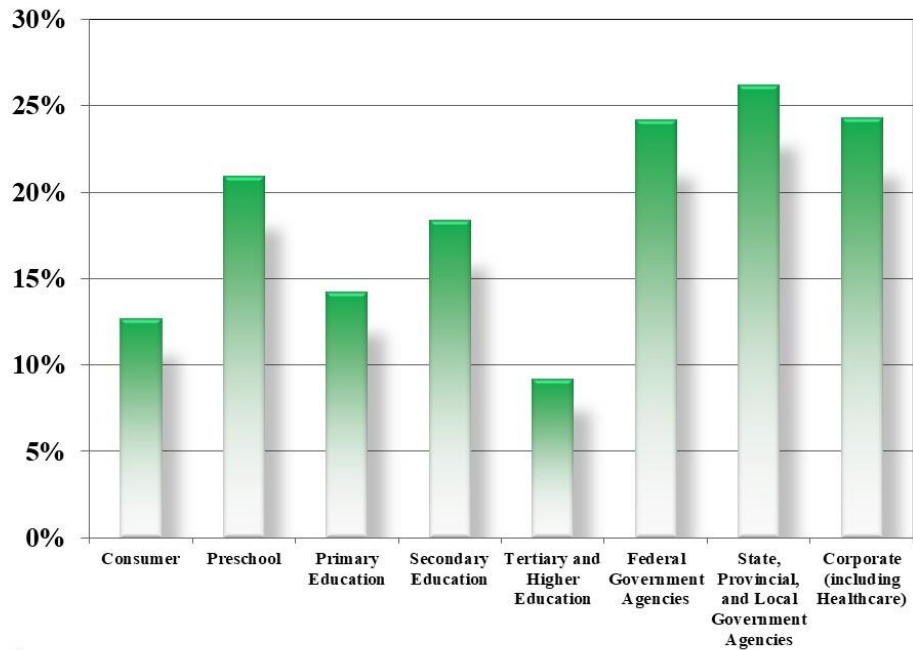
One major catalyst in the PreK-12 segment is the availability of cost-effective AR and VR Classroom Kits that come with stand-alone headsets and preloaded educational content. UK's ClassVR (an Avantis brand) is a major Classroom Kit supplier with customers across the planet.

The consumer buying behaviors in each of the countries analyzed in this report are quite different. This report identifies the mobile educational apps in the highest demand in each country.

These kits almost always ship with Google Expeditions experiences. As of late 2019, there were over a thousand VR Google Expeditions and hundreds of AR Expeditions on the market.

Mobile Learning games have been proven to be quite effective at teaching young children social and emotion learning (SEL) skills. The large for-profit preschool chains (particularly in the US and China) are the top buyers of educational games for preschoolers.

Figure 3 - 2020-2025 US Mobile Learning Growth Rates for Eight Buyer Segments



In many countries, the private for-profit schools (both PreK-12 and higher education) are avid adopters of Mobile Learning, while the public schools lag behind. Those countries are identified in this report.

Both federal and state government agencies in many countries buy Mobile Learning content for citizen outreach initiatives including language learning, tourism, literacy, healthcare, and, in some countries, for employees, first responders, military, security (particularly cybersecurity) training, and vocational training. Mobile procedural learning apps are used for equipment maintenance.

The state (and also prefectures and provinces) and local government agencies have the highest growth rate of all the segments at 26.2%. Many state and local agencies fund education systems but those expenditures are pulled out into the academic sub-segments in this report.

Lessons Learned: Pivoting to the Business Segment

One of the most significant trends that emerged in 2019 was the pivot away from consumer markets and a move to the business sectors by the AR and AR companies. Magic Leap and Niantic are the most notable examples.

After burning through funding and experiencing dismal headset sales in the consumer segment, they pivoted to the business segment in late 2019. They now have dozens of reseller partners (mostly field performance support and expert assistance developers) that compete in the corporate segments across the planet.

Niantic is the Google spin out that developed the enormously popular (and profitable) Pokémon GO AR-based mobile game. They continue to develop commercial games but are rapidly diversifying into new sectors. They are now an AR platform provider, a smart glasses developer, and a tourist app developer. Niantic joined the United Nations World Tourism Organization (UNWTO) agency as an affiliate member in September 2019 "to promote responsible tourism with augmented reality. The partnership will include 'new adventures inside Niantic's popular games and a campaign around playing safely.'"

- Over the last year, UNWTO has been working with innovators from around the world and promoting the use of new technologies through the newly created UNWTO Tourism Tech Adventures. UNWTO is reaching out to technology and communication partners beyond tourism to identify new ways of promoting destinations and reaching new audiences.

Niantic released their Real World Platform development kit to selected participants through the Niantic Creator Program in November 2019. The company is effectively "developing information layers anchored in the real world, which could one day power all kinds of applications for AR glasses and similar devices." The company also announced in November 2019 that they were inviting small businesses to participate in their sponsored locations program. In December 2019, Niantic announced that they were collaborating with Qualcomm to build 5G-ready smart glasses.

It has become apparent that the consumer demand for both AR and VR is quite weak. Devices are still relatively expensive, and except for games, content is a weak link in the consumer story. The major headset

developers are pivoting away from the consumer segment and are now marketing their products to corporations and government agencies.

Cornerstone OnDemand is a legacy eLearning provider and announced in November 2019 that they were partnering with Oculus "to help shared clients utilize data to build better virtual reality (VR) training experiences. Through the partnership, shared clients of Cornerstone and Oculus for Business, launched earlier this year to make it easier for companies to bring headsets, including the Quest, into the workplace."

Oculus launched Oculus for Business in April 2018. "Oculus for Business offers a secure and reliable VR solution for enterprise customers. The offering includes software to set up and manage VR deployments, a tailored in-headset experience and enterprise-grade customer support. Oculus for Business was designed for professional settings and enterprise needs. Making learning and collaboration tasks more immersive helps employees focus on the tasks at hand."

Google launched their Google Glass Enterprise Edition 2 in May 2019. They also announced that support for their consumer device, Glass Explorer Edition will be discontinued in 2022. The company has essentially admitted that their consumer push has been unsuccessful with some analysts calling it an outright failure. The Glass Enterprise Edition is being used by more than 50 businesses in the US, including AGCO, DHL, Dignity Health, NSF International, Sutter Health, Boeing, and Volkswagen.

HTC launched their VIVE Enterprise Solutions business unit in July 2019. "Recognizing that hardware alone isn't enough, this new business organization combines software, hardware, professional services, business solutions, and support to address four key areas where enterprises are investing today: Training and Simulation, Design and Visualization, Virtual Collaboration, and Location-Based Entertainment and Attractions." HTC launched their untethered VR headset called the Vive Focus Plus in early 2019. Despite the fact that HTC claims that the Focus Plus is a popular headset with consumers in China, the company did not release a consumer version in the US.

The Chinese AR headset provider Nreal has focused on consumer solutions until now. They have now pivoted to business solutions. During the Snapdragon Tech Summit in Maui in December 2019, Deutsche Telekom showcased a preview of a prototype field service app that is Nreal's first B2B application designed for remote AR assistance. The

Microsoft has always marketed the HoloLens to corporations (particularly the industrial vertical and the healthcare sectors) and government agencies.

solution is called AR FieldAdvisor and developed in cooperation with Qualcomm Technologies and 6D.ai.

- "The app will enable Nreal Light users to annotate objects that are within their field of view and then stream the images to remote experts. The remote experts are also able to add their diagrams or virtual notes to the scenes and share this data with the remote technician in real time." The spatial mapping is based on the 6D.ai technology.

In December 2019, Magic Leap announced a pivot from the consumer segment to the corporate segment and announced a new set of services for corporate clients. At that time, they announced that they had only sold 6,000 of their AR headsets in the first six months after launch, far from the 100,000 they wanted to sell in the first six months. They now offer a "slightly updated version of its mixed reality headset and a set of spatial computing services specially designed to help corporations collaborate in virtual spaces. ***The first mixed reality services fall into four basic buckets: collaboration, location-based experiences, 3D visualization, and training (also called Learn and Assist).***"

- "The final group of apps are designed to train employees for specific tasks while they're in the actual work environment and able to work hands-free, as opposed to in a classroom or training space. For instance, a remote trainer or expert might show a worker how to repair a machine in a manufacturing facility. Enterprises have used VR and AR to train employees, but this really takes it to the next level."
- Magic Leap provides the development tools and other resources for enterprise customers to build their custom versions of the apps. The new Magic Leap Enterprise Suite, priced at \$2,995, includes the Magic Leap 1, an updated version of Magic Leap One Creator Edition, as well as two years of access to enterprise-level support, Device Manager, that lets administrators manage hardware and software remotely.

Magic Leap is referring to their new enterprise bundle as a spatial computing platform. "To make the most of the spatial computing platform for collaboration, visualization, training, and location-based experiences, Magic Leap has partnered with Arvizio, EON Reality, Immersion Analytics, Immersiv, Flow Immersive, Nomtek, Minsar, Obsess, PTC,

RoOomy, Japan's NTT DoCoMo, Spatial, Spatiate, Taqtile, Verses, and VIM to create applications in these core areas."

- PTC is one of the world's largest AR-based decision support providers for the industrial sectors. In December 2019, they reported that they had formed a strategic alliance with Magic Leap to sell their Vuforia AR engine to Magic Leap customers. "AR offers companies an innovative and effective way to connect people to digital content where and when they need it, thereby increasing efficiency, providing more-impactful training, and achieving greater overall cost savings."

Seattle's Taqtile develops VR-based industrial training products and is one of Magic Leap's new enterprise partners. "Joining the enterprise partner program is a key milestone for Taqtile. Magic Leap will now re-sell Taqtile's Manifest solution *as it turns its focus to enterprise use cases.*" Their Manifest platform is a tool used to author AR field service performance support and remote assistance apps. Magic Leap, as a reseller, is now in the corporate training business.

Corporations have the second-highest growth rate at 24.3% followed very closely by federal agencies at 24.2%. The demand for Mobile Learning in the corporate segments is being driven by the rapid uptake of pre-employment evaluation and assessment apps (usually in the form of games) and mobile decision support apps. These products are now in wide use in the developed economies and gaining traction in developing economies.

What Are They Buying?

The regional and worldwide supply-side sections provide revenue forecasts for four types of Mobile Learning products and services including:

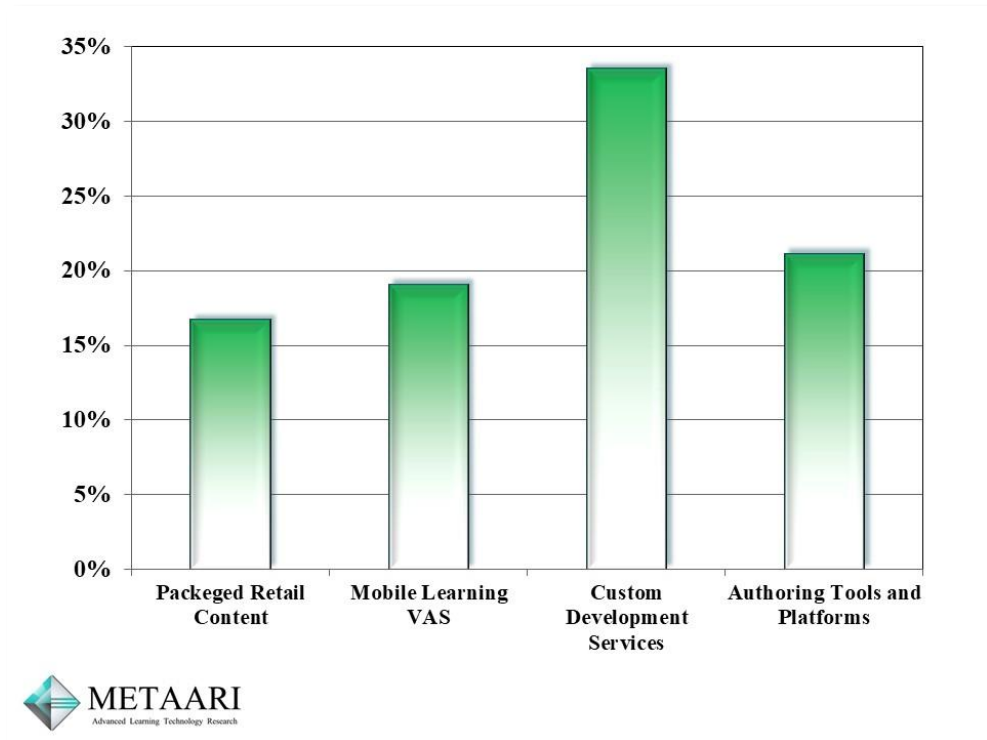
- Nine types of packaged retail education apps and edugames
- Mobile Learning as a Service (MLaaS)
- Custom content development services
- Authoring tools and platforms

Custom development services have the highest growth rate at 33.5%. Revenues will more than quadruple for this type of service over the

forecast period. All the organization buyers pay developers to create custom content. Corporations are the largest buyers of this type of service.

Mobile Learning as a Service (MLaaS) products are common across the globe *except in North America*. The mobile network operators (MNOs) are major distributors of Mobile Learning products outside the US. The MNOs dominate the supply chain in particular areas such as Southeast Asia.

Figure 4 - 2020-2025 Worldwide Mobile Learning Five-year Growth Rates by Four Product Types



The growth rate for all the Mobile Learning as a Service (MLaaS) products combined is 19.1%. The Mobile Learning as a Service (MLaaS) product type is rapidly evolving into Mobile Learning as a Service (MLaaS) as 5G rolls out globally. Mobile Learning as a Service (MLaaS) is also referred to as Mobile Learning VAS (value-added service).

Metaari defines three types of "native" Mobile Learning products: Mobile Decision Support, Location-based Learning, and Mobile Learning as a Service (MLaaS) (value added service). The first two are usually sold as retail software apps and the third is sold on a subscription basis.

Outside of North America, the telecoms offer Mobile Learning as a Service (MLaaS) products and they also operate their own app stores. Device makers also sell Mobile Learning as a Service (MLaaS) subscriptions but they also operate their own app stores. They are also major competitors in the education markets across the planet.

In March 2019, Samsung partnered with India's IndusOS app store (an independent app store) and preloads their app store on all Galaxy devices in India. One competitive edge they have is that they localized the store in 12 domestic languages. Only 15% of India's population is fluent in English.

The independent app store One Store was launched in 2016 in South Korea in a cooperation between the three major mobile carriers (SK Telecom, KT and LG Uplus). One Store is a joint venture and is marketing their store to other carriers across the planet. Singtel in Singapore and Deutsche Telekom in Europe are in talks with One Store to deploy the app on their networks.

Native Mobile Learning tools and platforms have a robust growth rate of 21.1% and revenues will more than double by 2025.

This report only includes native tools and platforms that are "mobile-first", if not mobile-only. Most legacy eLearning LMS products can handle mobile formats via responsive web design but they were not originally designed to do that; mobile is essentially tacked on. That said, several legacy eLearning providers has acquired so-called microlearning companies that do provide native mobile formats. In that sense, the legacy providers are buying their way into the Mobile Learning market.

Mobile device-enabled (handhelds and wearables) decision support products are in wide use in clinical healthcare organizations, the military, and in public safety and first responder agencies. One of the major mobile decision support products used in healthcare is Wolters Kluwer's UpToDate tool *that is now used by over a million clinical healthcare workers across the planet*. Mobile decision support tools are used in first responder situations dealing with biohazards and environmental disasters.

The demand for custom Mobile Learning content development services is the highest of all product types at 33.5% and revenues will nearly quadruple over the forecasts period. The demand is being driven by corporations, tourist venues, and healthcare sectors; all of which require custom solutions.

- There is now a strong demand for custom decision support and pre-employment assessment and evaluation apps in the corporate

segments in the developed economies. Tourist and exhibition venues need highly customized apps with content mapped to specific location. The apps are by definition Location-based Learning. Healthcare verticals require customized decision support solutions.

Consumer buying behavior is different in each country and can be dramatically different in specific countries. For example, test prep apps for driver's exams are quite often the top selling apps in several countries including the UK, New Zealand, and Australia, but rarely rank as bestsellers elsewhere.

Test prep apps for standardized academic tests are in high demand in so-called exam cultures like South Korea, India, China, and Japan. Language learning apps and brain trainers are nearly ubiquitous across the planet so they become conspicuous by their absence in some countries.

The global growth rate for all packaged retail mobile educational content combined is 16.7%. The vast majority of Mobile Learning revenues on the planet are generated by the sales of packaged content to consumers. This is changing fast as corporations rapidly migrate to a range of Mobile Learning content.

This report provides a detailed analysis of the buying segment behavior and provides five-year forecasts for nine distinct types of Mobile Learning content types for the seven regions combined. Those content types are:

- Language learning
- Early childhood learning
- General education, study guides, and reference
- Test prep for standardized exams
- Corporate recruiting assessment apps and games
- How-to guides, procedural manuals, and decision support apps
- Medical, health, wellness, nutrition, and fitness apps (including brain trainers)
- Continuing Education (CE) and Continuing Medical Education (CME)
- Training and professional development

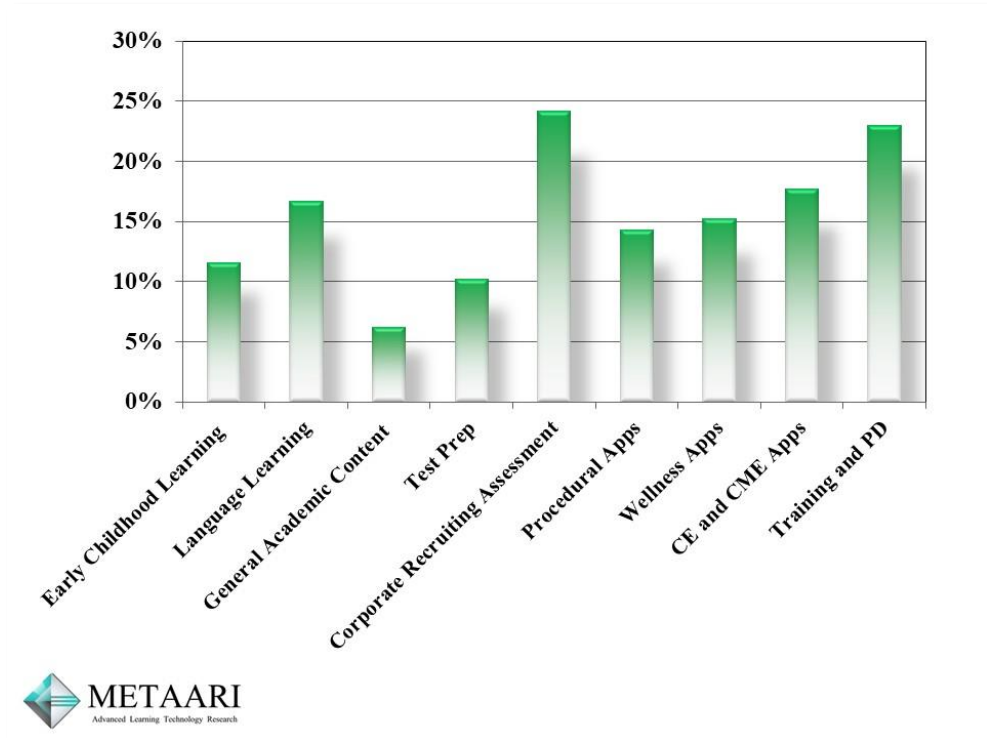
Academic buying behavior is quite different from consumer buying behavior. Most of the content purchased by government-operated school systems is tightly mapped to government-mandated curriculums. An analysis of those trends is provided for every country in this report.

There are now hundreds of personal learning devices (PLDs) designed for young children on the market. They all come preloaded with early childhood learning content developed by third parties. ***The PLD manufacturer is essentially the distributor of third-party content.*** Very few of the PLD companies develop their own content (LeapFrog and VTech are major exceptions).

Device manufacturers and education publishers offer education bundles with digital content preloaded on general-purpose tablets. The device maker is the seller and markets the bundles to the government education agencies and local schools. Acer and Samsung are just two examples of device makers that provide these bundles.

Conversely, the publishers form partnerships with third-party device makers and sell educational bundles with the publisher's brand. The publisher is the seller.

Figure 5 - 2020-2025 Global Mobile Learning Growth Rates for Nine Packaged Content Types



The presence of national, state, and local tablet deployments is essentially a vast new delivery channel for Mobile Learning content suppliers.

Vibal Publishing and Diwa Learning Systems in the Philippines are good examples. Both work directly with Filipino provincial education agencies

and local schools. Pearson sells a branded education tablet called the Pearson MX Touch tablet in India on third-party tablets.

The demand for the new pre-employment evaluation and assessment products is heavily concentrated in the corporate segments across the globe. The companies are starting to use the products for performance assessment of existing employees as well. The growth rate for this type of packaged content is the highest of all nine content types at 24.2%.

Mobile training content and so-called professional development healthy second-highest growth rate at 23.0%. A large percentage of this type of content maps to licensure requirements that professional need to stay in their job. In the US, there are over 50 professions that require licenses to work.

Wellness apps and games include education content for kids with special needs, cognitive fitness apps, mindfulness apps, mental trainers, and brain trainers. This Mobile Learning content type has a high growth rate of 15.2% and revenues will more than double for this content type over the forecast period.

Procedural apps include how-to guides and decision-support apps. These are in wide use in specific verticals particularly heavy machinery and healthcare. They are in wide use in the military and first responder agencies as well. The growth rate for the type of Mobile Learning content is 14.3% and revenues will nearly double over the forecast period.

Test prep apps and general academic apps are highly commoditized since the specifications are standardized allowing a large number of suppliers to enter the market. The growth rate for test prep is still quite high at 20.2% across the globe driven in large part by the so-called "exam cultures: in countries like China, South Korea, and Japan.

The growth rate for general academic mobile content is the lowest of all nine content types at 6.2%, although revenues will reach nearly \$800 million by 2025 for this content type.

The revenues for Mobile Learning packaged content are heavily concentrated in early childhood learning apps and language learning apps. The growth rate for early childhood learning content is 11.6% and revenues will reach well over \$6 billion by 2025, the second-highest of all Mobile Learning packaged content types. (Pre-employment evaluation and assessment apps will take the top spot by 2025).

Continuing education (CE) and continuing medical education (CME) have the third-highest growth rate at 17.7%.

Essentially, this is a captive audience for developers as CE and CME licensure are mandatory in a range of professions.

The growth rate for language learning apps is quite high at 16.7% and revenues will more than double over the forecast period. The combined revenues for early childhood learning and language learning content will account for 36% of all Mobile Learning packaged content revenues by 2025.

