

Ambient Insight

The 2016-2021 Worldwide Self-paced eLearning Market:

Global eLearning Market in Steep Decline

Analysis by: *Sam S. Adkins, Chief Researcher*

Published: *August 2016*



Ambient Insight's Organizational Enterprise Licensing Model

The buyer of this report is granted an Ambient Insight Organizational Enterprise Site License. The Ambient Insight Organizational Enterprise Site License is an organization-wide volume license, which allows companies that buy reports to post the reports on their internal portals, intranets, and servers and grants unlimited access to all of the company's employees, including employees in wholly owned subsidiaries.

The Ambient Insight Organizational Enterprise Site License covers an unlimited number of users within your enterprise, school, district/county, or organization, regardless of the number of locations and distance between them.

An Ambient Insight Organizational Enterprise Site license does not have any geographical restrictions whatsoever. There is no time limitation and the license is granted in perpetuity.

The Ambient Insight Organizational Enterprise Site License also permits purchasers to share the report(s) with investors, private equity firms, and investment banks. The license does not permit reproduction or distribution of the report(s) to external customers, consultants, channel partners, distributors, or suppliers without the express permission of Ambient Insight.

Permission is required to reproduce or distribute sections, tables, diagrams, or charts from Ambient Insight research in press releases, external blogs, promotional material, external presentations, or commercial publications.

About Ambient Insight

Ambient Insight is an ethics-based market research firm that identifies revenue opportunities for learning technology suppliers. We track the learning technology markets in 122 countries. Ambient Insight publishes quantitative syndicated reports that break out revenues by customer segment (demand-side) and by product category (supply-side) based on our industry-leading learning technology taxonomy and our proprietary Evidence-based Research Methodology (ERM). We have the most complete view of the international learning technology market in the industry. Ambient Insight has two lines of business: publishing quantitative syndicated reports and providing proprietary custom research to suppliers and private investment firms.



Founded in 2004, Ambient Insight has attracted an impressive list of international clients including academic institutions, government trade organizations, investment banks, equity firms, small innovative startups, and global companies.

Clients include Adobe, Amazon, Apple, the Australian Broadcasting Corporation, Berlitz, Blackboard, the Cambridge University Press (UK), the Consulate General of Canada, Chungdahm Learning (South Korea), Cisco, Dell, DeVry, Disney, DuPont, Hasbro, Houghton Mifflin Harcourt, IBM, John Wiley & Sons, the Korea Trade Center, McGraw-Hill, Macmillan, Microsoft, Mitsui (Japan), NIIT (India), the Oxford University Press (UK), Pearson, the Queen Rania Foundation (Jordan), Rosetta Stone, Sanoma Learning (the Netherlands), TOPICA (Vietnam), and U&I Learning (Belgium).

About the Analyst

Sam S. Adkins is the Chief Research Officer at Ambient Insight. Sam has been providing market research on the IT Training and eLearning industries for over twenty years and has been involved with electronic training technology for over thirty-five years. Sam is an expert at identifying revenue opportunities for global learning technology suppliers.

Sam specializes in learning technology research across several technologies including mobile, augmented reality, virtual reality, cognitive systems, collaboration platforms, simulation platforms, and game engines.

Sam provides clients with technology feasibility studies, strategic consulting on new product development, product revenue forecasts, emerging market analyses, and competitive intelligence. Sam is the only analyst in the industry that focuses exclusively on learning technology trends across all the major customer segments including businesses, government agencies, academic institutions, and consumers.



**Sam S. Adkins, Dubai, United Arab Emirates, 2013
(Photography by Tyson Greer)**

Sam was a business development manager for Microsoft's Training and Certification group. During his eight years at Microsoft, he managed the Advanced Knowledge Engineering team that built the world's first commercial online learning business (The Microsoft Online Learning Institute). Prior to that, he was a Senior Instructional Designer at United Airlines. Before joining United Airlines, Sam was the manager of the Instructional Animation and Graphics Lab at AT&T's central computer-based training (CBT) facility for four years.

Table of Contents

Ambient Insight's Organizational Enterprise Licensing Model	2
About Ambient Insight	3
About the Analyst	4
Table of Contents	5
List of Tables	7
List of Figures	7
Executive Overview: The Worldwide Self-paced eLearning Market is in Steep Decline	9
Customers Migrating Rapidly to More Efficient Knowledge and Learning Transfer Products	14
The US and China Weigh Down the Market	16
The Massive Decline in the US eLearning Market Driving Global Revenues Downward	16
US PreK-12 eLearning Market Shrinking	18
Open (and Free) Education Resources Dampening Revenues for Commercial Products in the PreK-12 Segment	22
The Government is Making Online Learning Difficult in the Higher Education Segment	23
Higher Education Enrollments Dropping Fast in the US	24
Consolidation and Weak Training Budgets: The US Corporate Self-paced Learning Market Driving the Massive Global Decline	24
Privatization and Consolidation Plague the Industry	25
Weak Training Budgets Drive Expenditures Downward	26
The Corporate Training Market is Bleak in Most Developed Economies	27
The Shake Out in China Rattles the eLearning Market: The Online Education Bubble Bursts	27
The Big Internet Brands Alter the Competitive Landscape in China	29
There are Significant Revenue Opportunities in Many Countries	32
Slovakia	33
Lithuania	34
Rwanda	35
Myanmar (Burma)	35
Mongolia	36
Lucrative Vertical Zones in the US	37
The Commercial Training and Education Industry Goes Digital	37
Continuing Education is Mandatory for Licensed Professions	38
Healthcare	39

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline	
Digital English Language Learning a Growth Market	41
One Bright Spot Is Also an Inhibitor: The Managed Training and Education Services Suppliers are Doing Well.....	42
Longitudinal Analysis: Five-year Growth Rates Falling Fast.....	45
Mounting Quantitative Evidence: Publicly-traded Companies Report Lower Revenues	46
Sources of Data on the Global Self-paced eLearning Market....	49
Sources of Data on the China Learning Technology Market.....	50
The Perfect Storm of Market Inhibitors	51
Intense Commoditization Erodes Pricing Power	52
eLearning is in the Final Stage of the Product Lifecycle	53
Entrenched Suppliers Migrating to New Products.....	55
The Global LMS Market is Imploding.....	56
LMS Replacement Cycles Drive Revenues Downward	58
The LMS Product Halo	60
The LMS Meltdown in the US by Buying Segment.....	61
The Big Guns Stake Out the US PreK-12 Segment with Free Platforms	63
Product Substitution Accelerates: Buyers Migrating Rapidly Away from Self-paced eLearning	64
Lack of Innovation the Root Cause of the Decline of the Self-paced eLearning Market	65
Psychometrics at the Foundation of New Game-based Learning Assessment and Evaluation Products.....	67
Empirical Evidence on the Effectiveness of Game-based Learning	68
Consumers Overwhelmingly Prefer Mobile Learning over eLearning	70
The Barriers to Simulation-based Learning Fading Fast.....	71
Assembling Reality	72
Next-generation Learning Products Hit the PreK-12 Market	73
Augmented Reality Makes a Comeback	73
Virtual Reality Goes to School	75
Game-based Learning Gains Traction in the PreK-12 Segment	76
The Rise of the Chatbots	77
Robot Teachers for Children Game Changers in Childhood Learning	78
Cognitive Learning Trumps Courseware	80
Virtual Tutors and Trainers with Embedded Artificial Intelligence Redefine Learning.....	83
Real-time Augmented Reality Decision Support Mitigates the Need for Training and Courseware.....	85
The Leapfrog Effect: There is No Addressable Market for Self-paced eLearning in Mobile-only Countries	87

List of Tables

Table 1 - 2016-2021 Worldwide Revenue Forecasts for Self-paced eLearning Products and Services by Region (in US\$ Millions)	10
Table 2 - 2016-2021 Worldwide Revenue Forecasts for Self-paced eLearning by Three Product Categories (in US\$ Millions)	12
Table 3 - Top Seventeen eLearning Buying Countries with Revenues Over \$300 Million for 2016 and 2021 (Ranked by Revenue).....	13
Table 4 - 2016-2021 US Revenue Forecasts for Self-paced eLearning by Three Product Categories (in US\$ Millions)	17
Table 5 - 2016-2021 Revenue Forecasts for Self-paced eLearning in the US by Six Buying Segments (in US\$ Millions)	17
Table 6 - 2016-2021 US PreK-12 Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)	18
Table 7 - 2016-2021 US Post-secondary Tertiary Education Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)	23
Table 8 - 2016-2021 US Corporate Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)	24
Table 9 - 2016-2021 China Revenue Forecasts for Self-paced eLearning by Three Product Categories (in US\$ Millions)	28
Table 10 - 2016-2021 Revenue Forecasts for eLearning Products in China by Six Buying Segments (in US\$ Millions)	31
Table 11 - 2016-2021 US Healthcare Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)	39
Table 12 - 2016-2021 US Healthcare Continuing Medical Education (CME) Expenditures by Medium (in US\$ Millions)	40
Table 13 - 2016-2021 Worldwide Revenue Forecasts for Self-paced eLearning Platforms (in US\$ Millions).....	56
Table 14 - Table 15 - 2016-2021 US Revenue Forecasts for Self-paced eLearning Platforms by Extended Buying Segment (in US\$ Millions)	62

List of Figures

Figure 1 - 2016-2021 Worldwide Self-paced eLearning Five-year Growth Rates by Region.....	11
Figure 2 - Ambient Insight's Learning Technology Research Taxonomy	15
Figure 3 - 2016 Total US PreK-12 Expenditures (in US\$ Billions)	19
Figure 4 - Primary Factors Driving the 2016-2021 China Self-paced eLearning Market Downwards	28

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Figure 5 - 2016-2021 Top Fifteen Worldwide Self-paced eLearning Five-year Growth Rates by Country	32
Figure 6 – Professions in the US with Licensure Requirements	38
Figure 7 - Service-based Education and Training Business Models	42
Figure 8 - Longitudinal Analysis: Global Five-Year Compound Annual Growth Rates (CAGRs) for Self-paced eLearning Products	46
Figure 9 - Primary Inhibitors Driving Dramatic Decline in the 2016-2021 Worldwide eLearning Market.....	52
Figure 10 - Learning Technology Product Lifecycle Phases	54
Figure 11 - Widespread Product Substitution in Full Swing Across the Globe	65
Figure 12 - 2016-2021 Global Five-year Growth Rates by Seven Learning Technology Types	66
Figure 13 - 2008-2015 Explosion of Mobile Learning Value Added Services (VAS) Products Across the Planet	89



"We Put Research into Practice"
www.ambientinsight.com

Executive Overview: The Worldwide Self-paced eLearning Market is in Steep Decline

The worldwide five-year compound annual growth rate (CAGR) for Self-paced eLearning is distinctly negative at -6.4%; global revenues for self-paced courseware are dropping fast.

In 2016, global revenues for Self-paced eLearning reached \$46.6 billion, down slightly from the \$46.9 billion in 2015. By 2021, worldwide revenues for eLearning will plummet to \$33.4 billion.

Ambient Insight defines eLearning as self-paced courseware products. This includes off-the-shelf content, learning management systems (LMS), and services. The defining characteristic of Self-paced eLearning is the pedagogical structure imposed by formal instructional design and systematic development of the products.

Ambient Insight only tracks platforms directly involved with instruction. We do not track non-instructional technology such as student information systems, classroom management systems, student services platforms (retention, engagement, course finders, student loans, etc.), or facilities management software.

There are still significant revenue opportunities for eLearning suppliers. This report identifies the more favorable market trends that will enable suppliers to tap into those revenues and move away from unfavorable market conditions. Of the 122 countries tracked by Ambient Insight, there are 15 countries that have growth rates for Self-paced eLearning over 15%. Those countries are identified in this report.

There are still significant eLearning revenue opportunities in specific verticals such as healthcare and for content that maps to continuing education for professional licensure. The demand for managed education services continues to rise in the corporate segment and in both academic segments.

In the current eLearning market, the single most unfavorable place to be is the LMS market, which is essentially imploding, particularly in the US corporate segment that has a very negative -33.9% growth rate (across the four company types analyzed in this report). The US corporate LMS market is beset by consolidation, commoditization, the migration to vastly cheaper cloud-based solutions, and a wave of product substitution. LMS revenues will drop by \$617.1 million in the US corporate segment over the forecast period.

A detailed analysis of the US LMS market is included in this report including a five-year forecast for the US by federal military agencies, federal civilian agencies, state government agencies, local and municipal agencies, PreK-12, higher education, and a breakout of four corporate sub-segments by

Ambient Insight will continue to track the industry and will publish free annual whitepapers on the global Self-paced eLearning market. We track learning technology markets in 122 countries.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

four company sizes. Ambient Insight compiles forecasts from each segment and sub-segment to generate the aggregate growth rate for the US. The buying behavior is quite different in each segment and sub-segment.

Ambient Insight uses statistical predictive analytics to refine and calibrate our revenues forecasts. The output of quantitative predictive analysis is just math and the math is not good for the global eLearning industry. We have over thirty years of longitudinal data that we use as our baseline of known dependencies. We input dozens of quantitative (numerical) variables in both top-down and bottom-up analysis.

LMS suppliers that win "swap" LMS contracts always underbid the incumbent and this is one of the root causes of the rapidly declining LMS market.

One of the most unreliable predictive variables is market share. The foundational principle of statistical analysis is that "correlation is not causation". Market share analysis is inherently "noisy" data and notoriously prone to error for a variety of statistical reasons and does not correlate to the health of a market.

In the current highly-commoditized LMS market, market share is a meaningless variable relative to aggregate revenues. Customers are swapping out their LMS platforms at an accelerating rate (particularly in the higher education segment) and expenditures are moving sideways at best. In August 2016, Brandon Hall Research reported that "According to Brandon Hall Group's most recent Learning Technology Trends Survey, 44% of companies with learning technology are looking to replace their solution within the next two years."

Due to the steep decline in the Self-paced eLearning industry, Ambient Insight will no longer publish commercial syndicated reports on eLearning. In a rapidly declining product market, there is essentially no demand for commercial market research on that product.

The global eLearning industry is now in the midst of a perfect storm of market conditions that are driving revenues down including weak demand for most self-paced products, commoditization, the late stage of eLearning's product lifecycle, pronounced product substitution, and the so-called leapfrog effect with buyers in developing countries completely bypassing eLearning for newer products.

Table 1 - 2016-2021 Worldwide Revenue Forecasts for Self-paced eLearning Products and Services by Region (in US\$ Millions)

Region	2016	2017	2018	2019	2020	2021	5-year CAGR
North America	\$23,337.4	\$22,258.8	\$21,605.2	\$20,003.6	\$18,357.0	\$16,967.0	-6.2%
Latin America	\$2,106.0	\$1,930.4	\$1,732.9	\$1,565.0	\$1,328.4	\$1,189.0	-10.8%
Western Europe	\$7,978.6	\$8,318.7	\$8,386.8	\$8,096.4	\$7,703.8	\$7,403.0	-1.5%
Eastern Europe	\$1,024.8	\$1,125.9	\$1,298.8	\$1,221.7	\$1,116.9	\$967.8	-1.1%
Asia Pacific	\$10,936.5	\$10,757.6	\$9,280.8	\$8,245.4	\$6,848.2	\$5,874.8	-11.7%
Middle East	\$683.7	\$708.3	\$729.4	\$700.1	\$586.3	\$460.4	-7.6%
Africa	\$607.7	\$716.0	\$806.3	\$833.2	\$754.6	\$636.3	0.9%
Totals	\$46,674.7	\$45,815.7	\$43,840.2	\$40,665.4	\$36,695.2	\$33,498.3	-6.4%

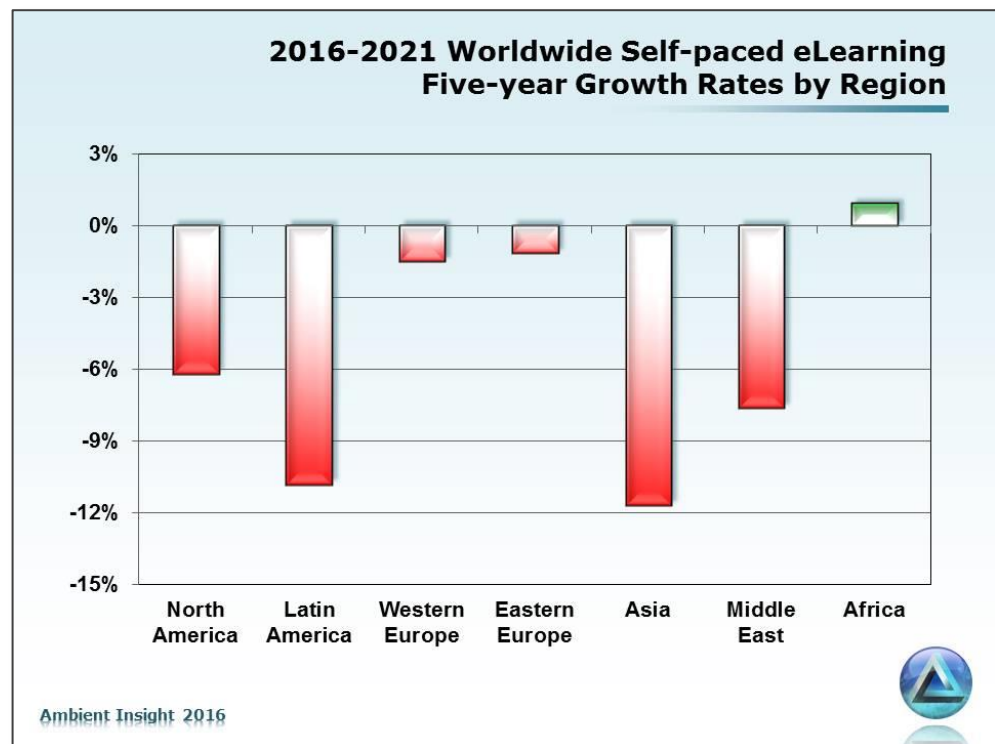
The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

The growth rates are negative in every region except Africa where the growth is flat at 0.9%. Eleven countries in Africa can be categorized as mobile-only and eLearning will never gain traction in those countries.

The steepest declines are in Asia and Latin America at -11.7% and -10.8%, respectively. The economic meltdowns in Brazil and Venezuela are major inhibitors in Latin America. The most significant inhibitor in Asia is the negative growth rate for self-paced products in China.

Ironically, the demand for digital English language learning is positive at 3.8% in China, yet 70% of the revenues are generating from the sales of mobile apps and Mobile Learning VAS subscriptions. *(Source: The 2015-2020 China Digital English Language Learning Market, Ambient Insight, LLC)*

Figure 1 - 2016-2021 Worldwide Self-paced eLearning Five-year Growth Rates by Region



The Asia market outside of China is also being inhibited by the so-called leapfrog effect in mobile-only countries in Asia. Self-paced courseware will never gain traction in mobile-only countries.

The growth rates are negative-to-flat in Western Europe and Eastern Europe at -1.5% and -1.1%, respectively. In the context of the global decline in revenues for self-paced products, these two regions are essentially safe havens for suppliers, at least for now.

That said, the largest buying country in Eastern Europe is the Russian Federation and the growth rate for Self-paced eLearning is negative-to-flat at -1.8%. The UK is the largest buying country in Western Europe and the growth rate is quite negative at -5.1%; revenues for self-paced products in the UK will drop to \$747.3 million by 2021, down from \$973.0 million in 2016.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Global revenues for Self-paced eLearning are heavily concentrated in North America (the US and Canada combined). The growth rate for the region is negative at -6.2%, and while this may seem like a modest decline, it will result in a decline of \$6.3 billion over the forecast period.

The growth rate for eLearning in the US is -5.3% and revenues will drop by \$4.9 billion by 2021. The growth rate is also negative in Canada at -4.2% and revenues will drop by \$483 million to \$2.0 billion by 2021.

Product substitution is the major inhibitor in the Middle East with consumers opting for Mobile Learning products over self-paced courseware. Turkey and Egypt are the largest buyers in the Middle East. They both have negative growth rates at -6.7% and -10.0%, respectively. The recent turmoil in Turkey will result in an additional negative impact on learning technology procurement in that country, but it is too early to quantify that impact.

In the global eLearning market, the only bright spot is the demand for services. The growth rate for Self-paced eLearning services is a modest 3.4%.

Table 2 - 2016-2021 Worldwide Revenue Forecasts for Self-paced eLearning by Three Product Categories (in US\$ Millions)

Product Category	2016	2017	2018	2019	2020	2021	5-year CAGR
Packaged Content	\$33,062.80	\$32,065.14	\$30,444.82	\$28,130.00	\$25,189.35	\$22,598.11	-7.3%
Services	\$6,490.38	\$6,898.56	\$7,161.09	\$7,333.42	\$7,502.12	\$7,657.60	3.4%
Platforms	\$7,121.49	\$6,851.99	\$6,234.27	\$5,201.97	\$4,003.76	\$3,242.50	-14.6%
Totals	\$46,674.67	\$45,815.69	\$43,840.18	\$40,665.39	\$36,695.23	\$33,498.21	-6.4%

The global growth rate for packaged retail self-paced content is quite negative at -7.3% and revenues will drop to \$22.5 billion by 2021. The factors driving this weakness are different in each country.

For example, the declining revenues in the US are related to reduced spending in the government, corporate, and higher education segments. The decline in revenues in China is almost entirely due to the winding down of massive digitization initiatives and the dramatic number of startup failures.

The growth rate for Self-paced eLearning platforms is distinctly negative at -14.6% and the global platform market is in freefall. Revenues for platforms will plummet by \$3.8 billion over the forecast period. Essentially, the global LMS market is imploding. This is particularly acute in the US where LMS revenues will fall by over \$1.5 billion over the forecast period.

The global meltdown in the Self-paced eLearning industry is being driven in large part by the sharp decline in revenues in the US and China. Nevertheless, the decline is present in most developed countries.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Of the 25 countries with eLearning revenues above \$300 million a year, the growth rate is negative in nineteen countries and flat in two countries. The four exceptions are Indonesia, Poland, Germany, and the Czech Republic.

Considering the state of the global industry, Indonesia's growth rate of 14.3% is astonishing and one of the few countries that still has significant revenue opportunities for suppliers. Indonesia ranked seventeenth in the 2016 market in terms of revenues; 2021, it will rise to eight position.

In the current business climate, Poland's growth rate of 5.2% can be considered quite healthy. On the other hand, the growth rate in Germany is an anemic 0.2% and flat in the Czech Republic at 1.0%.

Table 3 - Top Seventeen eLearning Buying Countries with Revenues Over \$300 Million for 2016 and 2021 (Ranked by Revenue)

Rank by Revenue	2016	Five-year CAGR	2021	Five-year CAGR
1.	US	-5.3%	US	-5.3%
2.	China (including Hong Kong and Macao)	-8.8%	China (including Hong Kong and Macao)	-8.8%
3.	Canada	-4.2%	Canada	-4.2%
4.	South Korea	-2.7%	South Korea	-2.7%
5.	India	-9.3%	India	-9.3%
6.	Japan	-3.9%	Japan	-3.9%
7.	United Kingdom	-5.1%	Poland	5.2%
8.	Brazil	-19.8%	Indonesia	14.3%
9.	Spain	-0.9%	United Kingdom	-5.1%
10.	Poland	5.2%	Spain	-0.9%
11.	The Russian Federation	-1.8%	The Russian Federation	-1.8%
12.	France	-1.9%	France	-1.9%
13.	Mexico	-2.3%	Germany	0.2%
14.	Sweden	-4.2%	Mexico	-2.3%
15.	Germany	0.2%	Italy	-0.9%
16.	Austria	-2.1%	Austria	-2.1%
17.	Indonesia	14.3%	Sweden	-4.2%
18.	Italy	-0.9%	Hungary	-0.4%
19.	Switzerland	-2.9%	Switzerland	-2.9%
20.	The Netherlands	-3.4%	Brazil	-19.8%
21.	Norway	-2.8%	The Netherlands	-3.4%
22.	Denmark	-2.6%	Denmark	-2.6%
23.	Hungary	-0.4%	Norway	-2.8%
24.	Finland	-2.7%	Finland	-2.7%
25.	Belgium	-5.3%	The Czech Republic	1.0%

One of the "really bad places to be" for eLearning suppliers is Brazil. Unfortunately, all the major learning technology suppliers have operations

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

in Brazil and it has been a very challenging 18 months. Brazil ranked number eight in terms of eLearning revenue on 2016. By 2021, it will rank number twenty.

Brazil is in the midst of an economic meltdown with an ongoing recession, high unemployment, rising taxes, a major currency devaluation, and high inflation. In February 2016, the Brazilian government announced over \$6 billion in budget cuts including a reduction in the education budget by \$400 million. This is on top of the \$3.5 billion in education budget cuts made in 2015.

The growth rate for eLearning in Brazil is quite negative at -19.8% and revenues will decline dramatically to \$322.8 million by 2021, down steeply from the \$970.8 million reached in 2011.

Suppliers with over exposure to the oil industry have seen their revenues tumble. The oil industry has been in decline for over two years and shows no signs of recovery. Oil companies have been downsizing and reducing training budgets. All of the oil dependent countries in the Middle East now have negative eLearning growth rates. For example, the growth rates for Self-paced eLearning in Saudi Arabia and Bahrain are quite negative at -16.7% and -17.9%, respectively.

Countries with government-owned oil companies use the revenues to fund education. These governments have been forced to reduce funding for education in the last two years. They have also cut back on buying eLearning technology for the diminishing workforce.

There are 77 countries with flat-to-negative growth rates. The countries with the lowest growth rates are Yemen, Brazil, Qatar, and Venezuela at -18.7%, -19.8%, -23.5%, and -26.8%, respectively.

The inhibitors driving growth down are different in each of these four countries. The decline in Yemen is due to civil unrest. The decline in Brazil is due to a plethora of negative economic factors. The decline in Venezuela is due to declining oil revenues, and more recently, a chaotic socioeconomic situation.

Qatar is heavily dependent on declining oil revenues to fund education and cut its education budget in 2016 to \$5.5 billion, down from \$7.1 billion in 2015. The government reduced funding to the Qatar Foundation by 40%. The Qatar Foundation subsidizes western universities that have set up campuses in Education City and those universities are reducing spending on all learning technology.

Customers Migrating Rapidly to More Efficient Knowledge and Learning Transfer Products

In educational psychology, the two phases of the learning process are knowledge transfer and learning transfer. Knowledge transfer is the

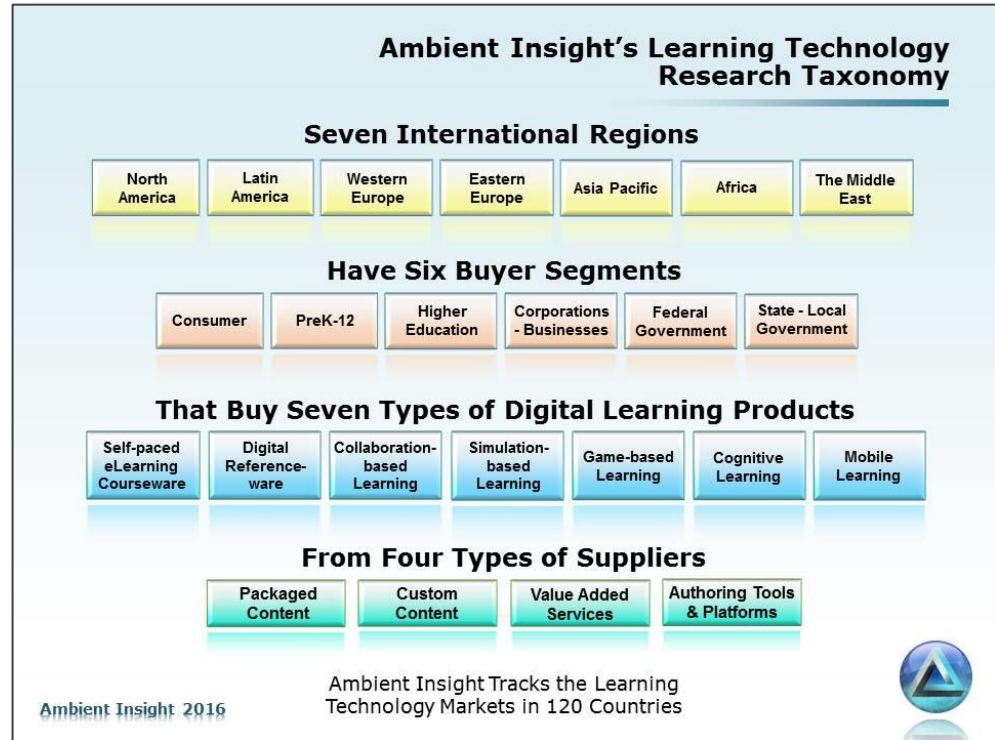
Despite the high growth rates in emerging economies, it is highly unlikely that the eLearning industry will return to positive territory in the near future.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

transmission of information and skills to the learner. Learning transfer is the ability of the learner to demonstrate mastery in a real world setting.

New learning technology products on the market now essentially merge these two phases. Augmented reality-based decision support is a good example of a worker learning to do tasks as he or she actually does the work on site in the real world in real time, essentially merging the two transfer phases.

Figure 2 – Ambient Insight's Learning Technology Research Taxonomy



NGRAIN and DAQRI design AR products for industrial clients; they are specifically marketing the products as performance improvement platforms.

Over several decades, Ambient Insight principals have refined a sophisticated and precise learning technology product categorization schema. Our research taxonomy is the backbone of our quantitative data repository.

It is the foundation of our classification system that enables us to identify, catalog, and index addressable revenue opportunities for suppliers marketing specific products to discrete buying segments in particular countries across the planet.

The purpose of our taxonomy is to provide tactical precision to suppliers competing in a complex global market. We track buying behavior for all the buying segments, not just corporate. We now have a comprehensive data repository for the buying behavior in over 122 countries across seven international regions. We have the most complete view of the international demand for learning technology in the industry.

Cost-effective Game-based Learning, Simulation-based Learning, Mobile Learning, and Cognitive Learning products are coming on the market at a

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

rapid pace and gaining traction in all the buying segments. They are far more effective knowledge transfer methods than eLearning and the learning transfer can be quantified with embedded psychometric measurement tools.

These new products are one of the factors contributing to the rampant product substitution in the eLearning industry. Several of these new products mitigate the need for courseware altogether.

A good example is DAQRI's new Smart Helmet, which is a hardhat that has a visor that displays procedural data over objects (machinery, construction sites, etc.) They are targeting the industrial verticals with the helmet. This product is just one example of the range of real time decision support products that have come on the market in the last year.

These new products are experiencing rapid adoption in the corporate and government segments, once the largest buyers of eLearning. Legacy eLearning products (particularly LMS platforms) are incompatible with these new learning technologies.

The US and China Weigh Down the Market

Revenues for Self-paced eLearning in 2016 are heavily concentrated in just two countries: the US and China. Revenues are declining fast in both countries, driving the aggregate revenues down precipitously.

- The growth rate in the US is negative at -5.3% and while this decline may appear modest, it will account for a \$4.9 billion decline in revenues for eLearning in the US by 2021.
- In China, the growth rate for Self-paced eLearning is distinctly negative at -8.8% and revenues will decline by \$1.9 billion over the forecast period. The eLearning market in China has deteriorated rapidly in just the last 18 months.

Revenues for Self-paced eLearning will drop an astounding \$6.8 billion over the forecast period in these two countries combined. The inhibitors are different in each country with commoditization and product substitution driving the US sharply downward and a meltdown of the highly-fragmented eLearning market in China exacerbated by the aggressive entry of the Internet giants into the market.

The Massive Decline in the US eLearning Market Driving Global Revenues Downward

The US is the largest Self-paced Learning buying country and even slight declines can have a dramatic impact on the global industry. The growth rate for Self-paced eLearning in the US across all buying segments is now negative at -5.3%. The growth rate is negative in all six buying segments in the US.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

The product type with the steepest negative growth is platforms at -14.9%. Over \$1.5 billion will come off the table over the forecast period. A detailed analysis of the US LMS market is provided in "The Global LMS Market is Imploding" section below.

Table 4 - 2016-2021 US Revenue Forecasts for Self-paced eLearning by Three Product Categories (in US\$ Millions)

Product Category	2016	2017	2018	2019	2020	2021	5-year CAGR
Packaged Content	\$12,466.96	\$12,090.74	\$11,428.00	\$10,704.99	\$9,927.65	\$8,914.10	-6.5%
Services	\$5,650.68	\$5,673.97	\$5,719.53	\$5,764.00	\$5,751.76	\$5,730.92	0.3%
Platforms	\$2,732.35	\$2,568.00	\$2,380.54	\$2,096.33	\$1,666.93	\$1,217.87	-14.9%
Totals	\$20,849.99	\$20,332.71	\$19,528.07	\$18,565.32	\$17,346.34	\$15,862.89	-5.3%

The revenue declines are steepest in the corporate segment. Twenty years ago the corporate enterprise was essentially the only eLearning buyer in the US and they were an early adopter due in large part to efforts to reduce training expenditures. The demand for eLearning in the US corporate segment has been declining for several years and the current five-year growth rate is quite negative at -7.2%. Revenues for Self-paced eLearning products will fall by almost \$2 billion in the US corporate segment over the forecast period.

Table 5 - 2016-2021 Revenue Forecasts for Self-paced eLearning in the US by Six Buying Segments (in US\$ Millions)

US Buyer Segment	2016	2017	2018	2019	2020	2021	5-year CAGR
Consumers	\$494.1	\$482.6	\$457.0	\$421.0	\$381.4	\$285.8	-10.4%
PreK-12 Academic	\$2,592.9	\$2,411.5	\$2,327.0	\$2,240.9	\$2,053.5	\$2,035.7	-4.7%
Post-secondary Tertiary Education	\$1,205.6	\$1,169.9	\$1,086.5	\$944.3	\$802.3	\$853.1	-6.7%
Federal Government Agencies	\$4,611.0	\$4,560.3	\$4,371.0	\$4,278.8	\$3,814.4	\$3,736.5	-4.1%
State & Municipal Government Agencies	\$5,694.7	\$5,499.9	\$5,439.5	\$5,271.1	\$4,834.5	\$4,658.2	-3.9%
Corporations and Businesses	\$6,251.8	\$6,108.4	\$5,837.0	\$5,549.2	\$5,400.3	\$4,293.7	-7.2%
Totals	\$20,850.0	\$20,232.7	\$19,518.1	\$18,705.3	\$17,286.3	\$15,862.9	-5.3%

The growth rate for eLearning in the US consumer segment is very negative at -10.4%. In comparison, the growth rate for Mobile Learning is 7.8% and the growth rate for Game-based Learning in the US consumer segment is 12.5%.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

The overall growth rate for Self-paced eLearning products across US federal civilian and military agencies in the US is negative at -4.7%; revenues will fall to \$2.0 billion by 2021. The negative growth rate in the US federal military is due primarily to the downsizing of non-military personnel, and the reduction of military personnel.

There has been a pronounced degree of downsizing in the military in the last five years and downsizing will continue in 2017. The civilian workforce in the DoD has shrunk by 6.8% since 2012 and the active military forces have declined by 6.8% since 2012.

As of July 2016, the civilian workforce in the federal government was just over 2.9 million people, reaching 2013 levels, which at that time were the lowest since 2006. Both military and civilian government agencies are shifting to contract workers, but they rarely get training paid for by the government.

Game-based Learning has long been a staple in the US military and there are now very sophisticated edugames on the market for this sub-segment. A company called Alelo has been developing simulation and game-based training for the military for decades. Alelo's virtual trainers are semi-immersive virtual worlds. They are primarily government facing but do have a product designed for corporations called the Workplace Coach.

US PreK-12 eLearning Market Shrinking

The growth rate for Self-paced eLearning in the PreK-12 segment in the US is negative at -4.7% and revenues will drop to \$2.0 billion by 2021.

Table 6 - 2016-2021 US PreK-12 Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)

US Buying Segment	2016	2017	2018	2019	2020	2021	5-year CAGR
PreK-12 Academic	\$2,592.9	\$2,411.5	\$2,327.0	\$2,240.9	\$2,053.5	\$2,035.7	-4.7%

The majority of expenditures in this segment are still for packaged content, although the larger school systems do license learning platforms. For-profit PreK-12 organizations buy custom content services when they convert extracurricular classroom programs, like credit recovery, into self-paced courses. Some content is converted by internal staff and there is a small demand for authoring tools in this segment.

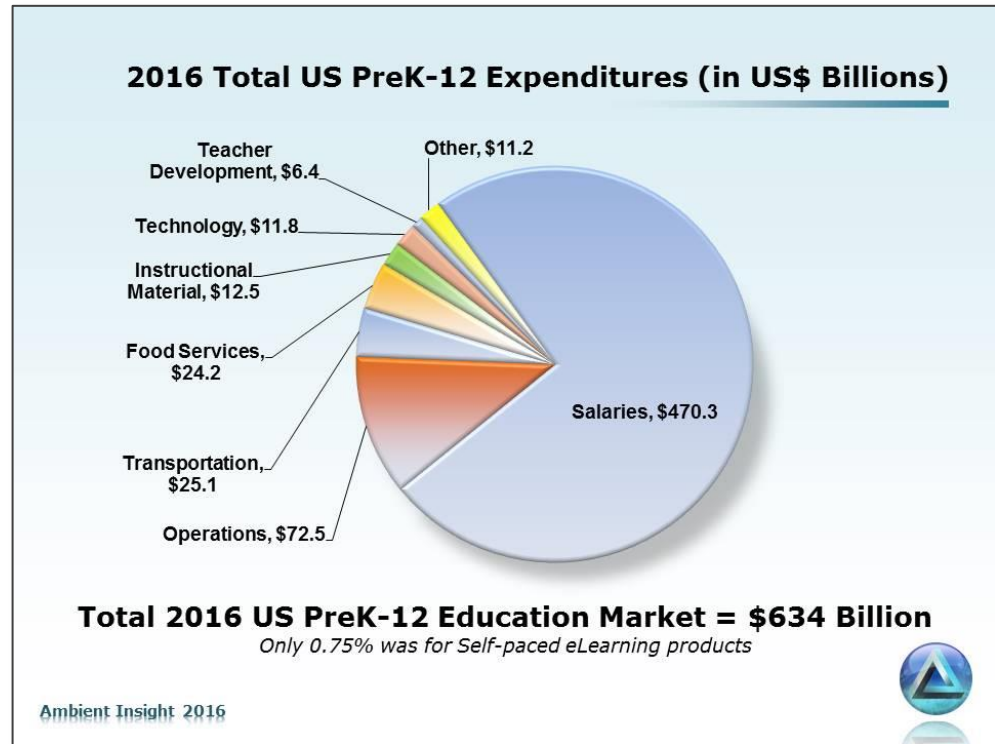
According to the US government's National Center for Education Statistics (NCES), "In fall 2015, about 50.1 million students will attend public elementary and secondary schools. Of these, 35.2 million will be in prekindergarten through grade 8 and 14.9 million will be in grades 9 through 12. An additional 4.9 million students are expected to attend private schools. The fall 2015 public school enrollment is expected to be slightly higher than the 50.0 million enrolled in fall 2014."

English is the top language taught to young children in US schools. This is a matter of necessity due to the influx of non-English speaking children into the US.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

The adoption of eLearning has been anemic in the US PreK-12 segment. Despite the success of the managed education service suppliers such as Pearson's Connections Academy and K12, Inc., eLearning accounts for a very small percentage of the overall instructional content market in the segment.

Figure 3 - 2016 Total US PreK-12 Expenditures (in US\$ Billions)



Estimates vary, but technology expenditures in the schools range from \$10-12 billion a year, a mere 1.5% fraction of the \$634 billion in expenditures made in this segment. Schools are now focused on buying technology for new testing mandates and have decreased expenditures on instructional technology. Schools are now in the process of updating infrastructure to support testing **and buying dedicated technology for digital testing**.

States and local governments fund the majority of education in the US; each funds about 45%. The federal government makes up roughly 10% of funding as of 2015, but this percentage is shrinking. The federal government has reduced educational funding by 19.8% since 2011. Spending dropped from \$44.6 billion in 2011 to \$38.2 billion in the 2015 budget.

Expenditures on instructional material (digital and non-digital combined) fell dramatically when the recession hit full stride in 2008. Budgets dropped by over \$2 billion between 2008 and 2013. While there was an uptick in spending in 2014, it is still much lower than pre-recession spending.

There are other learning technologies that are experiencing weak demand in this segment. UK-based Promethean (acquired by Japan-based gaming

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

company NetDragon in July 2015) and Canada-based Smart Technologies are the leading whiteboard makers in the US PreK-12 segment. They are publicly-traded companies and both have been reporting declining revenues for the last two years.

About 13 million computing devices were purchased in this segment in 2015. Over 9.5 million were for Chromebooks and Windows computers combined. Just over four million Chromebooks shipped to US PreK-12 schools in 2014 (three times higher than the year before). In 2015, this jumped to over five million. Just over five million computing devices purchased by the schools were Windows machines; this fell slightly to 4.5 million in 2015.

Budget cuts have prompted schools to reduce spending on summer school and classroom-based credit-recovery (making up for a failing grade) programs and increase spending (or even outsource to commercial providers) on self-paced courses.

Core curriculum in the US is set by local and state school boards, maps to state standards, and is mandatory for students. Consequently, content has to be customized for each state. That will change gradually over the forecast period due to the completion of the first set of the Common Core State Standards. However, the rollout has been less than smooth and many states are still not on board; some have even left the initiative.

The Common Core State Standards Initiative is managed by the National Governors Association Center for Best Practices and the Council of Chief State School Officers (CCSSO). The initiative has so far finalized standards for K-12 math and reading (language arts). As of August 2014, 42 states (and the District of Columbia) tentatively intended to adopt the standards.

This is good and bad news for online content suppliers. It means content can be mapped to a single standard and can be sold across all those states. Build once, sell many times. All the major educational publishers have content aligned to the standards already. Apex Learning and Connections Academy have also aligned their content to the new standards.

The bad news is that it will take 3-4 years for the states to align to the new standards and there is legislation in dozens of states to reject the Common Core. There are 34 states that have introduced legislation to opt out of Common Core. Indiana, Oklahoma, and South Carolina opted out in 2014. Official assessments, being developed by two assessment consortia that were funded via the Race to the Top Fund, will not be available until 2014-2015 and 27 states have introduced legislation to ban the use of the tests.

This may seem to create a climate of uncertainty for suppliers, but, so far, the new Common Core standards only map to English and math instruction.

Large-scale digitization efforts are also a catalyst for Self-paced eLearning. Florida, Texas, California are all mandating the digitization of instructional content used in the schools. All of the learning content had to have a digital version by the fall of 2015 in Florida.

Not all of the states in the US are participating in the Common Core initiative and suppliers will have to offer a wide range of products to meet the needs of those states.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Most of the spending in the US PreK-12 segment is on packaged content. In general, the vast majority of online courses in the PreK-12 segment are related to four subject areas: language learning (29%), math (26%), science (17%), and social studies (11%).

The rest of the spending is on what is called supplemental content. Supplemental content complements the core curriculum. Language learning, remedial math, remedial reading, art, and music are examples of supplemental content.

Renaissance Learning is the market leader for technology-based supplemental content with \$136 million in annual revenues. In February 2014, Google Capital invested \$40 million in the company. In April 2014, Renaissance Learning was acquired by a private equity firm for \$1.1 billion.

Edmentum (a 2012 merger of PLATO Learning, Archipelago Learning, and Education Options) and Scientific Learning are also market leaders. There are dozens of domestic best-of-breed online supplemental content and services suppliers including Atomic Learning, Apex Learning, Cambium Learning, Carnegie Learning (now owned by Apollo Group), DreamBox Learning, BrainPOP, Ignite! Learning, Learning.com, Power-Glide (now owned by K12), Hights Cross Communications, and Scholastic.

Schools in the US spent over \$440 million on English language learning instructional content in 2013 and only 11.7% was spent on digital products, indicating significant room for growth. The majority of the content purchased was for young children in the first three grades.

According to the National Center for Education Statistics (NCES), over 45,000 of the 93,600 public schools in the US have English language learner enrollments, a number that has doubled since 2004.

About 21% of very young children in the US speak a language other than English at home and 72% of these students are Spanish-speaking children. The US Department of Education (DoE) estimates that there are 5.5 million PreK-12 students classified as English language learners, which is just over 10% of the total enrollment.

The current market for core curriculum (not to be confused with Common Core) is dominated by three educational publishers: Houghton Mifflin Harcourt, Pearson, and McGraw-Hill. Much of this content is still print-based, but they are moving fast to digital formats in response to demand. All three of these publishers are aggressively exploring new business models.

It should be noted that not all Self-paced eLearning purchased by the PreK-12 segment is for students. There is now a significant amount of self-paced professional development content purchased for teachers and administrators.

Unlike the higher education segment, the PreK-12 segment has been an avid adopter of open education resources (OER). This is the primary inhibitor for commercial content in the segment.

Open (and Free) Education Resources Dampening Revenues for Commercial Products in the PreK-12 Segment

There has been a significant uptake of free Open Education Resources in the PreK-12 segment, which primarily inhibits the sales of commercial eLearning content. Interestingly, while the interest in OER is picking up in the PreK-12 segment, there is virtually no adoption of OER in the higher education segment.

In October 2015, the US Department of Education announced that it is proposing a new regulation "that would require all copyrightable intellectual property created with Department discretionary competitive grant funds to have an open license. By requiring an open license, we will ensure that high-quality resources created through our public funds are shared with the public, thereby ensuring equal access for all teachers and students regardless of their location or background."

UK-based TES Global has a division in the US. "We host a dynamic marketplace in which educators can discover, share, and sell original teaching materials; Blendspace, a lesson-building product where those resources can be freely integrated and implemented; and Wikispaces, an open classroom management platform that facilitates student-teacher communication and collaboration." TES Global had 7.3 million users by June 2016.

The publicly-traded educational publishers that compete in the PreK-12 segment have cited OER in their financial reports as a threat to their businesses:

- Houghton Mifflin Harcourt stated in their financial report for 2015 that "Free or relatively inexpensive educational products are becoming increasingly available, particularly in digital formats and through the internet. In addition, in recent years, there have been initiatives by non-profit organizations such as the Gates Foundation and the Hewlett Foundation to develop educational content that can be 'open sourced' and made available to educational institutions for free or nominal cost."
- In March 2016, Cengage Learning stated in their fiscal annual report that "In recent years, more public sources of free or relatively inexpensive information and research materials have become available. We expect these trends to continue. For example, certain educational institutions have increased demand for lower priced educational materials, including e-books at prices below the price of print books. Technological changes and the availability of free or relatively inexpensive information and materials have also affected changes in consumer behavior and expectations."
- In December 2015, McGraw-Hill reported that "As the market has shifted to digital products, customer expectations for lower priced products has increased due to customer awareness of reductions in marginal production costs and the availability of free or low-cost digital content and products. As a result, there has been pressure to sell digital versions of products at prices below their print versions

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

and an increase in the amount of products and materials given away as part of bundled packs."

Share My Lesson is a free learning content platform funded by the American Federation of Teachers (AFT). "Share My Lesson was created by the AFT and TES Global in 2012. From the beginning, Share My Lesson has been committed to providing our community of members high-quality and effective lessons, useful information to use in the classroom and in professional development. As of 2015, Share My Lesson had 900,000 members, and more than 300k Toddler - Grade 12 resources that have been downloaded more than 10 million times."

The Government is Making Online Learning Difficult in the Higher Education Segment

Ambient Insight's US higher education segment includes all Title IV schools defined by the US Department of Education: Public non-profit universities and colleges, private non-profit universities and colleges, and private for-profit career colleges. This segment also includes industry-centric and tertiary and vocational institutions.

Table 7 - 2016-2021 US Post-secondary Tertiary Education Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)

US Buying Segment	2016	2017	2018	2019	2020	2021	5-year CAGR
Post-secondary Tertiary Education	\$1,205.6	\$1,169.9	\$1,086.5	\$944.3	\$802.3	\$853.1	-6.7%

One factor contributing to the weak demand in the US higher education segment is the dramatic decline in enrollment at for-profit colleges caused by draconian policies being implemented by the government (and just on the for-profits).

These institutions are under intense scrutiny by the federal government and have actively limited enrollment and are now shifting their business focus to countries outside the US. The University of Phoenix had 319,700 online students at the beginning of 2013. By the end of 2015, this had dropped to 190,700.

The US government may become the primary inhibitor in the US higher education segment, exacerbating the weakness in the market. In July 2016, the US Department of Education announced new proposed regulations on distance education in the US higher education segment.

"The U.S. Department of Education today proposed regulations that seek to improve oversight and protect more than 5.5 million distance education students at degree-granting institutions, including nearly 3 million exclusively online students by clarifying the state authorization requirements for postsecondary distance education."

Institutions will have to get authorization from the states in which their enrolled students live in order to obtain federal student aid. "Institutions must disclose to students whether the program is authorized by the state

Campus Computing Project's 2015 Campus Computing Survey found that a full 94% of US faculty said they think digital content makes learning more efficient, but only 10% of general education courses used digital courseware.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

he or she lives in; any adverse actions taken against the distance education program in the past five years; and any refund policies."

Higher Education Enrollments Dropping Fast in the US

Another major inhibitor is the steady decline in higher education enrollments. Fewer students mean few online courses sold and fewer seat licenses for LMS platforms.

Enrollment has declined every year since peaking in 2011, according to the US Census Bureau and the National Student Clearinghouse Research Center. College and university enrolments peaked in 2011 in the US and have fallen by 6% since then.

The for-profit higher education industry consists of more than 3,500 vocational, technical and career schools that are focused on job training. More than 1.1 million students were enrolled in such schools in the spring semester of 2016, roughly 6 percent of the total college population, according to the National Student Clearinghouse.

The number of students over 24 continued to decline sharply in 2015 (more than 4%), according to the National Student Clearinghouse Research Center, which tracks this.

In their 2015 financial statement, Pearson reported "In Higher Education, market share gains in courseware were offset by lower enrolments (total US College enrolments fell 1.7%, with combined two-year public and four-year for-profit enrolments declining 4.4%, affected by a rising employment rate and regulatory change affecting the for-profit and developmental learning sectors), higher textbook returns and list sales. Gross courseware revenues fell 1.5% (compared to industry gross revenue declines of 2.7%) due to lower college enrolments offset by market share gains."

Consolidation and Weak Training Budgets: The US Corporate Self-paced Learning Market Driving the Massive Global Decline

Corporations were the top eLearning buyers in 2016 in the US, but by 2021, the higher education segment will be outspending corporations on self-paced products. ***The growth rate for Self-paced eLearning in the US corporate segment is distinctly negative at -7.2% and revenues will drop to \$4.2 billion by 2021.***

Table 8 - 2016-2021 US Corporate Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)

US Buying Segment	2016	2017	2018	2019	2020	2021	5-year CAGR
Corporations and Businesses	\$6,251.8	\$6,108.4	\$5,837.0	\$5,549.2	\$5,400.3	\$4,293.7	-7.2%

There are two major inhibitors in the US corporate eLearning market: LMS consolidation and reduced training budgets. Consolidation is driving

Enrollments at for-profit higher education institutions fell by 14% in 2015, according to the National Student Clearinghouse Research Center.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

customers into a small handful of large companies. Corporate training budgets have yet to recover from the "Great Recession" and show no signs of improving, despite claims to the contrary.

Privatization and Consolidation Plague the Industry

Consolidation has been a constant variable in the US corporate eLearning market for decades. Interestingly, while consolidation impacts the other US segments and the other regions and countries, it is not having a significant negative impact outside the US corporate segment.

Consolidation concentrates customers in a handful of companies. Much of the recent merger and acquisition (M&A) activity in the US LMS market involves companies with essentially the same customer base. This is drastically different from the early days of the industry when M&A was focused on adding new customers.

In a "normal" market, the large companies with the most customers have significant pricing power. The current LMS market is different and there are very inexpensive solutions available to customers which is forcing the large players to lower prices.

The leading corporate-facing LMS providers continue to be scooped up by investment firms and enterprise corporations. Once a company like SAP or Oracle acquires an LMS solutions, the solution is out of reach of non-enterprise customers. Publicly-traded companies are being taken private. This not only consolidates clients but also consolidates revenue. Revenue pools shrink during intense consolidation phases.

- Vista Equity Partners acquired SumTotal, the largest commercial LMS supplier in terms of users, for \$160 million in 2009. SumTotal acquired GeoLearning in January 2011.
- SuccessFactors was acquired by SAP for an astounding \$3.4 billion in 2011. At that time SuccessFactors had over 600 LMS clients and their platform was being used by over 11.5 million users. SuccessFactors had already acquired a leading LMS company called Plateau in early 2011.
- In February 2012, Oracle purchased Taleo for \$1.9 billion. Taleo had just acquired Learn.com in late 2010. Learn.com had one of the largest courseware catalogs at that time.
- IBM acquired Kenexa for \$1.3 billion in August 2012. Kenexa had already acquired OutStart in February 2012.
- In March 2013, an HR company called Infor acquired CERTPOINT Systems. CERTPOINT launched in 1996 and is one of the oldest LMS suppliers.
- Wiley acquired CrossKnowledge, one of the largest eLearning suppliers in the world, in April 2014. CrossKnowledge sells turnkey products via their own LMS. They offer "subscription-based, digital

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

learning solutions for multi-national corporations, universities, and small and medium-sized enterprises. CrossKnowledge solutions, which include managerial and leadership skills assessment, courses, certifications, content, and executive training programs, are delivered on a cloud-based platform providing over 17,000 learning objects in 17 languages."

- Skillsoft was acquired by Charterhouse Capital Partners in March 2014 and Skillsoft acquired SumTotal from Vista in October 2014. This had a chilling effect on Skillsoft's LMS partners that have content distribution agreements with the company. "In 2015, Skillsoft and SumTotal announced their first joint Talent Expansion suite solution, which embeds Skillsoft's library of over 60,000 IT, leadership and business content assets spanning multiple modalities directly within SumTotal's talent and learning processes."
- Saba was taken private in February 2015 when Vector Capital acquired them for \$300 million. Saba has had ongoing disputes with the US Securities and Exchange Commission (SEC) since 2013. In September 2014, the SEC charged Saba with "accounting fraud in which timesheets were falsified to hit quarterly financial targets." The company was fined \$1.7 million and the CEO was ordered by the SEC to return \$2.57 million to the company. As part of the settlement, Saba was required to restate its financial records for the years 2009 through part of 2012. By going private they are no longer under the scrutiny of the SEC.

Corporate training budgets in the US have yet to recover from the last two recessions and corporations have altered their buying behavior. Due to the shrinking labor participation rate, it is highly unlikely that training budgets will ever return to pre-recessionary spending.

Weak Training Budgets Drive Expenditures Downward

The breathless reports of increased training budgets in the last few years are misleading. The increases are in the context of the dramatic cuts made between 2008 and 2011. Training budgets are increasing only if taken out of context of the so-called "Great Recession". As of August 2016, training budgets have yet to reach pre-2008 levels.

In Training Magazine's report on the 2015 training industry, it was reported that "Average training expenditures for large companies decreased from \$17.4 million in 2014 to \$12.9 million in 2015, while the numbers for small companies (\$350,301 in 2015 vs. \$338,386 in 2014) and midsize companies (\$1.4 million in 2015 vs. \$1.5 million in 2014) remained basically flat. Overall, on average, companies spent \$702 per learner this year compared with \$976 per learner in 2014. 26.4 percent of training hours were delivered via online or computer-based technologies, down from 28.5 percent last year. An average of 6 percent of the total training budget was spent on outsourcing in 2015, down from 8 percent in 2014."

The US workforce is shrinking as well, making the claims of increased training budgets impossible. As of August 2016, the unemployment rate in

The lingering impact of the recession in the US will continue to dampen corporate spending. The economic recovery has been slow in the US with corporations cutting their budgets for both classroom and learning technology products.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

the US was 4.9% with 7.8 million people "officially" unemployed. This does not account for the fact that at least 100 million people exhausted their benefits and have stopped looking for work. This is called the labor participation rate and it is the lowest in the US since 1978.

A major inhibitor in the US corporate Self-paced eLearning market is the move to cloud-based LMS products. As their long-term contracts with LMS suppliers expire, companies are moving to vastly cheaper cloud-based solutions.

The Corporate Training Market is Bleak in Most Developed Economies

It should be noted that the US is not the only country where training budgets are being reduced. In their 2015 Learning and Development Survey, CIPD in the UK reported that "more than half of the public sector report their L&D budget has decreased over the last year, while the picture is more mixed in the private sector – a quarter report their budget has decreased and a quarter that it has increased." The percentages of respondents that stated that their training budgets were worse than a year before included 57% of the public sector, 42% of non-profits, and 23% of the private sector.

Survey respondents indicated that they were dealing with budget cuts by reducing training events, reducing L&D headcount, and reducing the use of external suppliers. It is interesting that 29% of the respondents said they used eLearning for training, only 12% said it was effective, the lowest effectiveness rating out of all the training methods used.

The Shake Out in China Rattles the eLearning Market: The Online Education Bubble Bursts

The growth rate for Self-paced eLearning in China is now quite negative at -8.8%. Revenues will drop precipitously to \$3.3 billion by 2021. China was a promising eLearning market as recently as 2014. This has changed dramatically in the last two years and now the eLearning market in China is in steep decline.

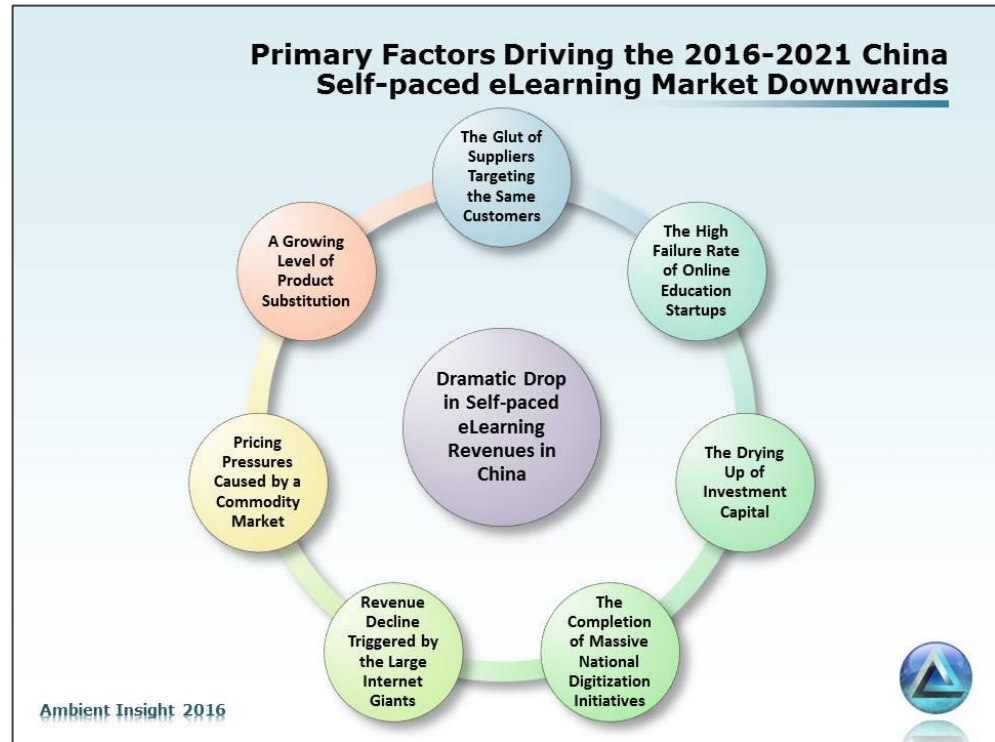
The sharp decline in eLearning revenues in China is due several convergent negative trends including:

- The glut of online learning companies targeting the same demographics
- The high rate of failures of online education startups
- The drying up of venture capital going to eLearning startups
- The winding down of massive national digitization efforts
- Rapid consolidation in the highly-fragmented online education market driven in large part by the Internet giants
- A pronounced degree of commoditization
- A significant degree of product substitution

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

There are two major trends in China's eLearning market: the proliferation (and fail rate) of online education startups and the growing number of large Internet companies entering the market. Prior to 2014, large Internet companies tended to invest in online education companies; in 2014 they started acquiring them and now compete directly in the market.

Figure 4 - Primary Factors Driving the 2016-2021 China Self-paced eLearning Market Downwards



There has been a spike in the number of online education startups in China that began in earnest in 2013. According to an April 2014 article in The China Times, over 1,000 new online education companies opened for business in China in 2013 alone.

Table 9 - 2016-2021 China Revenue Forecasts for Self-paced eLearning by Three Product Categories (in US\$ Millions)

Product Category	2016	2017	2018	2019	2020	2021	5-year CAGR
Packaged Content	\$4,105.12	\$3,820.17	\$3,449.37	\$3,066.12	\$2,711.59	\$2,502.56	-9.4%
Services	\$315.78	\$289.88	\$364.09	\$322.30	\$297.16	\$259.41	-3.9%
Platforms	\$842.08	\$821.33	\$776.00	\$693.91	\$625.44	\$553.87	-8.0%
Totals	\$5,262.98	\$4,931.38	\$4,589.46	\$4,082.33	\$3,634.19	\$3,315.84	-8.8%

At the end of 2012, there were roughly 100 online education companies operating in China. According to BANC Business Research, there are now

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

over 8,000 online education companies in China. Despite the healthy demand in China for online education, the market is just too crowded and fragmented. The market cannot sustain this many suppliers. It should come as no surprise that a shakeout is in progress. The turmoil intensified in 2015.

Prior to 2015, it was relatively easy for Self-paced eLearning startups to obtain venture capital. That changed dramatically in 2015 as investors starting aggressively moving funds into other types of learning technologies including Mobile Learning, Game-based Learning, and Collaboration-based Learning.

In June 2016, the South China Morning Post reported that "Despite the adequate funding support over the last two years, many online education start-ups have run out of money and were forced to close their business due to unprofitable business models. More than 30 out of 110 well-known Chinese online education start-ups including Tizi.com, nahao.com and fenbi.com, all shut down after running out of the money raised over the last two years."

Collaboration-based Learning suppliers in China continue to attract investor interest. In January 2016, 1Smart Education obtained \$75 million and VIPKID garnered \$100 million in August 2016.

Yet, new online education companies (mostly bootstrapped) continue to come on the market and some analysts are predicting that a bubble is on the horizon. A 2014 report from Deloitte predicts "that a third wave of IPOs by Chinese online education companies will wash up on American exchanges by the end of 2016."

According to ChinaVenture Investment Consulting Group, 32% of all online education companies in China are preschool education providers and 27% of all online education companies are dedicated language learning companies. The delivery method for both online preschool education and language learning are almost entirely collaboration-based with live online teachers and tutors.

Collaboration-based Learning suppliers are still attracting investment. Out of the 68 Chinese learning technology companies funded in 2015, only eight were eLearning companies and all of them were selling self-paced courses for professionals. In stark contrast, 32 of the 68 companies that were funded in China in 2015 were collaboration-based suppliers selling online classes and live online tutoring. Fifteen of the 68 companies funded in 2015 were Mobile Learning companies.

In many segments in China (particularly the consumer segment), eLearning startups are now competing for the same customers even offering products for free in concerted efforts to grow their installed user bases in a short period of time. These are the suppliers that are failing at a rapid rate. Another reason they are failing is that they simply cannot compete with the major brands that have aggressively entered the market.

The Big Internet Brands Alter the Competitive Landscape in China

The large Internet brands in China are aggressively entering the learning technology markets, largely through acquisitions. While on the surface this

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

may seem like a validation of the market, it is actually a direct cause of falling revenue as these Internet giants have massive economies of scale and sell their products for much lower prices than the best-of-breeds.

Baidu, Alibaba, and Tencent are the largest Internet companies in China and they all entered the commercial eLearning and Mobile Learning markets in 2013 and 2014. Several other leading Internet companies entered the commercial learning technology market in the last two years including NetEase, Sohu, Renren, Kaixin, Jiayuan, Sina Weibo, YY, NetDragon Websoft, Youku Tudou, and Kingsoft. All of their online learning businesses at launch were web-based; all of them are now adding mobile features or moving completely to mobile formats; a further factor causing the drop in eLearning revenues.

What is interesting is the diversity of the Internet companies. Baidu is the largest search engine in China. Alibaba and Tencent are eRetailers. Jiayuan is a dating site, RenRen and Kaixin are social networks, NetDragon is a game developer, Sohu is an online media and gaming company, NetEase is an IT giant, YY is a Skype-like platform, Sina Weibo is a media company with a Twitter-like product, Youku Tudou is an online video provider, and Kingsoft is a productivity software company.

To put this unusual ecosystem in perspective, imagine if Google, Google's YouTube, Yahoo, eBay, Facebook, Microsoft, Microsoft's Skype, Gameloft, Twitter, IBM, Amazon, and eHarmony all entered the commercial learning technology market **at the same time**.

Tencent, the largest online mass media company in China, started offering online courses in late 2013. In April 2014, they launched Tencent Classroom "an e-learning center that offers exam-oriented courses in language study, skill training and certification, as well as a few lessons for primary and high school students." By August 2016, they had attracted over 34 million users. While Tencent refers to Tencent Classroom as an eLearning product, instruction is actually live online tutoring via QQ and Tencent's video chat technologies.

New Oriental and Tencent announced a joint venture called Weixue Mingri (Beijing WeLearn Future Network Technology) in August 2014 to develop **mobile** English language learning products. Their first product launched in December 2014. New Oriental CEO stated in the press that, "Thanks to our joint efforts with Tencent over the past four months, we have successfully launched the first mobile learning product that will transform how students in China learn English. Working together, we believe we can create more best-in-class mobile learning solutions for students in China."

YY, the video-based social network, launched their online learning platform called 100.com in February 2014. The new learning platform is focused on digital English language learning. YY released the iOS and Android mobile versions of the learning platform in September 2014. "Like the website, the mobile app is able to stream live classes during which students can interact with teachers." The product is Collaboration-based Learning, not eLearning.

In the 2016 market, the government-operated PreK-12 segment was the top buyer in China followed by corporations and consumers.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

NetDragon, the largest mobile gaming company in China, obtained \$52.5 million in investment in January 2015 for their new mobile education platform. In July 2016, they acquired UK-based Promethean World, the world's largest interactive digital whiteboard supplier. Interestingly, Taiwan-based Foxconn acquired Canada-based SMART Technologies in June 2016, SMART is the world's second largest digital whiteboard supplier.

Table 10 - 2016-2021 Revenue Forecasts for eLearning Products in China by Six Buying Segments (in US\$ Millions)

China Buyer Segment	2016	2017	2018	2019	2020	2021	5-year CAGR
Consumers	\$959.97	\$990.31	\$1,064.71	\$1,105.84	\$1,027.19	\$980.54	0.4%
Corporations & Businesses	\$1,246.27	\$1,152.27	\$1,076.30	\$932.74	\$864.04	\$799.46	-8.5%
PreK-12 Academic	\$1,583.10	\$1,428.63	\$1,350.59	\$1,244.50	\$1,147.50	\$1,022.96	-8.4%
Higher Education	\$698.92	\$635.32	\$547.21	\$380.54	\$266.00	\$237.52	-19.4%
Federal Government	\$509.46	\$479.75	\$345.68	\$257.28	\$193.72	\$159.73	-20.7%
Provincial and Municipal Governments	\$265.25	\$245.09	\$204.97	\$161.43	\$135.74	\$115.63	-15.3%
Totals	\$5,262.98	\$4,931.38	\$4,589.46	\$4,082.33	\$3,634.19	\$3,315.84	-8.8%

In August 2016, the Hong Kong Institute of Human Resource Management (HKIHRM) released their annual survey on the Hong Kong training industry. "The results show that the proportion of training and development budget to employees' total annual base salary in 2015 was 3.4%, **the first decline in the past five years**. In view of a challenging economic situation, employers reduced the use of external training facilitators and resorted to internal/in-house resources such as on-the-job training, coaching by line managers, in-house development programmes, and internal knowledge-sharing events to enhance staff training and development." In other words, they are spending less money on commercial training and education products.

HKIHRM reported in May 2016 that "According to the findings, the hiring intention of employers for the first half of 2016 registered a decline compared with the second half of 2015. Employers showed a stronger inclination to freeze and reduce hiring and became cautious in their recruitment in view of Hong Kong's economic slowdown."

The growth rate for Self-paced Learning in the PreK-12 segment in China is negative at -8.4%. Revenues reached \$1.5 billion in 2016, but will drop to \$1.0 billion by 2021. The decline is due in large part to the winding down of massive digitization initiatives that will be nearly complete by the end of 2016.

China has a centralized primary and secondary curriculum developed by the government. As of 2010, the entire primary and secondary curriculum was online in China.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

There are over 230 million students and 14 million teachers across China's 520,000 primary and secondary schools. Primary schools are dominated by state-run public schools. Only 6% of students attended private primary schools in 2013, although this share is growing from a small base.

Private schools play a larger role at the secondary level, rising from less than 3% a decade ago to almost 12% in 2016. This holds across junior, senior and vocational secondary schools and includes about 12,000 schools.

As of the end of 2015, parents with children in private schools were responsible for paying for instructional material used in the compulsory grades up to the ninth grade. In 2017, the government will pay for all textbooks used in the private schools; the government already purchases the textbooks for the public schools.

The government will essentially be the only textbook buyer in China by 2017 and they will exert great control over prices for both print and digital content. The two state-owned telecoms dominate the PreK-12 learning technology market.

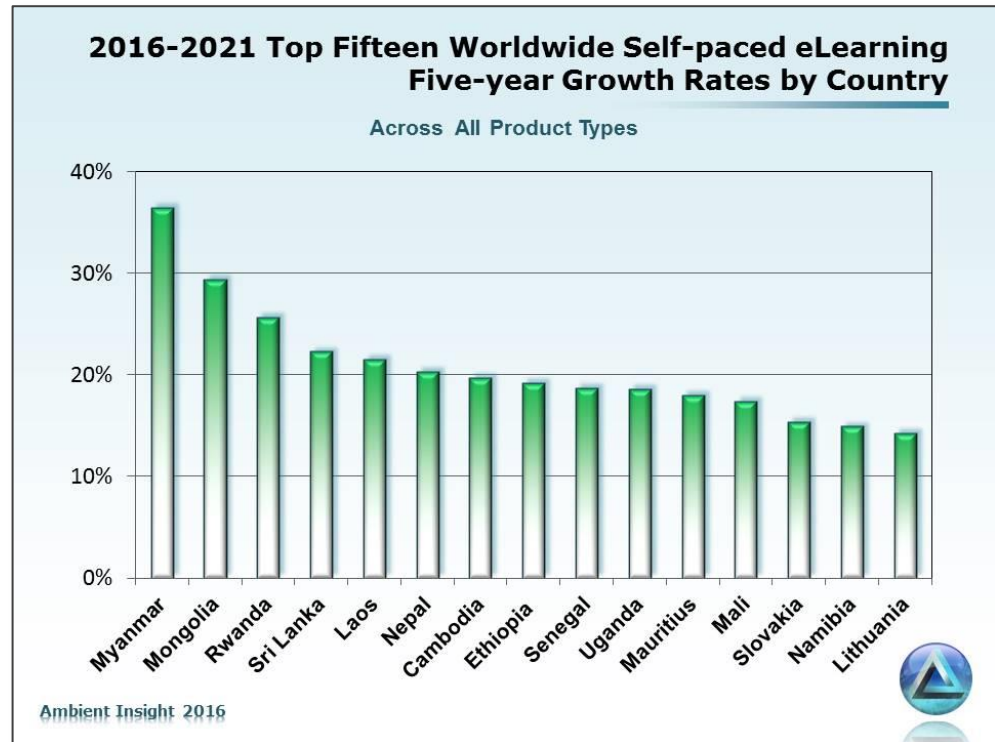
The government embarked on massive digitization efforts in the schools starting in 2013. By 2016, they had effectively digitized the entire public school system across the country. Spending on online courseware and eLearning platforms started dropping dramatically in late 2015.

There are Significant Revenue Opportunities in Many Countries

Of the 122 countries tracked by Ambient Insight, there are 15 countries that have growth rates for Self-paced eLearning over 15%. These countries are heavily concentrated in Asia and Africa, the two outliers being Slovakia and Lithuania.

Eleven of the top fifteen growth countries will generate less than twenty million dollars by 2021. Of the top fifteen, Slovakia and Lithuania will generate the highest revenues for self-paced products by 2021 at \$55.4 million and \$36.5 million, respectively.

Figure 5 - 2016-2021 Top Fifteen Worldwide Self-paced eLearning Five-year Growth Rates by Country



Slovakia and Lithuania offer substantial revenue opportunities for international suppliers. The growth rate for Self-paced eLearning in Slovakia is 17.4% and 15.0% in Lithuania.

Slovakia

Revenues in Slovakia are concentrated in the PreK-12 segment. The federal government sets the national curriculum and purchases roughly 80% of the textbooks used in the schools directly from publishers and allows the schools to select the remaining 20% (or develop content themselves). Schools order textbooks via the Education Ministry's Publishing Portal. The parents have to pay for workbooks and supplemental material.

- The PreK-12 segment is a late adopter of learning technology in Slovakia. It has one of the lowest academic ICT usage rates in the EU. This is about to change dramatically. In March 2016, the government announced that they had four bidders for the Edunet national education network project, which will connect all schools to wireless broadband. Edunet will be a central network operated by one provider.
- Several international education publishers now compete in Slovakia via domestic distributors. Macmillan competes in Slovakia via their two distribution partners: Albion Books and Oxico. Cambridge University Press has a local representative in the country. The Klett Group's RAABE Slovakia is also active in Slovakia.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

- There are five educational publishers with authorized contracts with the government: AITEC, Slovenské pedagogické nakladateľstvo, Expol Pedagogika, VKÚ, and Orbis Pictus. These publishers are the best distribution channel for foreign PreK-12 suppliers. Orbis Pictus is a reseller of Cambridge University Press' English products.

Corporate buyers in Slovakia are starting to adopt online learning and several best-of-breeds now serve this segment. Cegos sells 215 courses in the country via their distributor e-learnmedia, which distributes over 4,000 courses from the global online learning publishers.

Lithuania

Self-paced eLearning revenues in Lithuania will more than double from \$18.1 million in 2016 to \$36.5 million in 2021. The highest demand is for self-paced courses in English. The top buyer is the PreK-12 segment.

Over 90% of Lithuanians speak at least one foreign language and half of the population speaks two foreign languages, mostly Russian and English. As of 2012, over 80% of the population could speak Russian and 35% could speak English. This masks the fact that over 75% of people between the ages of 15 and 29 are relatively fluent in English.

- The PreK-12 state schools have just started to purchase laptops and will become major buyers by the end of the forecast period. According to the Lithuanian Ministry of Education and Science, as of May 2014, there were 552,000 primary and secondary students in the country across 1,300 schools and 260 "non-formal education institutions."
- Šviesa is a major educational publisher in Lithuania and claims to have 60% of the "educational literature market." They are also a distributor of Macmillan's content. Macmillan also has a distribution agreement with a company called ROTAS.
- Other domestic educational publishers include Alma littera, Didakta, the Lithuanian University of Educational Sciences Publishing House, Presvika, and Žodynas. These are the primary distribution channel for international publishers.

A good source of information for online learning and distance education in both the PreK-12 and higher education segments is the Lithuanian Association of Distance and e-Learning (LieDM) "an organization which unites all Lithuanian science, study, and education institutions that implement distance teaching and learning. It was created in January 2010."

The barriers-to-entry for foreign suppliers trying to compete in emerging markets in Asia and Africa can be quite high. There are exceptions. Rwanda is a good example.

Rwanda

The growth rate in Rwanda is 23.6% and revenues will nearly triple to \$28.1 million by 2021.

- English has been the official language of Rwanda since 2009 when the country switched from French.
- In May 2015, the Rwanda Utilities Regulatory Authority (RURA) reported that, on average, one hundred people an hour are subscribing to a new Internet service.
- In September 2015, the government announced an increase in the 2017/2018 education budget, which was 17% of the overall budget. Their goal now is to increase that percent to 22%. Rwanda now has the highest primary school enrolment rate in Africa with 98% of girls and 95% of boys enrolled.
- In January 2016, a new official competency-based curriculum was launched in Rwanda and places a great emphasis on practical skills (such as hands-on Biology Labs). The old curriculum was only five years old but was seen as more theoretical (knowledge-based) in focus.

Myanmar (Burma)

Myanmar has the highest growth rate for Self-paced eLearning in the world at 36.4% and revenues will reach \$24.8 million by 2021. Myanmar is the quintessential nascent market having opened their economy to foreign companies in just the last few years.

Myanmar is the most dynamic market in Asia due to the government's recent decision to move to a free market economy and open the economy to foreign direct investment (FDI).

In June 2013, the government reported that the state-operated public school system had increased to 41,000 schools and had over 8.1 million students and 270,000 teachers. Burmese spending on education has almost tripled from \$340 million in 2011 to \$1 billion in the 2013 budget.

In June 2014, Microsoft announced a three-year agreement with a domestic firm called Myanmar Computer Company "to train some 100,000 young people for cloud computing and related information technologies."

In July 2014, Microsoft and Intel announced an initiative in collaboration with the government "to help improve computer literacy **and develop a national electronic education system** in Myanmar. The development of a government e-education system is included in Nation's Third Wave." Microsoft will also provide support and technology education. The companies started delivering training classes in August 2014 "in a bid to improve computer literacy in schools, especially among faculty and teachers."

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

The University of Distance Education Yangon, is one of two universities under the University of Distance Education system in Myanmar. With over 500,000 students mostly studying liberal arts and economics, the UDE system is the largest university in Myanmar. The Yangon university serves distance education students in Lower Myanmar whereas the University of Distance Education, Mandalay serves Upper Myanmar.

Mongolia

Mongolia has a very high growth rate for Self-paced eLearning as well at 29.4%, but Mongolia has just under three million people and revenues will only reach \$8.6 million by 2021.

Mongolia is in a period of profound social and technical transformation. The middle class population is growing rapidly. In 2015, the economy slowed somewhat due to the reduction in coal exports to China.

The Mongolian 2011-2015 National Broadband Program intends to make sure that, "at least 50% of all households have access to inexpensive broadband connections for bandwidth-intensive services, high-speed internet, and television" by 2015.

A new government-funded Self-paced eLearning product in Mongolia launched in January 2013. It is part of an initiative called Medical Silk Road with content from Singapore's Borderless Healthcare Group. The primary application is called BabySmart, "an interactive online/Self-paced eLearning application for moms-to-be."

BabySmart has twelve Self-paced eLearning modules and also allows subscribers to connect directly to healthcare professionals. It also allows a subscriber to "attend virtual yoga and aerobic workouts conducted by health and wellness experts."

As of February 2013, most universities, research institutes, government agencies, banks, and companies in Ulaanbaatar were online. Ulaanbaatar has an extensive connectivity grid via fiber, 4G WiMAX, and 3G wireless broadband. The city government has installed over 100 free Wi-Fi hotspots in Ulaanbaatar so far and Internet access is readily available in the city.

There are just over 170 higher education institutions in Mongolia with over 215,000 students. The higher education segment is dominated by private institutions in Mongolia. There are 111 private institutions and only 60 public institutions in the country. English is widely used in both private and public institutions, particularly for STEM courses.

The government provides grants and no-interest loans to encourage enrollment. All students receive a monthly grant of the equivalent of \$45. The government also "rewards" students with high grade point averages with increases in the grants. Students with GPAs of 3.2 to 3.6 get an additional 50%. Students with 3.6 get an additional 75% and students with perfect GPAs get 100%, or double the monthly stipend.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

In late 2012, the Millennium Challenge Corporation-Mongolia (a US government aid agency) and The Asia Foundation signed an MOU "that brings the latest medical and technical information to Mongolia's future doctors, engineers, computer programmers, and other skilled workers."

"Under the agreement, the foundation's Books for Asia program delivered 10,000 new technical, vocational and medical books, CDs and DVDs to students and health centers benefitting from MCC's five-year, \$285 million investment in Mongolia. Many publishers generously contributed to the initiative, including McGraw-Hill, John Wiley & Sons, Oxford University Press, W.W. Norton & Company, Houghton Mifflin Harcourt, Books of Discovery, and Island Press."

Lucrative Vertical Zones in the US

Despite the overall negative growth rate for Self-paced eLearning there are lucrative opportunities in particular verticals and for particular products.

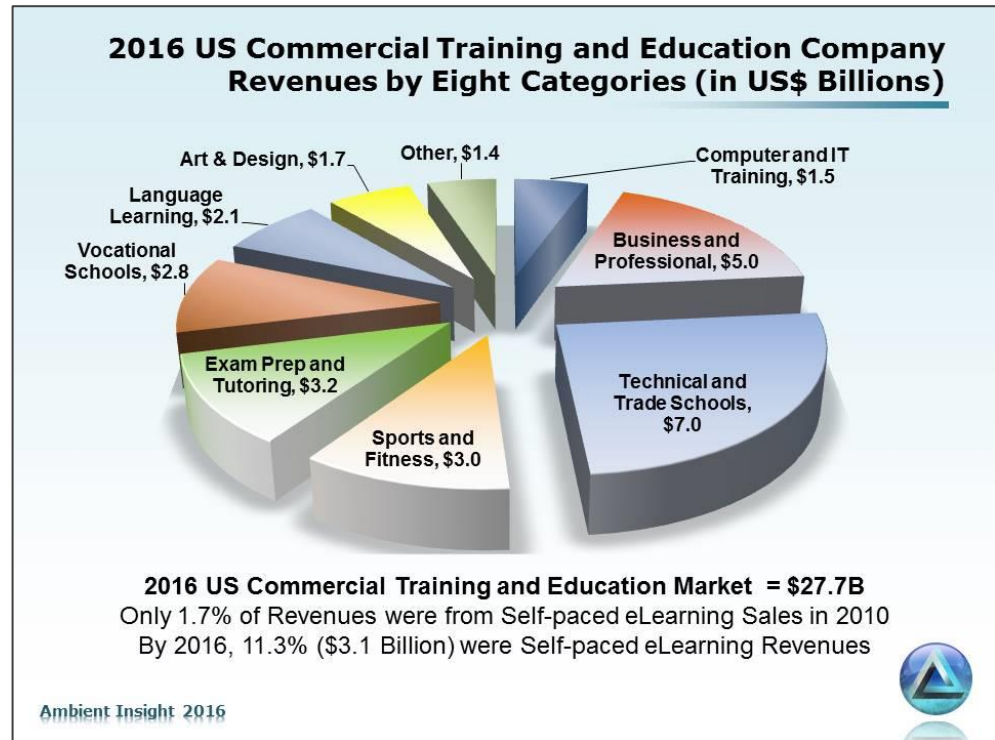
Managed education and training services is a growth market. Healthcare is a "safe" vertical for eLearning suppliers and growth rates for content and services are relatively high.

The Commercial Training and Education Industry Goes Digital

Commercial training and education was a \$27.7 billion industry in the US in 2016. With minor exceptions, most of the private training firms are migrating rapidly to technology-based products to lower costs and increase margins.

The single largest expense in classroom training is the salary paid to the teacher or trainer. On average, salaries account for 70-75% of the cost of delivery. Training firms must also maintain the costs of equipment and physical classrooms. Self-paced eLearning has much higher profit margins.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline



(Source: US Department of Commerce categorized by North American Industry Classification System (NAICS) codes for commercial training and education companies. Does not include community colleges or non-profit tertiary schools.)

In 2010, barely 1.7% (\$443.7 million) of all revenues generated by commercial training and education suppliers in the US came from Self-paced eLearning products. By 2016, 11.3% of their revenues were generated by the sales of Self-paced eLearning products; this was \$5.4 billion, a more than tenfold increase in five years. Yet, 11.3% is still quite low and points to significant room for growth.

Most commercial training and education suppliers develop a percentage of own content. Private vocational and commercial training firms are avid buyers (and resellers) of commercial self-paced educational products including packaged retail content, custom content development services, and tools/platforms. All three have a direct positive impact on their profit margins.

The customers for commercial education and training span several segments including consumers, corporations, and government agencies. The PreK-12 segment purchases tutoring and exam prep services.

Continuing Education is Mandatory for Licensed Professions

Professions that require continuing education to maintain licenses are significant revenue opportunities. Professions have to take training to keep their licenses; it is not optional.

Figure 6 – Professions in the US with Licensure Requirements

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Professions in the US with Licensure Requirements					
Accounting	Clinical Laboratory Technicians	Foresters	Library and Information Services	Osteopaths	Public Health Administrators
Acupuncture	Construction (includes electricians & plumbers)	Funeral Services	Marriage and Family Therapy	Paralegals	Rabbinical Education
Architecture	Cosmetology	Health Education Schools	Massage Therapy	Pesticide Operators	Radiologists
Asbestos Abatement	Counseling	Health Services Administrators	Medical Boards Medical Education	Pharmacists	Real Estate Brokers
Athlete Agents	Dentistry Professionals	Hearing Aid Dispensers	Midwives	Physical Therapists	Rehabilitation Professions
Athletic Trainers	Dieticians	Home Health Care Workers	Naturopathic Medicine	Physicians and Physicians' Assistants	Respiratory Care Therapists
Attorneys	Emergency Medical Technicians	Interior Design	Nursing and Nursing Assistants	Podiatrists	Securities Professionals
Banking	Engineers	Insurance	Nursing Home Administrators	Private Investigators	Social Workers
Cemetery Brokers and Salespersons	Film Professionals	Landscape Architecture	Occupational Therapy	Psycho-analysts	Speech and Language Therapists
Chiropractic	Financial Advisors	Land Surveyors	Optometrists and Opticians	Psychologists	Teachers

■ Finance and Insurance Professions
■ Healthcare Professions

Ambient Insight 2016 

There are over 60 professions (comprised of over 31 million employees) in the US that require workers to obtain continuing education (CE) or continuing medical education (CME) credits to maintain valid licenses in particular fields.

Over half of these professions are in the healthcare industry. Many of these professions also require licensees to achieve passing scores on exams. There is a significant market for Self-paced eLearning exam preparation courses in this segment.

Healthcare

The healthcare segment has a growth rate of 7.4% and revenues for Self-paced eLearning products will reach \$1.7 billion by 2021. The growth rate for self-paced continuing medical education (CME) is strikingly similar at 7.6% and revenues for self-paced CME will reach \$528.3 million by 2021.

Table 11 - 2016-2021 US Healthcare Revenue Forecasts for Self-paced eLearning Products (in US\$ Millions)

US Buying Segment	2016	2017	2018	2019	2020	2021	5-year CAGR
Healthcare	\$1,236.4	\$1,392.5	\$1,542.5	\$1,651.8	\$1,716.7	\$1,763.1	7.4%

The healthcare segment is not a monolithic vertical, but rather an amorphous cluster of buyers. The buyers in the healthcare segment are spread across the consumer, corporate, academic, government, and

Ambient Insight estimates that the overall US healthcare education and training market was over \$9 billion by the end of 2013.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

association segments. This section does not include expenditures made by consumers or higher education students.

Finding the buyer in the US healthcare segment can be a daunting task. Often the real customer is not the actual user. More often than not, the largest buyers are not users. These "non-user" buyers include:

- Pharmaceutical, device, electronic medical records (EMR), and publishing companies
- Public and private providers that buy products for their staffs
- Associations that develop and/or license certification and licensing content for their members
- Insurance companies (payers).

In the 2016 market, the pharmaceutical, device, EMR, and publishing companies were the largest buyers. A great deal of the content they subsidize relates to continuing medical education (CME).

The actual users of the products (healthcare professionals) account for relatively little of the overall expenditures since they often get the products free.

The pharmaceutical and medical device companies categorize their course development costs as marketing expenses. They offer it to professionals and institutions as a way to promote their products or as a training component bundled with the sale of their medical products.

Table 12 - 2016-2021 US Healthcare Continuing Medical Education (CME) Expenditures by Medium (in US\$ Millions)

2016-2021 US Healthcare CME Expenditures by Delivery Medium	2016	2021	5-year CAGR
Physical CME Classes & Events	\$461.54	\$182.40	-16.9%
Self-paced eLearning CME	\$367.09	\$528.39	7.6%
Mobile Learning CME	\$97.32	\$227.27	18.5%
Other CME Methods	\$109.16	\$72.66	-7.8%
Total US CME Market	\$1,035.11	\$1,010.72	-0.5%

Within the healthcare segment, the largest buyers for self-paced CME courses are the pharmaceutical and medical device companies followed by CME publishers themselves. These companies and organizations develop content in house and also hire outside developers to create the digital course content. There is now a cottage industry for services suppliers that specialize in creating Self-paced eLearning courses for CME.

Until recently, most CME was delivered in classrooms and at conferences. Tuition is usually a reimbursable expense so companies and organizations are the top buyers. The revenues of physical-location CME are declining rapidly and will drop to \$182.4 million by 2021, less than half of the revenue in 2016.

In contrast, the revenues for self-paced and mobile CME are growing at a brisk rate. The revenues for mobile CME will more than double over the

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

forecast period. Over 41% of all Self-paced eLearning revenues in the US healthcare segment will related to CME by 2021.

WellPoint, UnitedHealth, Pfizer, Aetna, and Cigna are examples of large insurance companies that are investing heavily in self-paced courses for both clinical professionals and patients.

The leading learning platform supplier to the US healthcare segment is HealthStream. They offer other products besides learning content and technology but they do break out their learning-related revenues in their financial statements.

The aggregate global growth rate for eLearning in the healthcare industry is 7.4%. The demand for digital English language learning content is also relatively strong in the healthcare segment at 6.6%. In July 2016, HealthStream reported that "For the first six months of 2016, revenues were \$108.9 million, an increase of 10 percent over revenues of \$99.3 million in the first six months of 2015."

Orbis Education is a private company that offers managed education services for the healthcare industry. The report that the overall healthcare education industry in the US is a \$4 billion market and they are doubling revenues annually.

Wiley's corporate-facing CrossKnowledge brand has experienced year-over-year growth since Wiley acquired the company in early 2014. CrossKnowledge is corporate facing and focusses on business and management content. They have a diverse catalog of content, platforms, and tools. Most of their clients are large enterprise companies in Europe.

Digital English Language Learning a Growth Market

The global market for digital English language learning is booming and there are significant revenue opportunities for suppliers. The global market for digital English language learning products reached \$2.8 billion in 2015. The worldwide five-year compound annual growth rate (CAGR) is 6.0% and revenues will surge to \$3.8 billion by 2020.

Ambient Insight has revised our international forecasts for digital English language learning products significantly upward from previous forecasts. Revenues will more than double over the forecast period in 57 of the 122 countries tracked by Ambient Insight. **(Source: The 2015-2020 Worldwide Digital English Language Learning Market Series, Ambient Insight, LLC).**

In terms of growth rates, the regions with the highest growth rates for digital English language learning are Africa, Latin America, and Eastern Europe at 17.1%, 13.7%, and 9.9%, respectively. Africa has sixteen countries with growth rates above the aggregate 17.1%.

Asia Pacific now has a relatively modest growth rate of 4.6% for digital English language learning, being dampened by the rapid commoditization

Japan and South Korea are the most mature digital English language learning markets in the world and while revenues are flat, the revenues are quite high.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

in China. Twelve of the twenty-one countries in the region have growth rates above 20% and only three countries have flat-to-negative growth rates (Japan, Singapore, and South Korea).

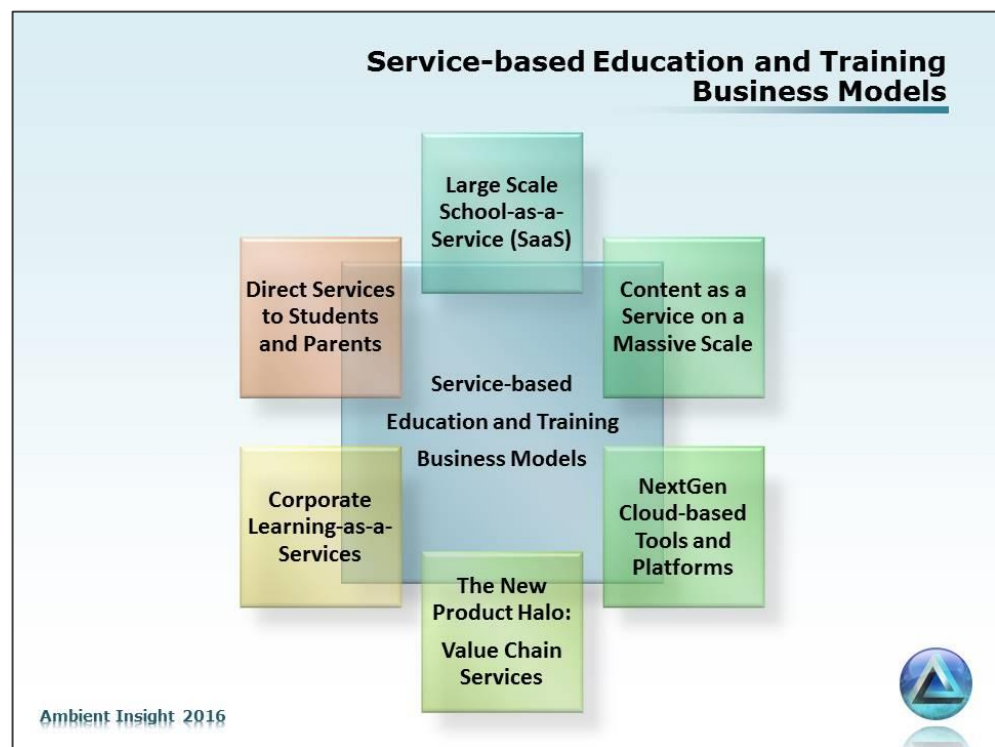
One Bright Spot Is Also an Inhibitor: The Managed Training and Education Services Suppliers are Doing Well

The global managed education and training services suppliers are generating significant revenues and the leading suppliers are reporting annual growth rates between 18-37%.

Managed education services (also called online program management and edtech program management) in the PreK-12 and higher education segments and managed training services in the corporate segments across the globe are bright spots for the eLearning industry in terms of revenues but also one of the factors driving overall revenues down.

When organizations and institutions outsource their online programs, they no longer have to buy their own content, tools, or platforms.

Figure 7 - Service-based Education and Training Business Models



HotChalk garnered an unprecedented \$230 million in private investment in November 2015. This is the single highest amount invested in a learning technology company in the history of the industry. Clearly, investors see the value of the School-as-a-Service business model.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

India-based Nspira is an online education management firm serving the Indian higher education segment. They obtained \$60 million in funding in January 2016, which is a very high amount for a learning technology supplier in India.

Managed training and education services usually entail supporting very large numbers of users and very few suppliers can scale their offerings to that extent. The revenues are concentrated in a handful of companies that have the resources to scale their services for large numbers of users.

Managed services (School-as-a-Service) are provided by commercial third-party suppliers. These managed services are usually turnkey bundles that include content design, content development, cloud-based hosting and delivery, and most importantly, 24/7 technical support; all at a fraction of the cost that the institutions would spend if they did it themselves.

In the academic segment, managed education services are paid for on a per-student basis by state, local governments, and federal subsidies. In the US, suppliers can charge up to \$1,800 per student. In the higher education segment, the most common business model is shared tuition in which the managed services suppliers take (on average) 50-70% of the tuition paid by enrolled students. In the corporate and government segments, organizations pay the managed training services suppliers a flat amount for every employee being trained.

In-house costs are greatly reduced for organizations adopting managed education and training services; this is a factor in lower spending in countries that are adopting managed services. The adoption of managed training and education services mitigates the need for a learning management system and is directly linked to the decline in LMS revenues.

Cengage Learning acquired the online program management company Learning Objects and its learning platform, Difference Engine in late 2015.

The major suppliers are buying their way into the managed services market in higher education. Pearson acquired EmbanetCompass and Wiley acquired Deltak in October 2012. EmbanetCompass had 35 institutions and Deltak had 26 institutions at the time of purchase; these were the two leading managed services suppliers in terms of institutional customers.

Other best-of-breeds include Bisk, Helix Education, GP Strategies, DeVry's Integrated Education Solutions, Academic Partnerships (operates as Whitney in Latin America), 2U, HotChalk, Capital Education, The Learning House, and Colloquy (a Kaplan startup sold to Everspring in early 2016), and Comcourse.

The business model is compelling for institutions since there are no startup fees. Comcourse states that "Comcourse never charges upfront fees nor do we have minimum requirements. We partner on marketing, recruitment, course development, and technology infrastructure. We work under revenue sharing models in which we absorb virtually all of the risk and share in the success of the programs."

Some of the suppliers manage large numbers of online students. In August 2014, Pearson stated in their financial report that "Student registrations for our under-graduate programs with Arizona State University Online,

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

University of Florida Online, Ocean Community College, and Rutgers grew more than 37% to 40,000. Student registrations for our post-graduate programs were up 7% to more than 23,000, adding new programs at Adelphi University and George Washington Business School."

It is interesting that of the top 20 managed services providers, seven have standardized on the Moodle platform.

These managed online learning suppliers are doing quite well in terms of revenues as can be discerned from their financial reports:

- Despite a 5% decrease in their overall education business reported in April 2016, Wiley's managed services division increased their revenues by 18% in 2015 compared to the year before. "As of April 30, 2016, the Company had 38 partners and 226 degree programs under contract. Deltak generated revenue of \$96.5 million in fiscal year 2016."
- GP Strategies reported an overall 2.3% loss in revenues for 2015 compared to the year before. Yet revenues in their Learning Solutions division, which provides managed services grew by 4.5% in 2015 compared to 2014.
- In 2U's earnings report released in August 2016, they cited a 39% increase in revenues from the same quarter in the prior year.
- In July 2016, Pearson stated in their financial report that "In Pearson Online Services, our Higher Education Online Program Management (OPM) business, course enrolments grew strongly, up 23% to over 165,000, boosted by strong growth in Arizona State University Online."

In March 2012, Pearson and Mexico-based INITE launched a joint venture called UTEL, a 100% online degree-granting university. A Mexican company called Scala replicates the online programs for other Mexican universities. In their July 2016 financial statement, Pearson reported that enrollments in UTEL grew by 33% in 2015 to reach 15,500 students. Pearson also reported in July 2016 that:

- In India, "enrolments at our managed schools grew 14% to over 28,000 students. Pearson MyPedia, an inside service 'sistema' solution for schools comprising print and digital content, assessments and academic support services, expanded to nearly 200 schools with over 56,000 learners."
- "In Higher Education Online Services, our Online Program Management business grew strongly in Australia with combined course enrolments up nearly 200% from 2015."

Managed services drive revenue into a small number of companies. When higher education institutions adopt managed services, the supplier manages the entire operation at volume prices and the schools no longer have to procure products from several suppliers.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

While this is indeed a bright spot in the global eLearning industry in terms of revenues, very few suppliers are tapping these revenues.

Managed services are not confined to the higher education segment. The top two managed services suppliers in the PreK-12 segment are K12, Inc. and Pearson's Connections Academy.

As of 2015, K12, Inc. had 114,600 enrolled students and operated in 32 states and the District of Columbia. In their 2015 financial statement, they reported that their managed programs generating \$813.6 million in revenue in 2015, up from \$793.8 million in 2014 and \$730.8 million in 2013.

Pearson acquired Connections Academy in late 2011. At that time, Connections Academy was experiencing an average of 30% annual revenue growth. In the 2015-16 school year, Connections Academy was operating 30 virtual public schools in 26 states. They had over 68,000 students enrolled students in 2015, up 11% from the year before and up from 40,000 in 2011.

Managed training services are offered by the major training firms. Companies outsource large portions (if not all) of their training programs to these vendors. India-based NIIT is one of the largest managed training service providers in the world.

Longitudinal Analysis: Five-year Growth Rates Falling Fast

The global eLearning market has been declining steadily for the last eight forecast periods. It did not enter negative territory until the 2014-2019 forecast period.

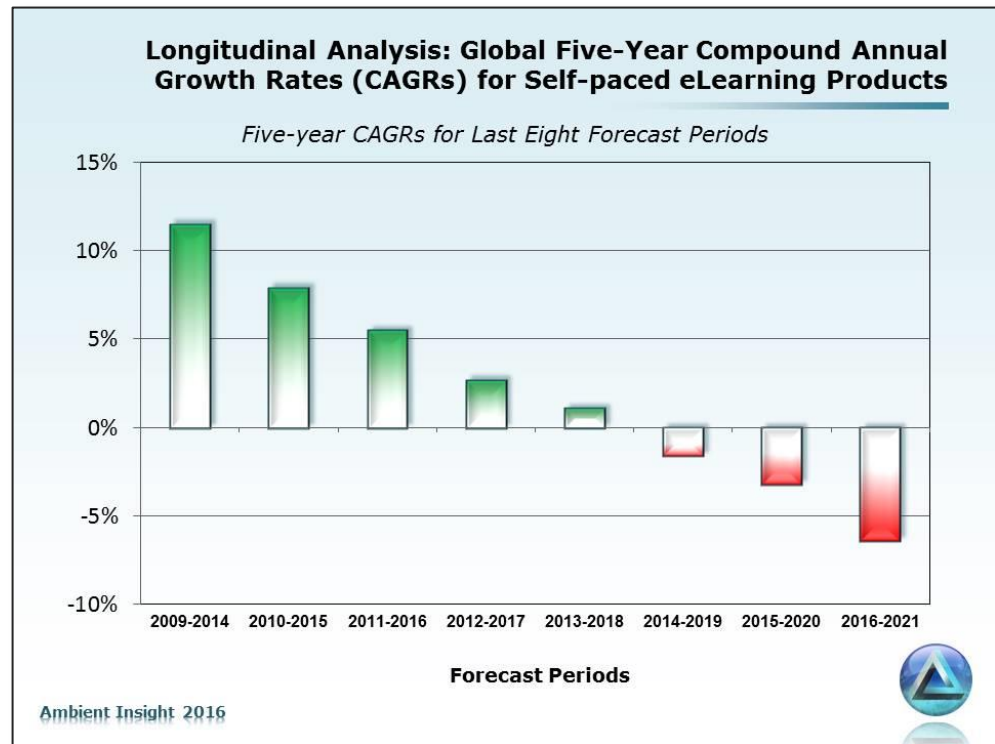
Despite the high growth rates in emerging economies, it is highly unlikely that the eLearning industry will return to positive territory in the near future. It is possible that the market could go positive again once the steep revenue declines bottom out, but the revenues will be quite low compared to the historical highs.

Nevertheless, it is more likely that the decline will continue indefinitely as several convergent inhibitors drive the market down. Although computer-based training has been used in the education and training industry since the early 1980's, the eLearning era began in earnest in 1999 at the height of the dot.com boom.

The industry managed to prosper until 2014 due to the sequential uptake of adoption in the higher education segments across the globe. It is likely that eLearning will remain firmly anchored in the higher education space despite the rapid growth in demand for game-based educational products in that segment.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Figure 8 - Longitudinal Analysis: Global Five-Year Compound Annual Growth Rates (CAGRs) for Self-paced eLearning Products



The recent steep declines in the eLearning industry essentially mean that the eLearning era is effectively over. The product has reached the end of its product lifecycle and simply cannot compete with new learning technology products on the market.

Due to the "perfect storm" of market inhibitors, growth rates for eLearning will never recover in the developed economies. Many of the developing economies are mobile-only countries and eLearning will never gain significant adoption in those countries.

It is interesting that new learning technology companies are citing the lack of innovation in the eLearning industry in their marketing material. A company called Knowledge Avatars sells a product used to create digital tutors and even digital students. In their marketing material, they state that "Conventional e-learning is outdated! It does not meet students' individual needs. Conventional e-learning has a dropout rate of 50%! Students need help to learn in a format that they will enjoy using!"

Mounting Quantitative Evidence: Publicly-traded Companies Report Lower Revenues

A review of recent financial reports from the publicly-traded learning technology companies provides ample evidence of the declining eLearning market.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Macmillan is a subsidiary of the Stuttgart-based conglomerate Holtzbrinck Publishing Group. They have operations in the US, Latin America, Western Europe, and in the Asia Pacific. Holtzbrinck is a private company but they do publish revenues. Their last revenue statement was for 2014. Compared to 2013, their Macmillan education division grew their 2014 revenue slightly from 888.8 million euros to 902.2 million euros; this is only a 1.5% increase.

In March 2015, Hachette Livre, one of the divisions of France-based Lagardère reported that their 2014 revenues were down 3% from the year before. Their education business accounts for 16% of their revenues. "In France, Hachette's business fell by -8.6% from trade and education. Declines were also reported in the US (-4.8%), and the UK (-4.6%). Spain and Latin America business operations remained relatively stable (-1.1%)."

For their fiscal year ending in March 2015, Japan-based Benesse reported that their domestic education revenues declined by 6% over the year before. Benesse is the largest education provider in Japan and has operations in China, South Korea, Taiwan, and Singapore. Net sales for the fiscal year ending March 31, 2016 fell by 4%.

In December 2015, McGraw-Hill Education reported that their 2015 revenues were \$1,237,270, down from \$1,290,478 in 2014, a 4.1% decrease. They were earning \$1,335,202 in 2011. Their 2015 international sales were down 8.6% compared to 2014, due in large part by weakness in demand and the strong US dollar.

In February 2016, Spain-based PRISA reported that their 2015 education division revenues fell by 10.3%. Santillana is their education subsidiary and has operation in 22 countries. They are the market leader in Spain and dozens of countries in Latin America. Santillana also has an operation in the US. PRISA cited the economic meltdowns in Brazil and Venezuela and the negative impact of foreign exchange rates for the decline.

In March 2016, Rosetta Stone reported that "For the full year 2015, revenue totaled \$217.7 million, down 17% from \$261.9 million in 2014." Rosetta Stone is in the process of restructuring its business away from the consumer segment. "Consumer segment revenue totaled \$119.6 million, down 32% from \$177.2 million in 2014 and E&E (Enterprise and Education) segment revenue totaled \$98.1 million, up 16% compared to \$84.7 million in 2014."

GP Strategies reported in March 2016 that their 2015 revenues were down 2.3% at \$490.3 million compared to the \$501.9 million in 2014. "The net decline is largely attributable to a \$30.0 million revenue decrease due to the completion of non-recurring alternative fuels projects in 2014 and an \$11.3 million revenue decrease due to unfavorable changes in foreign currency exchange rates, partially offset by an increase in global training services."

In their financial report for their fiscal year that ended in April 2016, Wiley & Sons reported that their overall revenue dropped to \$1.727 billion in fiscal 2016, down from \$1.822 billion the year before. Their education

It is amazing that a negative growth rate of -1.1% is referred to as "relatively stable". Expectations are now quite low in the market.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

division revenues decreased by 5% in 2015. The decline in their education revenues were particularly steep in the EMEA region at a drop of 15%.

Educomp is India's largest PreK-12 provider. It has 47 subsidiaries and operations in countries all over the world. "In fiscal 2015, the total consolidated revenues of Educomp group aggregated 5,942 million (\$89.1 million) rupees as compared to 7,247 million (\$108.7 million) rupees in fiscal 2014. This is a dramatic 18% decline.

In March 2016, Cengage Learning reported that their fiscal 2016 annual revenues were \$1.745 billion, down \$62 million from their 2015 fiscal revenues and down \$112 million from 2014.

In July 2016, Pearson reported that their global revenues were down 7% from the year before. They cited economic conditions China and Brazil, and reduced higher education enrollments in the US. "In our Core markets (which include the UK, Italy and Australia), we expect modest declines in vocational course registrations in UK schools, ongoing pressure in our various learning services businesses, partially offset by growth in managed services in Australia and the UK." They also reported that in Brazil, "revenues in our sistemas business were level with last year, whilst revenues in English language learning fell due to challenging economic conditions."

In July 2016, France-based Cegos Group reported a 3.4% decline in 2015 from the year before. "The very positive performance we achieved internationally was an effective counterbalance to the decline in business in the French market (a 9% decline), which was confronted with the uncertainties associated with the training reform that came into effect in early 2015." They did report stronger growth in several regions including a 7% aggregate growth across Northern Europe and a 6% growth in Southern Europe.

Cegos reported that revenue growth in Europe was concentrated in Italy, Spain, Switzerland, and the UK. This is a significant achievement considering that the growth rates for Self-paced eLearning in those countries are flat-to-negative. They reported that global revenues for their managed training services solution rose by 10%.

Cegos reported a healthy growth rate of 13% in Asia Pacific. They have a presence in China but they are not exposed to the academic segments, which are no longer spending large amounts on courseware.

Sanoma Learning, which has operations in five European countries and competes across Western and Eastern Europe, reported in August 2016 that their revenues fell by -1.1% in their fiscal 2015 and declined by -1.9% in their fiscal 2014. This is all the more remarkable since they had a growth rate of 8.9% in their fiscal 2013.

Market conditions are slightly better in the PreK-12 segment, but not by much. K12, Inc. reported that their 2015 revenues increased by 3.1%, yet their enrollments only grew by 0.7%. In Cambium Learning Group's annual report for 2015 released in early 2016, they stated that their annual revenues grew by 2.2%.

Sources of Data on the Global Self-paced eLearning Market

The financial reports from the domestic and international education technology companies that operate across the planet provide invaluable insight into the rapidly evolving market conditions and revenue opportunities in specific countries.

There are hundreds domestic education publishers in the world that are publicly traded. The financial reports of domestic publicly-traded suppliers provide highly-targeted insight on the market conditions in specific countries and in particular buying segments.

The major international educational publishers that provide quarterly and annual financial reports include Pearson, McGraw-Hill Education, Cambridge University Press, Sanoma, Wiley & Sons, Elsevier, Houghton Mifflin Harcourt, Macmillan, Oxford University Press, Santillana, Singapore-based Popular Holdings, Cegos, Cambridge University Press, South Korea-based Chungdahm Learning, India's Educomp, France-based Hachette Livre (Lagardère), and Japan-based Benesse (parent company of Berlitz). All have significant market presence in regional and global markets and their financial reports provide detailed data on the markets in specific countries.

Oxford University Press and Cambridge University Press are non-profits but they release annual financial reports. Smaller publicly-traded companies like Lingo Media and Cricket Media focus on very specific demographics in particular countries and their financial reports provide insight into the academic and consumer markets, respectively.

Pearson is the largest educational publisher in the world and generated just over \$6 billion in revenue in 2015; 65% of their revenues were generated from the sales of digital content. Their annual investor presentations include very detailed information about discrete types of products sold in specific regions.

Benesse is the largest educational publisher in Japan and the third-largest in the world. Macmillan (owned by the German publishing conglomerate Holtzbrinck) is the fourth-largest educational publisher in the world. McGraw-Hill, Scholastic, Wiley, Cengage Learning, Houghton Mifflin Harcourt, Oxford University Press, and China Education Publishing all generate over a billion dollars a year in revenue.

There are three public education publishers with major presence in Western Europe: Hachette Livre (Lagardère Publishing), Sanoma Learning, and the Klett Group. Their financial reports provide an enormous amount of precise data on the Western Europe market.

Hachette Livre has multiple brands in France (three brands with a 45% share of the education market), Spain (four brands including Anaya and a 21% market share), and the UK (four brands including Hodder Education). They sell products all across the region and the world. They have subsidiaries and joint ventures in the US, Mexico, Argentina, Algeria, Lebanon, the Russian Federation, China, and India.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

There is a wave of academic digitization efforts in many countries in the world and the government-operated school systems identify the budgets for those multi-year programs.

Sanoma Learning consists of six companies that operate in five European countries: Van In (Belgium), Sanoma Pro (Finland), Malmberg (the Netherlands), Young Digital Planet (ydp) and Nowa Era (Poland) and Sanoma Utbildning (Sweden). Young Digital Planet sells digital products across Europe. The company claims that, "One of our flagship products, EuroPlus+ REWARD, is now one of the most popular software packages for learning English in Europe."

The Klett Publishing Group is Germany's largest educational publisher and is comprised of 60 companies in 18 countries. They also operate seven distance-learning institutes and four distance-learning universities. Some of the publishing companies that belong to the Klett Group are: Klett, ÖBV, Bange, AAP Lehrfachverlage, PONS, Rokus Klett, Difusión, Klett und Balmer, RAABE, Klett-Cotta, Friedrich, Esslinger, Klett Kinderbuch, ILS, SGD, Euro-FH, and Klett Langenscheidt.

Santillana is the education division of the Spanish publishing conglomerate PRISA and generates over 80% of their revenues in Latin America. Their financial reports provide a great deal of data on the education markets in specific countries Latin America.

It is not uncommon for firms to disclose annual revenues when they obtain private investment. Private equity firms will also sometimes disclose annual revenues for the companies they fund. Companies will often report annual revenues for companies they acquire.

The mobile network operators (MNOs) and the third-party content providers that provide Mobile Learning VAS products usually report the number of subscribers and the MNOs always identify the price of the subscriptions.

Government trade agencies monitor the global and regional learning technology industry closely in several countries including agencies in the US, Canada, Australia, South Korea, Finland, China, Japan, and Taiwan. These trade agencies routinely report the number of companies and the number of employees in the domestic learning technology industry. The agencies also report total revenues for the industry.

Sources of Data on the China Learning Technology Market

The financial reports from the domestic and international online education companies that operate in China provide invaluable insight into the rapidly evolving market conditions and revenue opportunities in the country.

There are dozens of publicly-traded online education suppliers operating in China including ChinaEdu, ATA, ATA Online (a wholly-owned subsidiary of ATA), BAIIO Family Interactive, China Distance Education Holdings Limited, Xueda Education, Digital China, China Chuanglian Education, TAL Education Group, China Education Resources (CER), Shenzhen Kingsun Science & Technology (Kingsun), Ambow Education Holding, NetDragon,

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Tarena International, China Education Alliance, Hong Kong Education, Guangdong Qtone Education, Taomee, China E-Learning Group, and New Oriental Education. China Online Education Group, which operates the online English language learning site 51Talk went public on the NYSE in June 2016.

Smaller publicly traded companies like Lingo Media and Cricket Media operate in China and their financial reports provide insight into the academic and consumer markets, respectively.

Most of these education companies focus on a particular buying segment or a particular product and their financial statements provide precise reporting on particular product revenues generated in diverse buying segments.

- BAIIO Family Interactive targets preschoolers and Kingsun is a PreK-12 eLearning company.
- China Education Resources (CER) works directly with the Chinese government's K-12 education agencies and provides online professional development courses to over a million teachers.
- ChinaEdu is online education company serving the higher education segment; they are an aggregator with dozens of higher education partners.
- China Distance Education Holdings Limited (DL) offers professional online education and test preparation courses in accounting, law, healthcare, construction, engineering, and information technology exams.

The major international educational publishers are active in China. Pearson, McGraw-Hill, John Wiley & Sons, Elsevier, Sanoma, Houghton Mifflin Harcourt, Singapore-based Popular Holdings, South Korea-based Chungdahm Learning, France-based Hachette Livre (Lagardère), and Japan-based Benesse (parent company of Berlitz) all have significant market presence in China. In July 2015, Pearson reported that 6% of their sales in 2014 were in China; this equates to \$375 million in revenues.

A good source for the commercial education technology market in general in China is an edtech news website called JMDedu.com. "We observe the dynamic development of the edtech industry, discover inspiring companies and products, interpret policy change and market trends." They also track private investments made to learning technology suppliers in China.

The Perfect Storm of Market Inhibitors

There are five major convergent inhibitors driving the global revenues for Self-paced eLearning downward:

- Intense commoditization
- The eLearning product lifecycle is in the final stage and suppliers diversifying their product catalogs beyond eLearning
- The collapse of the global LMS market
- Profound degree of product substitution
- The leapfrog effect in mobile-only countries

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

The weakness in demand for eLearning is different in country and in each region, but there are overarching inhibitors common to the general market across the planet. The major market conditions contributing to revenue losses are commoditization, the end of the product lifecycle (and supplier focus on new product types), the collapse of the LMS market, a pronounced degree of product substitution, and the presence of the leapfrog effect in mobile-only countries.

Figure 9 - Primary Inhibitors Driving Dramatic Decline in the 2016-2021 Worldwide eLearning Market



None of these inhibitors are reversible. Combined, they are driving the global eLearning market into steep declines in revenue. Any one of these inhibitors would dampen the demand for eLearning, but the presence of all five creates very unfavorable market conditions for suppliers.

Intense Commoditization Erodes Pricing Power

The irony of a commoditized market is that demand is still quite high, large volumes of products are sold, but the prices are falling. Volume is rising but per unit prices are falling, which creates a market with negative revenue growth rates. In a commodity market, suppliers compete solely on price and profit margins decline. Large suppliers are often willing to operate at a loss to drive out competitors.

It should be noted that the pricing pressures created by commoditization are heavily concentrated in the US and China eLearning markets and only present in varying degrees in other countries. In general, early adopter countries are more prone to commoditization, but this is not always the

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

case. For example, there is little to no commoditization present in the South Korean eLearning market.

All products are disposed to commoditization to some degree, but hardware and software products have proven to be very predisposed to it. All technology-based products experience well-defined lifecycle phases. The Self-paced eLearning markets in the US and China are solidly in the commoditization phase and the value migration phase is in full swing in both countries.

K12, Inc. reported in June 2015 financial report that "Price competition from our current and future competitors could also result in reduced revenues, reduced margins or the failure of our product and service offerings to achieve or maintain more widespread market acceptance."

Aside from the impact on a supplier's pricing power, commoditization is also characterized by the lack of differentiation of products. This is certainly true for eLearning products. In the presence of nearly identical products with essentially the same features, customers will always opt for the lower priced product; price becomes more important than brand.

The one bright spot with minimal exposure to pricing pressure and commoditization is the managed education and training services sector.

eLearning is in the Final Stage of the Product Lifecycle

Self-paced eLearning is now in the final phase of its product lifecycle. Commoditization is now rampant in the industry. Once in the commoditization phase, the value migration phase begins with buyers moving to new product types and suppliers developing or acquiring new product lines to generate new revenue streams.

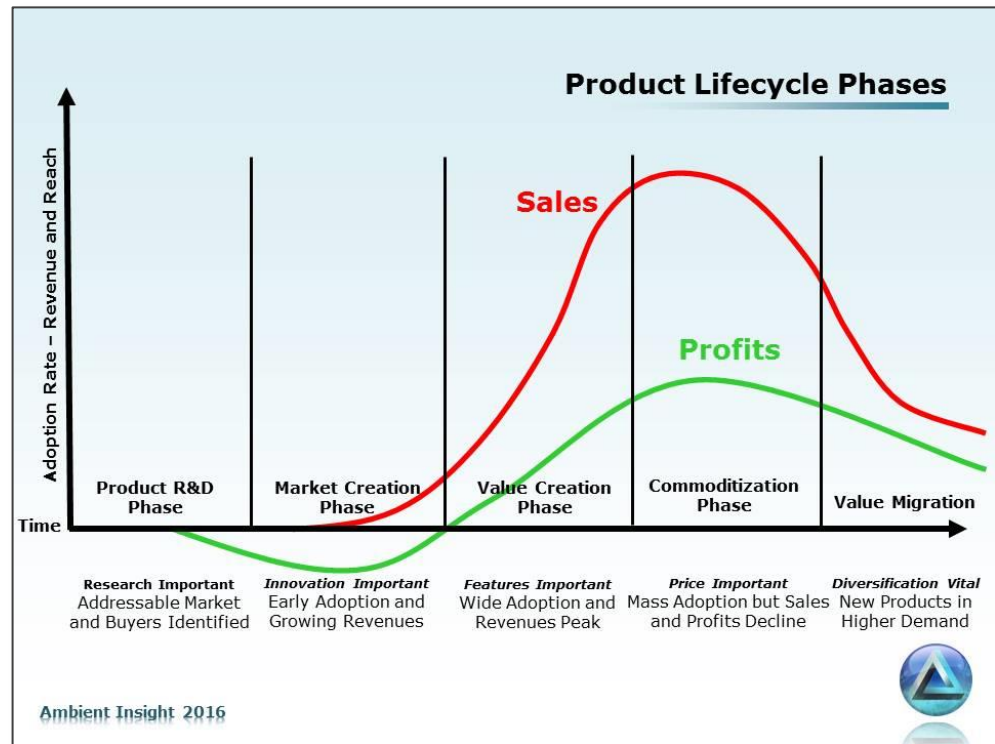
Moreover, while consolidation has created suppliers with very large revenues, the only way they can maintain those high revenues is to acquire more competitors. At a certain point in a commoditized market this becomes a case of diminishing returns.

The commercial learning technology industry has existed since the early 1970's. The first commercial computer-based training (CBT) system was PLATO (Programmed Logic for Automatic Teaching Operations), that was originally developed by the University of Illinois and commercialized in 1976 by Control Data Corporation (CDC).

The term "eLearning" was first used in 1997 by the author Aldo Morri and became firmly embedded in the lexicon in 1998 due to the widespread propagation of the word by the industry pioneer Jay Cross.

Self-paced eLearning has had an extraordinary product cycle primarily due to the sequential adoption across all the buying segments. Ironically, the early suppliers targeted the consumer market in the late 1990's. Consumers were simply not interested at that time and many companies failed in two years despite large injections of investment capital. The companies that survived recalibrated their products for the corporate and government segments.

Figure 10 - Learning Technology Product Lifecycle Phases



Subscription-based web-based self-paced language learning products have very high drop-out rates with vendors reporting attrition rates of up to 80-90% for three month subscriptions.

The eLearning products in the early days of the industry were primarily purchased by large corporations and federal military agencies. The primary appeal of eLearning has always been consistency of delivery and cost effectiveness compared to classroom training. ***Reduction in cost has always been the primary appeal of eLearning and still the key selling point for the product type.***

Adoption in the academic segments was quite slow and started to take root in the higher education segment in the US and the UK in the 2005-2006 timeframe. That said, the growth rates were quite low (below 2%) for several years. The adoption of Self-paced eLearning in the PreK-12 segments across the planet have been tepid at best and virtually non-existent in places like Japan and most of Scandinavia.

Game-based Learning is now more common in the US PreK-12 segment than eLearning and has a very high global growth rate at 26.1%. ***(Source: The 2016-2021 Worldwide Game-based Learning Market, Ambient Insight, LLC)***

Online education is now quite common in most higher education segments across the planet, but revenues are dropping. One major factor driving revenues downward in the higher education segment is the migration to managed online learning products (known as managed education services or School-as-a-Service (SaaS)).

Self-paced eLearning has had sporadic success in the consumer segments across the planet primarily due to the demand for language learning courses. The demand of self-paced products have waned dramatically in

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

just the last three years. Mobile language learning products are in much higher demand than self-paced courses in the consumer segments across the globe. And there is virtually no demand for self-paced products in mobile-only countries.

Entrenched Suppliers Migrating to New Products

In the value migration phase of a product lifecycle, entrenched suppliers have to divest or diversify their legacy product lines and expand into new buying segments to stay in business. This process takes time, even if the new products are acquired. Acquisitions can be a tricky process and entering a new buying segment can be a daunting task even for large companies.

Berkery Noyes is an investment bank that tracks the merger and acquisition (M&A) activity in the global education industry. They publish annual reports on the M&A activity in the education sector and in January 2016 reported that there were 415 mergers and acquisitions in the education industry in 2015, a 26% increase from the 329 mergers the year before and up from 300 mergers in 2013. The biggest spike was M&A activity in higher education jumping to 79 deals up from 48 deals in 2014.

Entrenched eLearning suppliers are moving fast to diversify their product portfolios with products that are in higher demand than eLearning. Both Pearson and Houghton Mifflin Harcourt have announced that they are building content for Google's Cardboard and DayDream AR platforms.

Blackboard is the market leader in LMS products in the higher education segments across the planet and has been aggressively diversifying into non-instructional products. They acquired Higher One Holdings in August 2016, which is a digital payment technology. They acquired the point-of sale provider Sequoia Retail Systems in May 2016. They acquired two predictive analytics companies in 2015. They acquired Schoolwires, a company that makes web pages for PreK-12 schools, in early 2015

In June 2013, McGraw-Hill bought the ALEKS Corporation. "ALEKS uses research-based, artificial intelligence to rapidly and precisely determine each student's knowledge state, pinpointing exactly what a student knows and doesn't know. ALEKS then instructs students on the topics they are most ready to learn, constantly updating each student's knowledge state and adapting to the student's individualized learning needs."

In August 2015, Houghton Mifflin Harcourt (HMH) acquired the children's mobile eBook provider called MeeGenius. "The MeeGenius assets will serve to further bolster HMH's offerings outside the classroom, which is a key area of growth for the company."

- HMH launched a new virtual world for children called Curious World in October 2015 and reported in August 2016 that "HMH's subscription-based early learning platform recently reached the one million download milestone and continues to gain popularity with millennial parents and children."

Rosetta Stone has diversified away from the consumer language learning market into mobile brain trainers, game-based learning for children and adults, and into literacy software used in the PreK-12 Segment.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

- In August 2016, HMH also stated that "Based on a content partnership with Google, HMH Field Trips use Google Expeditions, a smartphone-based virtual reality platform built for the classroom, to provide an engaging experience for students while seamlessly integrating with HMH's existing curriculum.
- The Company has also seen strong momentum from HMH Marketplace—its online platform for buying and selling educational resources and technology—since its launch in the first quarter of 2016."

Pearson has been buying their way into the Brazil market via acquisition of brick-and-mortar academic chains. In 2010, Pearson acquired Sistema Educacional Brasileiro (SEB) for \$517 million.

In February 2014, Pearson reported that "In Brazil, we ended 2013 with 497,000 students in our public and private sistemas. In 2013, we added 24,000 net students in our three private sistemas, COC, Dom Bosco, and Pueri Domus, up 7% on 2012."

Pearson acquired Grupo Multi, the largest English-language learning chain in Brazil, for about 440 million pounds (\$721 million) in late 2013. "Grupo Multi is the largest provider of private language schools in Brazil serving over 800,000 students across more than 2,600 franchised schools. It primarily delivers English language courses through a range of school brands including Wizard, Yazigi, Microlins and Skill."

At the time of the acquisition, Pearson reported that, "In 2012, Grupo Multi generated operating profits of £42m (\$60.9m USD) and at 31 December 2012 had gross assets of £200m (\$290m USD)."

Pearson acquired the international language learning school chain called Wall Street Institute in 2011. The rebranded it as Pearson Wall Street English and began an aggressive expansion of the chain, particularly in China.

The Global LMS Market is Imploding

The worldwide growth rate for LMS products is very negative at -14.6% and revenues will plunge to \$3.2 billion by 2021, down from \$7.1 billion in 2016. The meltdown the US LMS market (the largest in the world) is the primary inhibitor for the global LMS market.

Table 13 - 2016-2021 Worldwide Revenue Forecasts for Self-paced eLearning Platforms (in US\$ Millions)

Region	2016	2017	2018	2019	2020	2021	5-year CAGR
North America	\$3,032.91	\$2,850.48	\$2,642.40	\$2,326.93	\$1,852.51	\$1,351.84	-14.9%
Latin America	\$379.08	\$328.22	\$277.26	\$234.75	\$152.89	\$142.68	-17.8%
Western Europe	\$1,436.15	\$1,414.18	\$1,341.49	\$1,052.53	\$807.62	\$767.31	-11.8%
Eastern Europe	\$184.76	\$190.70	\$207.88	\$183.26	\$145.78	\$123.67	-7.7%
Asia Pacific	\$1,859.21	\$1,817.65	\$1,484.93	\$1,114.69	\$785.00	\$646.23	-19.1%
Middle East	\$123.00	\$128.39	\$143.31	\$156.50	\$139.21	\$110.99	-2.0%
Africa	\$106.39	\$121.72	\$137.00	\$133.31	\$120.75	\$103.79	-0.5%
Totals	\$7,121.49	\$6,851.34	\$6,234.27	\$5,201.97	\$4,003.76	\$3,246.50	-14.6%

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

The LMS markets are quite negative in five regions and flat in the Middle East and Africa. Asia Pacific and Latin America have the lowest growth rates at -19.1% and -17.5%, respectively. Despite the overall meltdown in China, the negative growth rates for LMS products in Asia Pacific is not due to the conditions in China, but rather the consolidation, commoditization, and product substitution in the more mature LMS markets in the region including Japan, South Korea, Taiwan, Singapore, New Zealand, and Australia.

Except for Hong Kong, China has not been a strong adopter of commercial LMS products. The Chinese government operates the vast majority of PreK-12 schools and controls the curriculum and the technology procurement process. The two state-owned telecoms manage most of the learning technology in the schools and to date have not implemented LMS features in their content delivery platforms.

The government exert great pressures on the small handful of suppliers that are awarded contracts. It is essentially impossible for a commercial LMS suppliers to compete in the PreK-12 segment in China. There are commercial LMS suppliers competing in the Chinese corporate segment, but the growth rate is distinctly negative for LMS products in China at -8.0%

There are ten countries in Asia Pacific that are categorized as mobile-only countries and they will never adopt eLearning in any meaningful way. Mobile Learning and mobile edugames are the only viable learning technologies in those countries.

The decline in Latin America is related to the negative economies in Brazil and Venezuela and the education reforms in Mexico. Brazil is dominated by private school chains called sistemas and they tend to develop their own platforms (Pearson owns several sistemas in the country) or consolidate on a single platform. The central government of Venezuela and Mexico are the largest buyers in those countries. Venezuela has made deep cuts to their education budgets and Mexico's recent education reforms have created chaos in the school systems.

The two largest eLearning buying countries in Latin America are Brazil and Mexico and the growth rates for LMS products are negative in both countries at -22.3% and -6.7%, respectively.

Western Europe was an early adopter of eLearning and there are now intense commoditization and pricing pressures across the region. Only three countries (Slovakia, Lithuania, and Poland) have positive growth rates for eLearning out of the 24 Western European countries tracked by Ambient Insight; 15 of the countries have flat-to-negative growth rates and six have very negative growth rates.

Eastern Europe is experiencing significant economic and political turmoil. The Russian Federation is the top buying country in the region and now beset by a weak economy driven mostly by low oil prices. The growth rate for LMS products is negative in the Russian Federation at -4.9% and LMS

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

revenues will drop to \$96.6 million by 2021, down from \$104.3 million in 2016.

The growth rates for LMS products in the Middle East and Africa are negative-to-flat at -2.0% and -0.5%, respectively. The Middle East is dominated by private school chains and they tend to develop their own platforms or standardize on a single platform. The oil dependent countries with government-operated schools systems have made major budget cuts in their education funding.

Turkey is the largest buying country in the Middle East and is now in state of political and economic chaos. The growth rate for LMS products and services in Turkey is quite negative at -11.2% and revenues will drop to \$31.5 million by 2021, down from \$55.8 million in 2016.

The LMS expenditures in Africa will peak in the 2018-2019 timeframe due in large part to the winding down of digitization initiatives in South Africa, the region's largest buying country. Additionally, there are eleven mobile-only countries in Africa and eLearning will never gain traction in those countries.

Ambient Insight only tracks suppliers with stand-alone LMS platforms. There are many so-called Talent Management products on the market today that do include an LMS module, but LMS revenues are not broken out.

LMS Replacement Cycles Drive Revenues Downward

The current LMS market is dominated by replacement cycles, not new revenues. Organizations are also consolidating on single LMS platforms and the use of multiple systems is becoming less common. Large community college systems are moving quickly to single LMS platforms to reduce costs.

The California's Community College System (CCCS) has, on average 2.1 million enrolled students attend 113 colleges. In April 2016, they announced that they were consolidating their multiple LMS platforms and would use Canvas as their single platform. The point is that these are replacement processes and do not represent new buyers or increased revenue. The LMS revenue pool is shrinking fast.

Buyers are shifting to competing products and almost always at a cheaper price. Free trials on cloud-based LMS platforms are now quite common. Consolidation initiatives always entail greatly reduced expenditures by buyers. In particular, suppliers are reducing their implementation fees. In June 2016, when Tallahassee Community College announced they had selected Canvas as their system-wide LMS, they reported that it would save \$30-45 thousand a year on the five-year contract.

There are LMS companies that are reporting significant revenue increases, but these are not new revenues. Instructure is an LMS supplier primarily serving the academic markets and now expanding into the corporate segment; they went public in late 2015. They are experiencing phenomenal growth but this is not new industry revenue. Institutions that are already using LMS products are switching to the platform.

The selection process for a new LMS in academic institutions is usually public information and the institutions provide detailed information about

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

the process. They also publish contract award documents that make it relatively easy to calibrate actual expenditures.

- The Broward County Public Schools (BCPS) awarded Instructure a system-wide contract in November 2015. The San Diego Unified School District awarded a similar contract to Instructure. Both schools districts were using multiple systems and standardized on Instructure to reduce costs; both districts and are actually spending less now.
- The State of New Mexico announced in June 2016 that they were replacing the statewide use of Blackboard with D2L's Brightspace.
- K12,Inc. is one of the world's largest managed virtual school system and announced in August 2016 that were replacing their LMS with D2L's Brightspace.
- In May 2016, Instructure reported that Canvas was selected by the University of California, Davis to replace their Sakai-based SmartSite platform.
- In May 2016, Instructure announced the University of Nevada Reno had selected Canvas as their new LMS replacing their Blackboard system. Blackboard's five-year contract with the university had expired.
- In August 2016, Instructure announced that they had been selected as the primary LMS for Ohio State University's Carmen eLearning program. OSU switched from DL2 to Instructure.
- Instructure also announced in August 2016 that the University of North Carolina at Charlotte selected Canvas as their LMS platform. The university was using Moodle prior to selecting Instructure and will keep Moodle online until May 2017.

In April 2016, Oklahoma University (OU) announced that they were replacing D2L with the Canvas LMS. Both systems will be used until July 2017, when Canvas will become the sole LMS for OU.

In July 2016, D2L announced that "number of institutions have switched to Brightspace from Pearson LearningStudio." Pearson announced that they would retire LearningStudio on January 1, 2018 and institutions are moving quickly to new platforms. D2L's Brightspace was selected to replace LearningStudio in several institutions over the last two years including the Texas Christian University, Saint Leo University, Mount Sierra College, Southern Technical College, and Oklahoma Panhandle State University.

While most companies that need learning management already have LMS products, there is significant churn as they can now easily switch to another supplier.

Long-term contracts for LMS products are now quite rare and switching vendors is relatively painless for buyers. Cloud-based platforms and suppliers have been lowering maintenance fees to influence buyers to switch.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Cloud-based products have much less overhead and suppliers can still earn a profit, but the aggregate revenues across the global industry are falling fast. The barriers-to-entry to bring a cloud-based LMS to market are much lower now and new suppliers are entering the market at a rapid rate. The LMS industry is now highly fragmented with over 1,000 suppliers across the planet and the industry is rife with commoditization.

However, there is a more fundamental problem causing the decline in LMS revenues. LMS platforms are incompatible with new learning technology products. While some suppliers claim to offer gamification features, there are no LMS platform on the market than can integrate with native Game-based Learning products. This is equally true for Cognitive Learning and AR-based decision support. The need for an LMS becomes obsolete for buyers adopting these new products.

In a November 2015 article entitled "*The Decline and Fall of the Learning Management System*" published on the Pearson Ed site, Ryan Craig, Managing Director of University Ventures wrote "As anyone involved in higher education is aware, there is a battle underway for dominance in the world of Learning Management Systems (LMS). In an effort to stay ahead of the pack, LMS providers have unveiled updated versions and product offerings in the name of revolutionizing the delivery of higher education in a digital environment. Observers breathlessly monitor evolving product offerings from market leaders such as Blackboard and Canvas as a way of projecting the changing direction of higher education. ***But in a very real sense, the winners in today's LMS battles are losing the war.***"

He cited the lack of mobile innovations as the cause of the decline. "In a world of apps, there is no LMS. Each app is designed from first principles to maximize student outcomes and purpose-built. Unless LMS leaders change direction quickly, edtech observers seeking to project the changing direction of higher education can stop wasting time on LMS providers and begin monitoring emerging higher education app developers."

The LMS Product Halo

Free and open LMS platforms shift the revenues for software license fees to peripheral services such as hosting, training, customization, localization, and configuration. This is known as the "product halo". It is hard for commercial LMS suppliers to compete with free platforms available in the current market. Microsoft and Amazon are now offering access to Open edX for extremely low usage fees, even compared to commercial cloud-based LMS companies.

Trimeritus eLearning Solutions has been cataloging the LMS vendors for years and in the May 2016 list, identify 57 free open source LMS products including the market leader Moodle. They also identify over 50 "Free and Lower Cost LMS's".

Blackboard has been aggressively expanding into open source solutions since they acquired Moodlerooms and NetSpot in 2012 and Remote-Learner UK in early 2015. In March 2016, Blackboard became an official Moodle partner. In August 2016, Blackboard acquired Brazil-based Nivel Siete, a

The edX organization is primarily known for working with universities but is now working with corporate clients. The Open edX platform is free and companies that sell online courses have a revenue sharing model with edX.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Moodle provider, that has "over 200 customers in Mexico, Colombia, Peru, Ecuador, Venezuela, Honduras and the Dominican Republic." At the time of the acquisition, a Blackboard spokesperson stated in the press that "We are seeing strong momentum for our open source solutions and in particular for Moodlerooms, with the addition of more than 80 new customers around the world in the last few months and a significant growth in Mexico, Colombia, Peru and Brazil."

Microsoft announced a free Moodle plug-in for their Office 365 services in January 2015 and an integration with Open edX in July 2015. In July 2016, Microsoft announced Open edX on Azure that enables the delivery of online courses at massive scale for very low costs.

The significance of the Open edX offering on the Microsoft and Amazon web services is the sheer ability to scale. The free LMS is now available worldwide to potentially millions of new clients and many more million users. These are the first global LMS ecosystems in the world.

The platform is free but the buyer pays for hourly usage fees. They describe Open edX on Azure as "the most scalable, reliable, and secure Cloud platform, which will help partners provide Learning as a Service to their customers. Our partners will be able to effectively and efficiently launch a Learning as a Service business by using this Open platform for scalability, plus the content and services that this platform makes available."

In June 2015, edX, announced that Open edX, "the open-source platform powering edx.org, is now available **for free** in the Amazon Web Services (AWS) Marketplace. The platform is free but the buyers pay for usage fees on AWS. "The Open edX package, powered by Bitnami, provides a basic version of the Open edX platform that, with just one click (and acceptance of license terms), installs easily on AWS, and supports Internet scale deployments that can host thousands of courses for hundreds of thousands of learners. EdX is committed to offering free, high quality courses to learners worldwide and advancing the state of digital learning on campus and online through research and development."

The LMS Meltdown in the US by Buying Segment

The growth rate in the US, the world's largest LMS buying country, is quite negative at -14.9%, mirroring the global decline. By 2021, revenues for LMS products in the US will fall by \$1.2 billion, down from \$2.7 billion in 2016.

Revenues for LMS products in the US will fall by \$1.5 billion by 2021. That is a 55% decline in revenues. The steepest declines are in the US corporate segment, once the mainstay of the LMS industry. The corporate breakout below includes a forecast analysis by four corporate types based on the size of the company. Ambient Insight breaks out revenue forecasts for four sub-segments of the US corporations and businesses segment:

- Enterprise, defined as companies with over 10,000 employees
- Large organizations (LORG), defined as companies with 1,500 to 9,999 employees
- Medium-sized organizations (MORG), defined as companies with 100 to 1,499 employees
- Small organizations (SORG), defined as companies with less than 99 employees

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

All four have very low growth rates. Combined, the revenues for LMS products will decline by a dramatic \$557 million by 2021. This due in large part to the rolling expiration of multiyear contracts and the subsequent move to cloud-based products a product substitution. SORG and MORG companies tend to be specialized verticals in specific industries. The large industrial companies are now moving to quite sophisticated knowledge and learning transfer products. The US corporate decline is also related to the low labor participation rate; each year there are fewer and fewer seat licenses.

The growth rates for platforms in the federal and state/local government agencies are also very low. In the federal military segment, this is due to the continued downsizing of personnel and the consolidation on single platforms across the branches. In the state and local agencies, the downturn is due to the move to cheaper cloud-based platforms.

Table 14 - Table 15 - 2016-2021 US Revenue Forecasts for Self-paced eLearning Platforms by Extended Buying Segment (in US\$ Millions)

US Buyer Segment	2016	2017	2018	2019	2020	2021	5-year CAGR
Consumers	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0.0%
Government							
Federal Government Civilian Agencies	\$88.15	\$69.22	\$60.32	\$53.29	\$30.16	\$22.18	-24.1%
Federal Government Military Agencies	\$92.79	\$70.13	\$62.54	\$43.06	\$32.03	\$20.03	-26.4%
State Government Agencies	\$70.53	\$65.16	\$59.19	\$52.33	\$38.65	\$20.13	-22.2%
Local (County and Municipal) Government Agencies	\$110.82	\$88.47	\$66.78	\$40.32	\$34.31	\$23.27	-26.8%
Academic							
PreK-12 Academic	\$873.20	\$856.64	\$840.22	\$803.54	\$669.00	\$540.32	-9.2%
Higher Education Academic	\$790.71	\$808.50	\$817.66	\$773.62	\$694.92	\$502.87	-8.7%
Corporations and Businesses							
SORG	\$10.82	\$9.68	\$7.23	\$5.32	\$3.00	\$2.16	-38.3%
MORG	\$86.29	\$75.10	\$59.84	\$29.23	\$18.62	\$11.40	-31.7%
LORG	\$252.63	\$223.00	\$174.50	\$115.71	\$55.73	\$22.58	-38.3%
Enterprise	\$356.41	\$302.10	\$232.06	\$179.89	\$92.51	\$52.93	-31.7%
Totals Across All US Buying Segments	\$2,732.35	\$2,568.00	\$2,380.54	\$2,096.33	\$1,668.93	\$1,217.87	-14.9%

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Consumers do not buy platforms or services; consumers have no impact on the US LMS market.

The two segments that have the least-negative growth rates are the PreK-12 and the higher education segments at -9.2% and -8.7%. Large PreK-12 school systems and state community college systems are consolidating on single platforms and both segments are moving steadily to managed education services, which often eliminates the need to buy an LMS. That said, relatively speaking, revenues for LMS products are still quite high in both academic segments.

In June 2014, Blackboard CEO stated in the press that they were generating \$650-\$700 million in annual revenues with 80% generated in the US. He said 80% of their revenues were in the higher education segment and 20% were in the PreK-12 space. He also said they were aggressively expanding outside the US to compensate for the saturated US market.

In April 2015, Blackboard CEO stated that they were "tripling down" on international expansion and open source solutions where revenues are generated by the product halo, not by the platform.

Five-year contracts are still common in the higher education segment, but PreK-12 buyers rarely sign five-year agreements and lean towards 2-4 year agreements. These are the low hanging fruit for competitors seeking to poach customers in the PreK-12 segment.

The Big Guns Stake Out the US PreK-12 Segment with Free Platforms

One major inhibitor in the global PreK-12 LMS market is the aggressive entry into the segment by Google, Apple, Microsoft, Amazon, and Facebook. They all provide free platforms to the schools. ***It is hard enough for commercial suppliers to compete with open source suppliers, but competing with "free" is an oxymoron.*** Trying to compete with companies like Google, Apple, and Microsoft is a lost cause.

- Google released their Google Classroom product in 2014. It is a free learning platform and they are constantly adding new features. Their content partners include Discovery Learning, duolingo, Cengage Learning's Gale, nearpod, PBS LearningMedia, and dozens of other companies.
- In March 2016, Apple launched a Classroom app with the release of iOS 9.3. It is quite different from Google's Classroom platform. Apple's platform is designed for iPads and the teacher is in complete control of content accessed by students. Content is not stored on the student device. The teachers tablet not only administers the content (apps, iTunesU, iBook sections, etc.), but the teacher can also monitor each student screen.
- In May 2016, Microsoft announced their free Microsoft Classroom product. It is tightly integrated with their cloud-based Office 365 suite. One interesting thing is that Microsoft also announced the School Data Sync feature, ***which allows schools to transfer data***

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

from 25 other learning management systems including Edmodo, Canvas, and Moodle.

- In June 2016, Amazon announced that they would launch their free Amazon Inspire platform that includes "tens of thousands of free lesson plans, worksheets, and other instructional materials for teachers." The new site is "intended to make it easier and faster for teachers to pinpoint timely and relevant free resources for their classrooms."
- In August 2016, Facebook and the non-profit Summit Public Schools, a nonprofit charter school network with headquarters in Silicon Valley, announced that "nearly 120 schools planned this fall to introduce a free student-directed learning system developed jointly by the social network and the charter schools." The Summit Personalized Learning Platform is described as "student-driven" in which the students assemble their own learning materials. They are provided with tools to develop learning material to accomplish the learning goals established by the schools.

In August 2016, a Google education executive stated in the press in "There are more than 50 million Chromebooks in schools today. Our latest numbers say that 30,000 new Chromebooks are activated in schools every school day — that's more than all other devices combined. In the third quarter of 2015, Chromebooks were the majority— 51 percent — of devices sold in K-12 education in the U.S."

A clear indication of the weakness in the LMS market is Pearson phased exit. In early 2016, Pearson announced that they would exit the LMS market completely by 2018. In November 2015, they sold their Fronter platform to itslearning. They are shutting down their two remaining LMS products.

"While the LMS will endure as an important piece of academic infrastructure, we believe our learning applications and services are truly 'where the learning happens'. In short, withdrawing from the crowded LMS market allows us to concentrate on areas where we can make the biggest measurable impact on student learning outcomes."

Product Substitution Accelerates: Buyers Migrating Rapidly Away from Self-paced eLearning

The term product substitution is used in the product market analysis industry to describe the demise of one product due to the preference of substitute products.

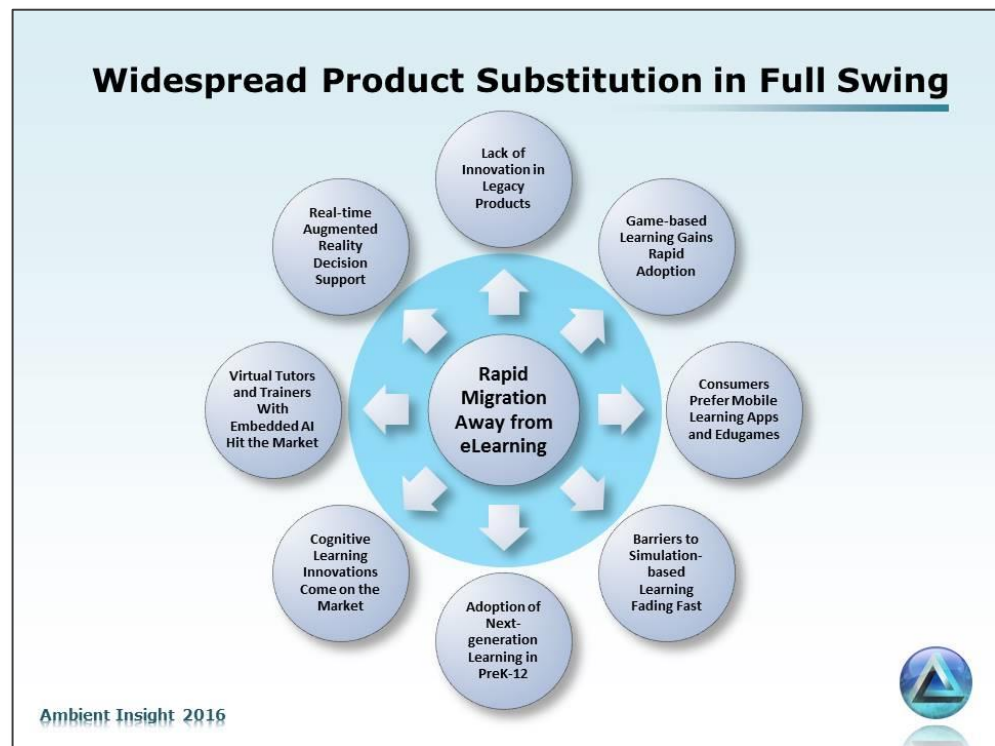
Three factors that contribute to product substitution are lower-cost substitutes, higher quality in the substitutes, and low "barriers-of-switching" (ease of substitution) to the substitute.

In the global eLearning industry, all three of these factors are now present and a pronounced degree of product substitution is underway.

Buyers are moving away from legacy products and new suppliers are entering the market to meet the demand for the more advanced products. The new products are game changers relative to knowledge transfer and learning transfer.

The learning technology industry has entered a new phase characterized by innovation and highly-effective knowledge/learning transfer. (Source: ***Ambient Insight's 2016 Crossing the Rubicon: The Reinvention of Learning Technology***)

Figure 11 - Widespread Product Substitution in Full Swing Across the Globe



NGRAIN and DAQRI design AR products for industrial clients; they are specifically marketing the products as performance improvement platforms.

There is strong quantitative evidence that the current wave of product substitution in the global eLearning market will continue unabated until only pockets of eLearning adoption remain. Product substitution is now cannibalizing the revenues for legacy products.

Lack of Innovation the Root Cause of the Decline of the Self-paced eLearning Market

Despite the recent advances in learning research and technology in general, no significant innovations have been introduced in the last decade for Self-paced eLearning. Self-paced courseware has not changed in decades. The only significant change in the LMS market is the move to cloud-based solutions, but that is a software industry trend and not something unique in an LMS.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

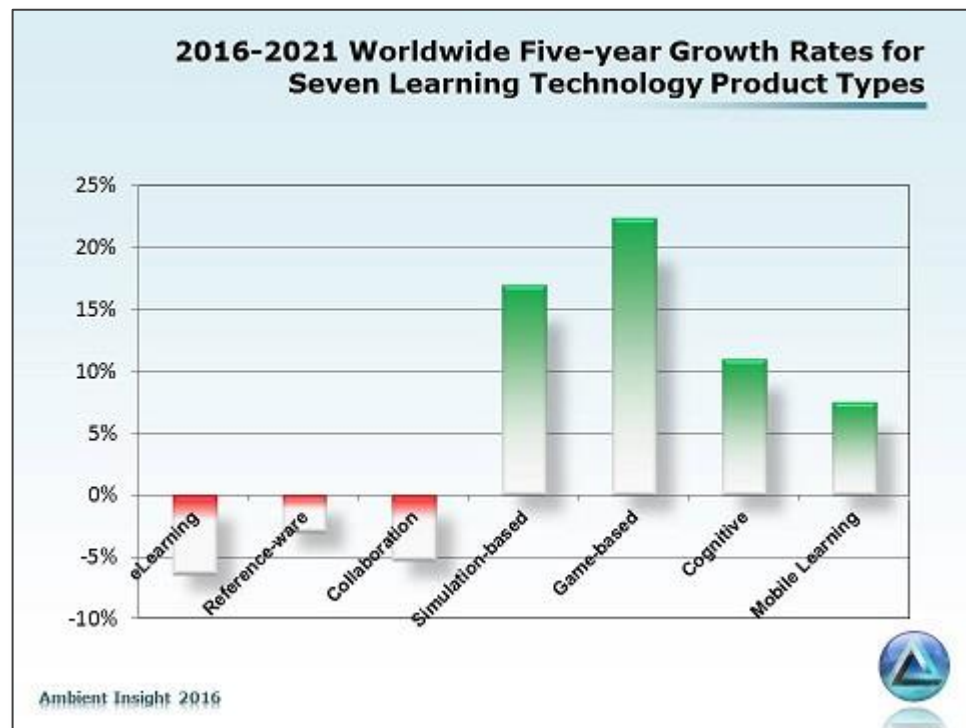
"While LMSs have evolved over time, they generally have the same capabilities that they had back in the late 1990s." (January 2014, George Kroner, enterprise solutions architect at the University of Maryland University College.)

In contrast, a wave of innovation is occurring in other learning technologies. As of 2016, learning technology innovation is heavily concentrated in four learning product types: Simulation-based Learning, Game-based Learning, Cognitive Learning, and Mobile Learning. A flood of new highly-advanced, low-cost, very efficient knowledge transfer products are flooding the market.

The 2016-2021 worldwide growth rates for Simulation-based Learning, Game-based Learning, Cognitive Learning, and Mobile Learning in the US are 17.0%, 22.4%, 11.0%, and 7.5%, respectively.

In striking contrast, the 2016-2021 global five-year compound annual growth rates for Self-paced eLearning, Digital Reference-ware, and Collaboration-based Learning are -6.4%, -3.0%, and -5.3%, respectively.

Figure 12 - 2016-2021 Global Five-year Growth Rates by Seven Learning Technology Types



Some legacy learning technology suppliers claim to offer new advanced "personalization" and "adaptive learning", but these features have been integral features in Self-paced Learning products for decades. Truly adaptive learning products are just now coming on the market, in particular the products that integrate with IBM's AI platform Watson. None of these new products are eLearning products.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Low-cost learning technologies with highly-effective knowledge transfer and learning methods are now on the market. A range of studies can now quantify the effectiveness of the knowledge transfer process measured in terms of performance improvement and observable behavior modification.

In stark contrast, mastery methods used in Self-paced eLearning products are almost all text-based exams and assessments. While these are adequate for demonstrating the retention of information, they are not very good at measuring skills. Being able to pass a test on procedural skills does not guarantee learning transfer to the real world.

A good example of this is found in non-immersive language learning methods. Students can pass a written test on foreign languages, but are often quite incapable of speaking the language with any degree of fluency.

The latest innovations in Mobile Learning include next-generation Location-based Learning, Real-time Performance and Decision Support, Mobile Learning Value Added Services (VAS), and most recently, Augmented Reality Mobile Learning.

Psychometrics at the Foundation of New Game-based Learning Assessment and Evaluation Products

Psychometrics is the science that focusses on statistical measurement of psychological states. Psychometric instruments measure knowledge, abilities, skills, attitudes, and personality traits.

Several new companies that specialize in psychometric-based edugames used to assess and evaluate job candidates have come on the market in just the last 2-3 years including Pymetrics, Revelian, Knack, Scoutible, SHFuse, RoundPegg, Arctic Shores, and High Voltage Software. All of them are seeing rapid uptake in the corporate segments across the planet and are a major factor in breaking down the resistance to Game-based Learning in the corporate segment.

Psychometrics can be complex and very few people outside of the psychometrician profession understand the science, but psychometrics are the foundation of all the major certification exams. It is not a hard sell to convince corporations to buy products based on psychometrics. They may not understand the science, but they recognize the clear benefits of using it.

Job candidates who play these new edugames are assessed based on their game play. Companies pay as little as 99 cents to review a single candidate's gameplay and large companies pay up to \$15,000 a month for unlimited use of the edugames in their hiring process.

"Pymetrics is reinventing the recruiting process by using big data, neuroscience, and machine learning to identify optimal career paths for job seekers and ideal employees for organizations. Pymetrics assesses cognitive and personality traits using a series of fun and quick neuroscience games, making it easier than ever to understand where inherent characteristics can lead to success."

Knack was founded in 2010 and as of March 2016, has more than 200 clients that use its three mobile games for recruiting, including Daimler Trucks North America and the Royal Bank of Canada.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

A mobile assessment edugame company called Debut launched in the UK in November 2015. At launch the company already had partnerships with 41 global clients, including Capgemini, Google, Barclays, PWC, Transport for London, Microsoft, Royal Mail, Allen and Overy, and BT. As of March 2016, their four mobile edugames that "have been downloaded 14,000 times, with over 40,000 game plays and 140,000 app sessions in the last month alone."

Artic Shores was founded in 2013 and has developed three mobile job recruitment edugames based on psychometrics including Cosmic Cadet that places a job candidate on a virtual spaceship where they must complete six levels of "interstellar challenges" in 30 minutes. "Measuring cognitive processes such as resilience and problem-solving, the game collects data on how job candidates instinctively respond to given situations, thereby helping employers gain a better understanding of how they would perform in the role and whether they are a good fit for the company."

In July 2016, Arctic Shores announced a distribution agreement with the global talent measurement and assessment company Cut-e. Cut-e is now a global distributor of Arctic Shores' edugames and is collaborating with Arctic Shores on new learning games. "Cut-e provides ability, personality, motivation, values, creativity and integrity assessments in 70 countries."

A US company called Simcoach has clients in healthcare, retail, manufacturing, and the government. They have developed games for numerous companies such as Alcoa, Honeywell, Lowe's, and Wegmans and organizations like the Three Rivers Workforce Investment Board and OSHA. As of July 2016, they had fifteen mobile Edugames and four vertical-related edugames available for download. They have a subscription-based business model with tiered pricing depending on the number of employees.

"Measurable and sustainable behavior change is at the core of what we do. Our team of experienced game developers is committed to making every learning experience fun. Our Simcoach Method combines superior game design with proven learning science to develop industry leading workforce training that is both engaging and effective."

Empirical Evidence on the Effectiveness of Game-based Learning

One major inhibitor for the Game-based Learning market was the lingering debate over the effectiveness of the product relative to knowledge transfer and learning transfer. That tide has turned. A string of empirical meta-analysis research results have found that Game-based Learning is a more effective knowledge transfer method than conventional methods.

Meta-analysis is defined as "a method for systematically combining pertinent qualitative and quantitative study data from several selected studies to develop a single conclusion that has greater statistical power."

- In 2011, the results of study by Traci Sitzmann were released in a paper called "*A Meta-Analytic Examination of the Instructional Effectiveness of Computer-based Simulation Games*". She found

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

that "Interactive cognitive complexity theory suggests that simulation games are more effective than other instructional methods because they simultaneously engage trainees' affective and cognitive processes. Meta-analytic techniques were used to examine the instructional effectiveness of computer-based simulation games relative to a comparison group."

- "Consistent with theory, post training self-efficacy was 20% higher, declarative knowledge was 11% higher, procedural knowledge was 14% higher, and retention was 9% higher for trainees taught with simulation games, relative to a comparison group."
- In 2012, Thomas M. Connolly and his team published a paper called "*A systematic literature review of empirical evidence on computer games and serious games*". "This paper examines the literature on computer games and serious games in regard to the potential positive impacts of gaming on users aged 14 years or above, especially with respect to learning, skill enhancement, and engagement. Search terms identified 129 papers reporting empirical evidence about the impacts and outcomes of computer games and serious games with respect to learning and engagement and a multidimensional approach to categorizing games was developed."
 - "The findings revealed that playing computer games is linked to a range of perceptual, cognitive, behavioral, affective, and motivational impacts and outcomes. The most frequently occurring outcomes and impacts were knowledge acquisition/content understanding and affective and motivational outcomes."
- In a seminal study called "*A Meta-Analysis of the Cognitive and Motivational Effects of Serious Games*" released in 2013 in the Journal of Educational Psychology, Pieter Wouters and his Utrecht research team reported that, "It is assumed that serious games influences learning in two ways, by changing cognitive processes and by affecting motivation."
 - "However, until now research has shown little evidence for these assumptions. We used meta-analytic techniques to investigate whether serious games are more effective in terms of learning and more motivating than conventional instruction methods. Consistent with our hypotheses, serious games were found to be more effective in terms of learning and retention."

In March 2014, SRI International, an international R&D company, released the results of their meta-analysis of research papers on the effectiveness of simulation and games on learning. Both Simulation-based Learning and Game-based Learning were found to be significantly more effective knowledge transfer methods than learning products that did not include simulation or game play. "When digital games were compared to other instruction conditions without digital games, there was a moderate to

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

strong effect in favor of digital games in terms of broad cognitive competencies."

In a 2015 Stanford study on the effectiveness of edugames for third grade math it was found that third graders that played the Wuzzit Trouble math edugame for ten minutes a day on 3 days a week over a four week period (a mere two hours of total game play) had a 20.5% improvement rate over the control group that were given the same material in traditional formats.

Consumers Overwhelmingly Prefer Mobile Learning over eLearning

In the consumer segment, the boom in demand for Mobile Learning is a direct cause of decline in eLearning revenues in that segment. The growth rate for eLearning products in the US consumer segment is -10.4%, the lowest of all six buying segments; in stark contrast, the growth rate for Mobile Learning in this segment is quite healthy at 7.8% in the US. (**Source: The 2015-2020 US Mobile Learning Market, Ambient Insight, LLC**)

PBS Kids, Disney, Sesame Street, Spin Master, Toca Boca, and Sago Mini (both acquired by Canada-based Spin Master in April 2016) are major early childhood learning edugame developers. Duck Duck Moose, PlayKids (Mobile), DragonBox, Osmo, and Dr. Panda are also well-known early childhood learning edugame developers.

Edugames for very young children are quite unique. They focus on shapes, sounds, music, colors, numbers, letters, hand-eye coordination, movement, and spatial awareness. Most of them use cartoon characters that interact with the children.

Fingerprint sells a mobile early childhood learning education platform and has over 200 developer partners in over 40 countries. Their white-label platform allows major brands to get educational games up and running quickly. Well-known brands that use the Fingerprint platform include Mattel, National Geographic, Toca Boca, Sylvan Learning, Tiny Tap, China-based BabyBus, PBS Kids, and Nickelodeon. By March 2016, they had over 2,000 apps for kids on the platform and announced in the press that they expected to double this by the end of 2016.

One of the most successful early childhood learning suppliers is Age of Learning, which sells the immensely popular ABCmouse app. Their app consistently ranks in the top best-selling educational apps in over 100 countries in the world. They garnered an unprecedented \$150 million in private equity in May 2016; this is the highest amount invested in a Game-based Learning company in the history of the learning technology industry.

Until recently, the most successful mobile augmented reality learning apps were consumer-facing Mobile Learning products for astronomy, anatomy, and tourism. Popular augmented Mobile Learning apps include Star Chart with 18 million global users and Star Walk with 10 million users across the planet.

All of the major mobile players are now in the augmented reality market; they have entered the market by acquisition and internal product development. In May 2015, Apple acquired Germany-based Metaio. Metaio developed the popular augmented reality platform called Junaio; this is a strong validation of the AR market. The vast majority of apps developed with Junaio are travel and tourism guides.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Google and Microsoft are developing their own AR and VR products. Google is developing the Cardboard viewer and Daydream VR platform and Microsoft is working on the HoloLens AR headset. Google is targeting the schools with the Cardboard and Microsoft is focused on corporate uptake of the HoloLens (at least for now).

The Barriers to Simulation-based Learning Fading Fast

Simulation-based Learning used to be prohibitively expensive to develop but that has changed dramatically in just the last year. The solid modelling process used to be time consuming and very expensive. In just the last year, dozens of so-called Automatic Spatial Mapping tools have come on the market. These tools generate digital objects and simulated environments in near real time.

The most significant catalyst driving the rapid adoption of AR and VR education and training products is the availability of easy-to-use and cost-efficient authoring tools. This will jump start the development of new educational apps and edugames in all the segments. The tool suppliers are also starting to release educational content that can be licensed with the tools.

A company called iTycom sells an educational VR authoring tool called ITyStudio that includes a range of premade characters and 2D and 3D objects. Pricing is tiered based on the amount of objects licensed.

NGRAIN claims their Producer Pro authoring tool "is the fastest, easiest way to make 3D virtual maintenance training and virtual task trainers (VTTs). Go from instructional design to deployment without expensive programmers, 3D artists, or game developers. Train maintainers in removal and replacement for the installation, repair, and maintenance of equipment."

Austria-based Wikitude is a pioneer in education-related augmented reality. The company was founded in 2009 and they launched their first augmented "tour guides" using geotags from Google that overlaid geographic and educational information about objects, historical sites, and tourist areas. They now license a cloud-based augmented reality authoring tool called Wikitude Studio and claim that no programming skills are needed.

Google's Project Tango is a good example of a platform that can generate 3D digital objects (3D meshes) in real time via a tablet equipped with several cameras and motion, location and depth sensors. "With a Project Tango tablet, a user can scan a room, rendering furniture and other items into 3D objects. Google previously showcased this technology by combining the tablet with a VR headset, which transforms a user's "real" world into a virtual one." In August 2015, Intel announced that they had integrated their RealSense technology with the Project Tango platform.

In June 2016, Lenovo announced their new Tango-enabled phone called Phab2 Pro that uses three core technologies: motion tracking, depth perception and area learning to sense its surroundings. "Among the

Mantis Vision, Occipital, and Matterport have imaging platforms that can convert real world images to digital 3D objects in real time. Dozens of other companies with similar technology have come to the market.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

applications mentioned by the company were the ability to visualize new furniture in the home, AR-guided museum tours, and games. Powering this is an advanced camera set-up, with 16MP fast-focus camera, depth sensor and motion tracking."

Microsoft has a product called MobileFusion, which generates 3D graphics in real time. "MobileFusion lets smartphone users turn their mobiles into 3D scanners without any additional peripherals. A 3D mesh model can be created by the system using full color in front of your eyes."

Mozilla released a new VR authoring tool called A-Frame in December 2015. "Mozilla is one of the pioneers of WebVR, but until A-Frame became available, developers needed to know how to code in WebGL. This tool does all the heavy lifting automatically, "the rendering of the objects in 3D, the side-by-side stereoscopic view, and the motion tracking that knows the direction the user is looking in — is all handled behind the scenes."

Assembling Reality

Companies are now offering commercial marketplaces where developers can buy premade 3D objects and virtual environments. Odeum is a new academic-facing company that launched in 2016. It has premade 3D role-playing games and an authoring platform allowing teachers to develop their own role-playing edugames.

A company called Voxelus operates a community-based VR market on the Voxelus Platform. In June 2016, they announced that they had over 600 virtual reality worlds in the marketplace. The company's CEO stated at the time that "In less than two years, we built the world's first end-to-end community content creation and gaming platform for virtual reality, the largest marketplace for VR content, and in-game currency. With each development, we're improving our framework and building our content library to offer the most robust marketplace and platform for virtual reality creation and gaming."

Voxelus also sells a gaming engine called Voxelus Creator that they claim requires no coding. "Voxelus Creator enables content producers, hobbyists, gamers, and students to create their own virtual worlds and games. This real-time online platform provides users with all the tools, as well as a growing library of pre-existing content, to support the creation of 3D content. Voxelus Creator requires no coding skills as it is a drag-and-drop experience."

Lifelike is an official partner of the HTC Vive and has over 1,000 3D animated models in their marketplace on a range of academic subjects including biology, paleontology, chemistry, physics, and geology. The objects can be used on a screen, projected as augmented reality objects in a physical setting, and also in immersive VR. They have a subscription-based business model and charge \$9.99 a month per device.

In May 2014, EON Reality launched their EON Experience Portal, which they claim is the world's largest library of virtual reality content. "These applications are used in a variety of settings: Industrial, Educational, and

HTC launched their own VR store called Viveport in August 2016. "Viveport will feature content across exciting, new categories for VR-like information, **edutainment**, social media, 360° video, news, sports, health, travel and shopping."

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Edutainment applications such as offshore safety training, virtual chemistry labs, and a virtual aquarium with sharks and dolphins. The EON Experience Portal also contains the world's largest Virtual Reality library for learning, with over 5,000 applications."

Eon Reality has a heavy focus on education and sells two VR authoring tools: Eon Creator 7 and EON 9. "Creator is an easy-to-use Virtual Reality authoring tool that allows everyone to build their own customized VR applications in minutes. Users can instantly select from thousands of 3D models from the EON Experience portal annotate them and begin teaching right away, with no coding required. By combining AR and VR together with a large industry related component library and assessment database, companies can build "on demand" training and "smart worker" applications to boost employee performance while improving safety."

A company called WEARVR operates a VR App marketplace. They have several categories related to learning including educational, architecture, travel, exploration, space, and virtual worlds. They support all the major VR headsets. They publish a weekly top-ten list and educational apps consistently rank in the top ten. WEARVR obtained \$1.5 million in private equity in March 2015. One of the most popular VR apps according to WEARVR is DinoTrek designed for Google Cardboard and developed by Geomedia and HIVE VR.

Next-generation Learning Products Hit the PreK-12 Market

The PreK-12 segment is adopting new learning technology products at a rapid rate. These include virtual reality apps, augmented reality apps, chatbots, robot tutors, and sophisticated edugames. Legacy eLearning suppliers cannot compete with these new products and instead have aligned themselves with the new products. Both Houghton Mifflin Harcourt and Pearson are now developing content for the Google VR platforms (Cardboard and Daydream).

Augmented reality and virtual reality are not the same. In AR, digital information is overlaid on the real world. In virtual reality, the user is totally immersed in a simulated environment. Almost all AR educational products on the market are mobile and Ambient Insight categorizes AR-based learning products as a native type of Mobile Learning. VR-based learning products are by definition a type of Simulation-based Learning.

Augmented Reality Makes a Comeback

Mobile augmented reality educational apps emerged in 2010 and had a rocky start. The demand diminished in 2012-2013, but came roaring back in 2014 and the first half of 2015. This is due to the proliferation of new augmentation hardware and software being developed and marketed by large companies like Microsoft, Sony, Google, Intel, Apple, and Qualcomm and the booming demand for industrial and field-based augmented reality learning in the corporate segments across the planet.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Until recently, the most successful mobile augmented reality learning apps were consumer-facing Mobile Learning products for astronomy, anatomy, and tourism. Popular augmented Mobile Learning apps include Star Chart with 18 million global users and Star Walk with 10 million users across the planet. The products are now gaining traction in the PreK-12 segment.

All of the major players are now in the augmented reality market; they have entered the market by acquisition and internal product development. In May 2015, Apple acquired Germany-based Metaio. Metaio developed the popular augmented reality platform called Junaio; this is a strong validation of the AR market. The vast majority of apps developed with Junaio are travel and tourism guides.

Augmented reality (AR) overlays images, schematics, multimedia, 3D objects, animation, location data, and other forms of digital content on real-world objects and locations using the device's camera and sensors; most AR content is interactive. The augmented elements are "triggered" by object recognition, print-based markers, barcodes, and geotags (collectively these are known as triggers).

A company called PTC sells a range of enterprise products including ERP and CAD platforms. They sell training to corporations on these products. In November 2015, they acquired the Vuforia augmented reality platform from Qualcomm for \$65 million. The Vuforia portal had 103 education apps on the portal in November 2015; this was the largest category out of the other categories of content. The AR content ranges from early childhood learning to STEM education content. PTC's acquisition will expand the platform into the enterprise training market. In August 2016, PTC announced a new SDK allowing developers to create content for Microsoft's HoloLens.

London-based Blippar sells an AR authoring tool called Blippbuilder that embeds AR triggers (what they call Blipps) in print material. "Using our simple, drag-and-drop, web-based platform you can enable readers to buy products directly off your magazine pages; add 3D sequences, animations and videos to your packaging; fill your newspaper with additional image galleries; include interactive digital polls in your printed employee handbooks; add contextual web-links and informative PDFs to your art gallery's paintings, or make your school's textbooks digitally interactive."

Blippar soft-launched their new education division called Blippar for Education at the BETT 2015 education trade show in London in January 2015 and hard-launched the new division's global headquarters in September 2015 in New York City. "Blippar's goal in the education space is to enable educators to seamlessly enhance learning spaces and materials digitally - which students access using their smart device."

They reported in August 2015 that, "Of the thousands of pilot schools that have been helping us, 46% are from the USA, and within that number, the dominant subjects taught are Computing, Science, and Math. Blippar has been deployed across all levels of education in the US: 41% of our pilot schools are elementary, 21% middle school, 14% high school, and 32% continuing or further education."

Virtaul Reality Goes to School

In July 2015, a company called Touchstone Research released the results of a survey of 500 children on the topic of VR. 79% of the kids were aware of VR. But the interesting thing is what they said they wanted to do with VR: 64% wanted to visit another country, 64% wanted to go someplace they could not go in reality (like space or another planet), 62% wanted to go on an adventure, and 58% wanted to travel back in time (not surprisingly, most of them wanted to go back to see dinosaurs in their natural surroundings.) This is invaluable information for suppliers developing educational VR apps for children.

Google started offering schools a free bundle called Expeditions based on the low-cost Cardboard VR technology in May 2015. As of November 2015, over 100,000 PreK-12 students in the US were using the platform. The bundle comes with smartphones for the students, the cardboard (literally) viewer, and a tablet for the teacher preloaded with a variety of field trips. The teacher selects the expedition on the tablet and all the students experience it simultaneously in the VR viewers. Google announced that it was working with the Planetary Society, the American Museum of Expeditions, and the Palace of Versailles on content for Expeditions.

In June 2016, Google released the commercial version of their Cardboard VR platform. "Google has over 200 expeditions available right out of the gate, all of which have dedicated pieces of information that you can listen to and watch while exploring the area." It was also announced at that time that Pearson and Houghton Harcourt Mifflin were developing content for the platform.

Google announced their new VR platform called Daydream in May 2016. It is embedded in a new version of Android allowing any smartphones that use the OS to have native VR capabilities. Users with smartphones running the new OS will not have to download a player app.

Daydream includes a headset for docking the smartphone, apps, and a controller. The controller contains "a gyroscope, an accelerometer, a magnetometer, a touchpad, buttons, and a fine sense of orientation for understanding where it is in 3D space. The controller has three degrees of freedom, or DOF: yaw (where you are pointing), pitch (elevation), and roll (twist). In human terms, every little movement of your wrist or your arm provides a signal that the headset will register." The platform includes a virtual keyboard.

Google and Mattel announced a partnership in February 2015 to launch a smartphone enabled product for the iconic View-Master that displays animated virtual learning experiences when the viewer is pointed at a physical "experience reel" (a physical disk-shaped trigger). The first version of the device shipped in October 2015.

The reel triggers a virtual reality experience on Cardboard's smartphone display. "Mattel's new View-Master offers an easy-to-use and affordable platform that will enable users to take engaging field trips where they can

In late May 2015, Google announced that they had shipped over five million Cardboard viewer kits in just one year. In October 2015, the New York Times distributed an additional one million Cardboard viewers to their subscriber base.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

explore famous places, landmarks, nature, planets, and more in 360 degree 'photospheres'. By pairing the View-Master's 'experience reel' and app with an Android smartphone, kids will immediately experience an imaginative and interactive learning environment."

The boom in virtual reality technology has created an emerging cottage industry for VR education companies.

- Boston-based Alchemy Learning has a product bundle called Alchemy VR designed for the PreK-12 segment. It includes hardware, software, teacher training, and custom app development. "Alchemy VR is Alchemy Learning's end-to-end virtual reality solution for teachers and schools. Alchemy VR provides teachers and schools virtual reality hardware configured to be easily integrated into classrooms, a growing portal of educational virtual reality experiences, and adaptive web-based curriculum and learning management tools."
- A company called Unimersiv focusses on educational VR apps and has over 20 apps available on their site. Their most popular VR app is Teleport: Google Street View for VR. They had 21 VR "courses" available on their site as of November 2015. They have a subscription-based business model.
- Immersive VR Education has a range of educational VR apps including the popular Apollo 11 Moon Landing (and moon walking) experience. "We will cover a wide range of subjects including History, Geography, Biology, Mathematics, Medicine, Astronomy, and Science in an engaging and fun manor which will inspire a new hunger for learning with our users." They support the headsets from Oculus, Sony, and Samsung's smartphone-enabled headset.

In the academic segments, the use of Game-based Learning is still heavily concentrated in the early grades in the PreK-12 segment and gaining traction in the higher grades in secondary schools (particularly for STEM edugames).

A learning technology company called EXO U serves the PreK-12 segment and launched their first Oculus Rift title called Dinosaurs in March 2015. "The app is designed to be used in the classroom and teachers can 'teleport' all the students simultaneously to one of sixteen dinosaurs located in the virtual 100-million year old landscape."

Game-based Learning Gains Traction in the PreK-12 Segment

There is now clear evidence that Game-based Learning is gaining traction in the PreK-12 segment. According to a survey of 800 PreK-12 teachers and 350 administrators done in late 2015, "Approximately half of all administrators (55%) and 53% of teachers believe that games can be used to teach complex and challenging ideas and topics. A total of 51% of teachers use games in the classroom either daily or weekly."

Several recent trends could greatly accelerate the adoption (and the revenues) of Game-based Learning products in the academic segments.

- Of course, Microsoft is making waves in the education space with their new Minecraft: Education Edition game platform. In June 2016, Microsoft announced the Minecraft: Education Edition early access

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

program "that allows teachers to test the game at no cost up until its official release in September. After that, schools and districts will have the opportunity to purchase annual licenses for between \$1 and \$5 per student."

- According to Microsoft, "Learning-by-doing in Minecraft teaches students independence and perseverance, giving them great satisfaction and sense of accomplishment when they can demonstrate their knowledge. And because Minecraft: Education Edition is a flexible platform for learning, educators are able to map student activities directly to specific learning outcomes and curriculum standards."
- In June 2016, Unity launched their Unity Educator Toolkit, which is a bundle of free training content and discounted platform licenses for post-secondary institutions. They also announced a grant program for primary and secondary schools. "Unity Technologies is proud to provide a variety of free resources in support of educators and academic programs; the Unity Educator Toolkit includes curricular development resources and is available for download at no charge. The Unity License Grant Program provides free educational licenses to primary and secondary schools seeking to develop gaming and interactive programs."
- GlassLab's educational games are being used in over 10,000 schools in North America. They announced in June 2016 that they would launch an educational version of wildly popular role-playing game Civilization called CivilizationEDU in the latter half of 2017 across high schools in the US and Canada.

In July 2016, Project Tomorrow released the results of a study that stated "In 2015, 48 percent of teachers said they use games in their lessons. In 2012, that number was 30 percent. In 2010, it was only 23 percent. What's surprising about those findings is that, according to another survey we run with technology leaders, more CIOs and CTOs believe game-based learning will be an area of high growth compared to technologies that may receive more attention."

The Rise of the Chatbots

Chatbots are automated chat products that simulate the responses of a human being. They are making inroads into the PreK-12 segment and solve one very large problem in education – the need to scale to millions of students. The primary advantage of chatbots is the sheer scale of reach.

Rikai Labs, whose motto is "WE BUILD BOTS", uses chatbots in their English education platform, Englishquiz, "to handle a growing number of participants. By working with China's most popular chat application, WeChat, Rikai Labs helps users to learn English by chatting with both a bot and a real human teacher by integrating the two with what they call 'Artificial Artificial Intelligence'."

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

- "The lessons are conducted via WeChat, which has 697 million monthly active users. The chatbots are meant to enhance the teaching and learning experience by including extra media such as labelled pictures or transcribed spoken audio files that would otherwise take a long time to do." The bots, dubbed "teacherbots", are also responsible for providing practice material and responding to answers from students. The addition of the bots should take out "all of the drudgery" according to the company as well as help teachers "deal with 20 students at the same time".

In May 2016, India-based PaGaLGuY launched what they claim is the first educational portal to utilize commercial chatbots. The platform is called Prepathon "the first bot in education and has taken early lead in the future-changing zone of BOTS. This bot gives progress report like a teacher, makes study plans like a tutor, provides revision practice like a coach and motivates like a mentor." Prepathon claims to have 150,000 users since launch and now has multiple bots for different subjects.

PaGaLGuY believes that "Technologies like bots will dramatically alter the way people learn. 90% of a teacher's job is to motivate, to correct, to advise and help students study their material. Bots are extremely good at doing repetitive jobs and therefore can help manage students at scale, which is something traditional teachers cannot."

In July 2016, National Geographic Kids launched their educational chatbot called Tina, a virtual T-Rex dinosaur. At the launch, a National Geographic Kids executive stated in the press that "Tina is an exciting example of how technology can enhance a child's learning. Not only is she fun, she's seriously educational, too, and that's just what NG Kids is all about. Kids can pick up some great facts about a fascinating topic – even parents will find it addictive!"

Robot Teachers for Children Game Changers in Childhood Learning

The most innovative education products on the market in 2016 use robots to teach children. Smart robot Albert was launched in December 2012 by South Korean-base SK Telecom. Albert is "first kids learning robot that uses a smartphone as its brain to provide interactive games and educational contents. Together with its sister model 'Atti', Albert is designed to make learning easier for children worldwide."

SK Telecom sells the Albert robot bundled with the Smart Robot Coding School training program designed to teach children how to develop software. The product has been sold to schools in South Korea, Spain, France, Brazil, Colombia, Taiwan, and Malaysia. In May 2016, SK Telecom signed an MOU with the Central State Government of Paraguay to supply 10,000 units of the smart learning robot to schools in the country.

In April 2015, SK Telecom signed a distribution deal with Columbia's C.I. Nextrading. SK will supply 36,000 units of its smart robot Albert to be sold in the South American markets, including Brazil and Colombia. The company has also entered into a MOU with Brazilian regional operator Sercomtel to sell the Smart Robot Coding School program. The program

KT Corp's Kibot is sometimes referred to as a robot babysitter for kids. It sold over 10,000 units in South Korea in the just four months after launch in 2011. One of the things it does is teach English to young children.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

will be operated in 102 kindergartens and grade schools located within the state of Parana.

In October 2016, SK Telecom announced that they would deploy smart-education robots to Costa Rica, in cooperation with the Inter-American Development Bank (IDB). Under the agreement, SK Telecom will deploy its Albert in 300 preschool classrooms "to support children's mathematics education."

Many new educational robots designed to teach kids programming and related skills have entered the market over the past year including the Vortex, the Kamibot, the Fisher-Price Code-a-Pillar, Codeybot, Aisoy, and Ozobot.

Ozobot is a robot designed to teach children coding skills and logical thinking. "Used in schools for STEM lessons, Ozobot offers a fun and educational way to play while learning important logic and programming skills. By drawing different colored lines in red, green, blue and black, kids can control and influence Ozobot's behaviour on both paper and tablets. Ozobot can also be programmed to remember and playback up to 500 different moves to create one-of-kind dance routines set to your child's favorite songs."

Children with autism and other developmental disorders often struggle with social skills that often impede the learning process. Robots are now proving effective in teaching life skills and academic subjects to these children.

Sphero 2.0 is the second version of the popular Sphero robot. "Controlled using a smartphone or tablet this little guy can recognize and react to your voice, record holographic videos, and with fully autonomous behavior, he even has a mind of his own!"

- "Leka, a robotic smart toy designed to teach multiple skills, helps coach children through games like hide and seek. One child shakes the robot to activate it, hides it, and the other child follows the robot listening to the sound that it makes. Over time, the robot gives caregivers detailed data on progress the child makes."
- France -based Aldebaran Robotics (rebranded as SoftBank Robotics in June 2016) sells a robot called Nao and has a version designed to assist autistic children called the ASK Nao (Autism Solution for Kids).
- The University of Hertfordshire in the UK developed Kaspar, a robot designed to help autistic children. "Specially designed with a human-like face and the tacit complexities therein, Kaspar helps teach facial expressions and appropriate physical contact, creating a safer learning environment for special needs children."
- Alelo built RALL-E in cooperation with RoboKind. "Our advanced social robots are purpose-built for autism intervention, special education, STEM instruction, and university research. We can deliver therapies created by subject matter experts, and include appropriate interaction for both verbal and non-verbal learners."

Beijing-based ROOBO sells a robot called Pudding, "a voice-controlled, educational robot for kids. "Pudding is used to teach kids vocabulary,

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

geography, jokes and more." In June 2016, ROOBO unveiled a prototype of their newest product Domgy, which they define as a "pet robot".

Cognitive Learning Trumps Courseware

Cognitive Learning products are meta-cognition technologies that enable users to modify cognitive behavior (learn) by understanding and manipulating the learning process itself. Behavior modification is a fundamental component of learning theory. Learning and behavior modification are synonymous; behavior modification is structured learning.

There are three primary types of Cognitive Learning products on the market:

- Cognitive assessments
- Cognitive and intelligent tutors
- Brain training and brain fitness products.

Cognitive assessments evaluate and measure the spatial perceptions, verbal abilities, memory, problem-solving skills, temperament, and the so-called "intentional" states of users. These products are used in two major areas: in the evaluation of childhood cognitive abilities and in employee personality screening during the hiring process.

Cognitive and intelligent tutors are meta-cognition technologies that simulate the behavior of a human mentor and provide personalized responses, remediation, and interventions in real time based on the knowledge, behavior, and cognitive abilities of a particular user.

Brain trainers are evolving into increasingly sophisticated products as new suppliers bring innovative products to market. A unique Game-based Learning product is marketed by Akili Interactive Labs. They develop games that assess the cognitive states of users. In that sense, it is a hybrid between an edugame and a Cognitive Learning product. The company garnered \$30.5 million in investment in January 2016 and an additional \$11.9 million in July 2016. "Our cutting-edge cognitive gaming engine enables three separate clinical game versions for remote data-capture, with features designed for extreme patient engagement. Our proprietary adaptive mechanics allow the software to automatically personalize to the patient's ability level with no clinician input required."

Cubic is a US-based simulation supplier primary serving the military. In May 2016, they reported that "Experiential technology represents innovations that increase the human experience by combining digital solutions with advances in neuroscience to improve emotional and cognitive performance through the use of experiential technologies, such as augmented reality, game-based simulation and neurotechnology in military training."

Halo Neuroscience "develops neurotechnology to unlock human potential in both the healthy and impaired. Their first product, Halo Sport, stimulates the motor cortex to accelerate gains in skill and strength acquisition when paired with athletic training. In their first month since emerging from

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

stealth mode, Halo has partnered with the US Military, 3 MLB teams, 2 NBA teams and the U.S. Olympic Ski Team."

Cognitive Learning products for sports training are coming on the market at a rapid rate:

- Neuro Trainer uses a VR headset to deliver mental training to athletes. "The Neuro Training Program is designed for athletic and sports trainers. This contemporary and unique program is based on clinical functional neurological applications that target specific brain regions and is intended to complement existing training protocols. Specific, contemporary insights and practical state of the art tools are taught in the Neuro Training curriculum, and can be utilized to instantaneously reset the individual athletes central processing capabilities, culminating in increased timing, balance, endurance and precision."
- In June 2015, HeadTrainer launched a mental training app for athletes "that is the first sports based app and offers to train the brain in the areas of focus and concentration, visual and spatial awareness, processing speed, memory and decision making." HeadTrainer partnered with Duke Sports Science Institute and clinical scientist Deborah Attix "to develop mental workouts in the form of games aimed at helping help athletes of all ages exercise their brains to enhance performance."
- Nike launched their Pro Genius mental training app for soccer in June 2016. The app was developed by the London-based media firm AKQA London. The app contains a range of mental training games and tools, focusing on skills such as decision-making, strategy, confidence, and visualization. "It features five training tools: Counter Attack, Priming, Cross Anticipation, Visualization and Self-Talk – all exclusive to the Nike Football App as a mixture of interactive mobile games, audio tools and inspirational video content."

Qneuro is "developing a technology that utilizes real-time brain monitoring coupled with an adaptive learning platform in order to maximize the efficiency of learning. We believe that education and technology have brought us to a point, which if appropriately harnessed, can expand our individual and collective potentials to be greater than ever before. At Qneuro, we are advancing education through neurotechnology."

ATENTIVmynd Games are "a ready to use digital learning platform that objectively measures the user's underlying neural correlates of attention states and then uses those discrete measures to manage the rapid training and development of the necessary cognitive skills underlying effective attention and impulse control."

Qusp's NeuroScale product "is the first streaming platform for brain and body state decoding through a flexible cloud API. NeuroScale connects diverse sensors and applications with robust pipelines for neuroimaging, physiological analysis, cognitive state decoding, and more. We empower

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

developers to create transformative solutions impacting health, performance, education, entertainment, and more."

Imagination Transformation's mobile app Imagine All Better is "designed to provide stress-relief-on-demand and is completely confidential, addressing the 'source' of our common everyday worries, angers, frustrations, depressions, fears, doubts, etc. - as a first step - without requiring the services of professional counselors."

A leading indicator pointing to the growth of Cognitive Learning is the increase in investment flowing to these companies. Prior to 2000, there were no recorded investments made to Cognitive Learning companies. Before the first three quarters of 2015, there was never more than \$50 million invested in commercial Cognitive Learning companies in any given year.

It is interesting that, except for one PreK-12 company, the investments made to behavior modification companies in 2015 were evenly divided between corporate-facing and consumer-facing companies.

- Virgin Pulse obtained \$92 million in investment in 2015 the highest single amount investment in a investments in Cognitive Learning company
- A behavior modification company called Omada Health obtained \$48 million in funding in September 2015. They offer a range of methods to help corporate employees reduce the rates of preventable diseases. The program is a sixteen-week experience that includes online coaching and game-based learning.
- Another Cognitive Learning company called Headspace garnered \$34 million in investment in September 2015. Headspace is a "digital health platform, providing guided meditation sessions and mindfulness training. With hundreds of hours of content, it is acknowledged as one of the most comprehensive secular programs for meditation and mindfulness.

Scientific Learning's Fast ForWord product "is a computerized reading intervention that uses the principles of neuroplasticity to make fast, permanent changes to a child's brain, which makes reading and learning in all subjects much easier. What makes Fast ForWord different from other interventions is that it works to improve the underlying cognitive foundation necessary for learning — memory, attention and processing — in a fun, engaging way. It is designed to help children pay attention longer, process information faster, and comprehend what they're reading."

C8 Sciences sells a Cognitive Learning product for the PreK-12 segment called ACTIVATE, which they claim is more effective than one-to-one tutoring. The product is an "innovative cognitive training program specially designed to enhance and develop learning skills such as focus, self-control, and memory for all students— but especially those with educational challenges associated with poverty, race, trauma, ADHD, Autism, and other developmental disorders."

Carnegie Learning sells Cognitive Tutors for math in grades 9-12. Over a half a million students across 2,000 schools use the product. "In May 2016, Carnegie Learning announced today that "its Co-founder, Dr. John R.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

Anderson from Carnegie Mellon University, was awarded the 2016 Atkinson Prize in Psychological and Cognitive Sciences by the National Academy of Sciences on May 1, 2016. Anderson is receiving the award for developing effective, theory-based cognitive tutors for education."

Virtual Tutors and Trainers with Embedded Artificial Intelligence Redefine Learning

The learning technology industry is on the verge of extraordinary innovations in knowledge transfer and learning transfer as educational products with embedded AI hit the market. So-called intelligent tutoring systems (ITS) have been used by the US military for several decades and are now quite sophisticated and vastly cheaper than the original systems.

New AI-based educational products designed for the consumer and academic markets are now hitting the market. In April 2016, Sesame Street announced a three-year partnership with IBM to develop educational products using IBM's artificial intelligence platform Watson.

In the press, IBM stated "As part of a three-year agreement, Sesame Workshop and IBM will collaborate to develop educational platforms and products that will be designed to adapt to the learning preferences and aptitude levels of individual preschoolers. Research shows that a significant extent of brain development occurs in the first five years of a child's life, making this window critical for learning and development. Working together with Sesame Workshop, we aim to transform the way in which children learn and teachers teach, and envision having an impact on the lives and education of millions of children."

"Over the next three years, the pair will create mobile apps, games, smart toys, and a range of products offering adaptive, individualized education. Using Watson's cognitive capabilities, the app will analyze a child's response in real-time and then intervene with content just for that child because each of us learns in a very, very different way."

Querium "uses artificial intelligence to provide students with step-by-step coaching in math, science, and engineering. Students receive real-time grading and coaching that mimic a live tutoring experience through smartphones, tablets, and personal computers." Austin-based Querium "collects 20 pieces of data including types of errors made from student entries, which helps teachers understand where and why students make mistakes so that they may better tailor their lesson plans to provide more personalized instruction."

CogniToys Dino from Elemental Path is a unique educational robotic product for young children that also integrates with IBM's Watson. "The curious and conversational Dinosaurs are powered by IBM Watson and Elemental Path's Friendgine technology, allowing them to deliver the kind of personalized play experience every child deserves. Recommended for kids ages 5 to 9, CogniToys have custom content modules such as questions and answers, storytelling, and games that include vocabulary, math and more to engage children in educational play. Then as a student

There are dozens of simulation and game-based companies that incorporate artificial intelligence into their products. They tend to cater to the US federal government.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

progresses or gets stuck, Watson can rethink its approach to get them on the correct track. "

The most sophisticated virtual trainers in use today were developed for the military. Stottler Henke develops intelligent tutoring systems "that provide the benefits of one-on-one training — automatically and cost-effectively. These systems encode the subject matter and teaching expertise of experienced instructors, using artificial intelligence (AI) software technologies and cognitive psychology models. We have developed numerous systems that provide practice-based learning for K-12 education, corporate training and professional development, and military training."

The US navy recently launched their Digital Tutor (DT) program, which replaced instructor-led courses for system administrators. "DT is an artificial intelligence-based training method designed for the next generation of cyber warriors, reducing training time from years to months."

- "The artificial intelligence DT program was developed by studying how the best instructors teach, tutor and adapt to individual students to achieve the most effective learning outcome, and then incorporating the information into the software. DT not only teaches each student one-on-one, but also monitors, processes and coaches student responses as an actual tutor would through a series of highly interactive, progressively challenging troubleshooting exercises."

IBM now has a serious game development group serving the government segment. "IBM's Smarter Serious Games can incorporate dynamic data. Dynamic data translates to real models and simulations that most accurately reflect the real-life scenarios and provide real analytics. In these realistic scenarios, IBM uses city sims for players that enable hypothesis and strategy testing to determine best outcomes."

Alelo's virtual trainers are semi-immersive virtual worlds. They are primarily government-facing but do have a product designed for corporations called the Workplace Coach. In June 2016, the Office of Naval Research (ONR) awarded a \$3 million contract to Aptima and Alelo to develop ALLEARN, "a system to accelerate foreign-language learning using artificial intelligence technologies."

The ALLEARN system will be an adaptive learning solution using artificial intelligence "that will let learners, whether active duty personnel, civilians or contractors, develop and practice their skills through computer simulations of real-life language use. The system will automatically collect data on learner performance and use machine-learning techniques to optimize each learner's learning trajectory. The system will combine the latest advances in natural language processing, automated speech recognition, and machine learning."

In August 2016, Alelo announced a partnership with Laureate International Universities to replace their self-paced English language learning courses with Alelo's virtual role playing product. The new product will be " offered to its 50,000 lower-level students in Latin America. The modules to be co-

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

developed by Alelo and Laureate will utilize Alelo's virtual role-playing, speech-driven technology that delivers personalized learning interactions with artificially-intelligent, computer-based characters programmed to teach, challenge, encourage and engage in life-like scenarios."

In September 2015, Oxford University Press launched a new subscription-based version Oxford English Vocabulary Trainer. The subscription costs the equivalent of \$8 a month or \$80 a year. The Mobile Learning VAS was developed in collaboration with "Alphary GmbH, a talented language-technology start-up from Austria." Alphary's core technology is called Feebu, (the Feedback Butterfly), "is the world's first truly intelligent, digital English tutor. Feebu gives automatic, corrective feedback to help students learn from their mistakes."

A company called iDAvatars (IDA) sells a virtual medical assistant avatar named Sophie. IDA merged with CodeBaby in June 2016. CodeBaby has developed similar virtual assistants but their client base extends beyond the healthcare industry. Both companies are using the IBM Watson AI platform.

"Digital avatars interact with users with empathy and humanity. We are the only integrated platform in the field that combines Unity animation, artificial intelligence, natural language processing, emotion recognition, automated speech recognition, and text to speech to build avatars capable of listening, having contextual conversations and responding with gestures."

Real-time Augmented Reality Decision Support Mitigates the Need for Training and Courseware

In July 2015, Boeing shared the results of an internal study on the assembly of a wing unit using three groups; one group with paper PDF instructions, one group with the PDF instructions on a tablet, and one group with AR objects and guided instructions overlaid on the assembly on a tablet screen. "The AR-tablet group were 30 percent faster and 90 percent more accurate on their first tries than the other groups."

Canada-based NGRain has optimized their AR tools to run on the Epson Moverio BT-200 smart glasses (headset). Lockheed Martin uses the platform and the headset for aircraft maintenance on the F-22 and the F-35. "Maintenance and construction are big areas. We can provide the information the worker needs whether they're using a mobile device or the augmented reality glasses. You can get information and step-by-step instructions right in the field on the display in front of you. You can get feedback on whether you're doing something right."

In June 2015, NGRain launched three specialized versions of their AR platform: NGRain Scout, NGRain Consort, and NGRain Envoy. NGRain Scout is designed for manufacturing companies, NGRain Consort is for quality and repair inspections, and NGRain Envoy is a "virtual 3D and augmented reality application that eliminates inefficiencies in field-based operations."

Corporate buyers are moving rapidly to new augmented reality (AR) and virtual reality (VR) educational technologies. These new products provide real-time performance support and decision support to field-based and industrial workers.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

APX Labs sells an AR platform called Skylight. The software is compatible with a range of headsets, making it device independent. In November 2014, APX announced that Boeing was licensing the platform "for hands-free, real-time access to engineering specifications and complex assembly instructions." SAP also uses the APX Labs platform.

Newport News Shipbuilding (NNS) has over 30 AR-based programs in use. The programs combine employee training and decision support in real time as shipbuilders perform tasks. NNS uses the AR technology from a company called Index AR Solutions. Index was founded by former NNS executives in February 2015.

One of DAQRI's innovative products is their Smart Helmet, which is a hardhat that has a visor that displays procedural data over objects (machinery, construction sites, etc.) They are targeting the industrial verticals with the helmet. "Reduce talent and experience gap with repeatable, fully modularized, and contextualized training capturing experts' knowledge and experience; avoid costly human teaching errors with the use of precise data driven decision-support training."

In June 2016 Scope AR launched their WorkLink product, "the first smart instruction creation tool that enables non-technical staff to produce highly interactive augmented reality (AR) instruction and training materials within a complete platform for data generation, feedback and analytics. WorkLink's 'smart' step-by-step instructions or training content can then be projected directly onto the task at hand, empowering end users to become their own expert without the requirement of extensive training."

Government agencies are also using these new products. A company called Civic Resource Group serves the public sector and has launched a product called CivicAR (Civic Augmented Reality), "The first Mobile Augmented Reality solution that enables governments and public sector agencies to deliver information and services directly to citizens and communities in a highly contextual and easy to use mobile environment."

Microsoft's HoloLens is a self-contained device with a built in computer; it does not have to be tethered to an external PC. It is interesting that Microsoft is initially focusing on corporate and government solutions with their HoloLens headset. In June 2015, NASA and Microsoft announced a partnership in which two HoloLens headsets would be sent to the International Space Station (ISS).

- "The units will be used for a new 'Sidekick' pilot program that's designed to help crews work on the ISS. The program provides augmented-reality overlays to educate astronauts about how to perform certain procedures on the station, which could eventually reduce the need for extensive crew training."

In July 2015, Microsoft opened an RFP for higher education research facilities to submit project ideas for the HoloLens headset. Microsoft is "interested in seeing its technology used for things like data visualization, new forms of collaboration, interactive art and new teaching tools."

Case Western Reserve University has already developed an anatomy educational app for the new HoloLens headset from Microsoft.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

In November 2015, Microsoft provided \$100 thousand in seed funding and HoloLens developer kits to five institutions: Carnegie Mellon University, Dartmouth College, Virginia Tech, Clackamas Community College, and the University of California, Berkeley.

In June 2016, Japan Airlines announced that they were using HoloLens for inspections and training. "Instead of using videos and printouts of cockpit panel instruments and switches, the flight crews will experience what it is like to be inside the cockpit. And engine mechanics can study and be trained as if they were working on the actual engine or cockpit instead of reading about it in manuals."

In August 2016, Microsoft released a commercial version of HoloLens aimed squarely at corporate and government buyers. The commercial suite contains enterprise security and management features including a Kiosk mode, which "Allows businesses to set HoloLens to a specific app or run in 'demo mode' for presentations or experiences--**Useful for tourism and education.**"

Augmented reality is soon to become mainstream. In August 2016, Microsoft announced that all Windows 10 installations will be updated with the HoloLens "shell" in 2017. "This will enable mainstream PCs to run the Windows Holographic shell and associated mixed reality and universal Windows applications. Microsoft says it will enable an entirely new experience for multi-tasking in mixed reality, one that blends 2D and 3D apps at the same time while supporting a range of devices."

The Leapfrog Effect: There is No Addressable Market for Self-paced eLearning in Mobile-only Countries

In mobile-only countries, the mobile device is the dominant device used to access the Internet. In mobile-only countries, people are introduced to learning content on a mobile device.

Self-paced products will never gain traction in mobile-only countries and there are virtually no addressable markets for Self-paced eLearning in those countries.

In mobile-only and mobile-first countries, buyers are much more likely to buy Mobile Learning apps and edugames and Mobile Learning VAS products and may never be exposed to PC-based self-paced courses. In mobile-only countries, smartphones are the primary, if not the only, device used to access the Internet.

Mobile-only countries are heavily concentrated in Africa and Asia. Eleven countries in Africa can be categorized as mobile-only: Benin, Botswana, Burkina Faso, Ghana, Mali, Mozambique, Namibia, Rwanda, Senegal, Tanzania, and Uganda. All of these countries had mobile penetration rates above 120% by mid-2016.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

In October 2012, Aidan Baigrie, Head of Business Development at SEACOM stated in the press that "Operators are already reporting that they are shipping more smartphones than feature phones. In the process, many Africans are gaining access to services such as social networking, the web, and email for the first time. Africa will leapfrog the PC era to the mobile, post-PC world."

In December 2012, Riitta Vänskä, Senior Manager in Nokia's Mobile Learning Group, said "Mobile phones are now the laptops of Africa." In June 2013, Kristin Atkins, Senior Director at Qualcomm, said "For many in Africa, the first and only computing experience will be mobile."

In many countries in Africa, accessing the web on an Internet-enabled feature phone or a smartphone is often a user's first Internet experience, in what is often referred to as a "Post-PC experience". In this scenario, Mobile Learning is their primary learning technology and they may never be exposed to other digital learning product types.

Mobile users in African countries are quite advanced in the use of mobile technology for a variety of things that are still quite rare in developed economies. Africans now use their devices for banking, payrolls, healthcare, agro-business, everyday purchases (like bus fare), and social media.

There were operational commercial app stores in 28 of the 30 countries in Africa as of May 2016. In some countries, the mobile network operators (MNOs) dominate the app ecosystem.

Consumers in Asia are driving the Mobile Learning market. Mobile penetration rates are overwhelmingly higher than PC penetration rates in sixteen of the twenty-one countries in Asia tracked by Ambient Insight; these are mobile-only countries with rapidly developing economies. Mobile Learning is the only viable learning technology in mobile-only countries

Ten countries in Asia are now considered mobile-only: Bangladesh, Cambodia, China, Indonesia, Myanmar (Burma), Mongolia, Laos, Nepal, Sri Lanka, and Vietnam. By the end of 2015:

- Cambodia had a mobile penetration rate of 167%.
- Mongolia had a mobile penetration rate of 152%.
- Vietnam had a population of 93.5 million people and a breathtaking mobile penetration rate of 177% by the end of 2015, one of the highest in Asia (and indeed the world).

School systems in developing economies have been rolling out learning technology in the last five years (usually with funding from NGOs) but they are more likely to deploy tablets and mobile content rather than PCs and PC-based products.

In March 2016, William Bao Bean, the managing director of MOX (a mobile software accelerator), stated that "In the US and Europe, you have one billion people who started using the internet on PCs. In China, one billion

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

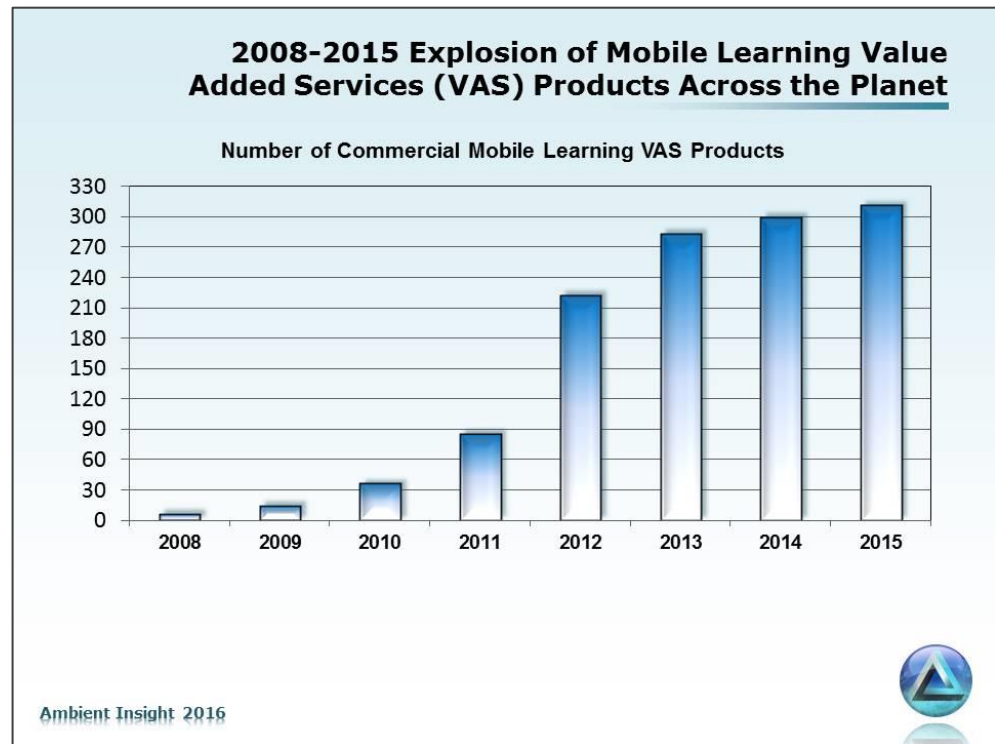
people will soon be online, first on mobile – the largest mobile-only population in the world. That's the next billion."

Mobile Learning VAS products are not on the market in some countries. There are no operational English language Mobile Learning VAS products on the market in Turkey, Canada, the Russian Federation, or the US.

Mobile Learning VAS products are essentially a new type of learning technology with education content sold on a subscription-based business model. They are a primary educational source in both developed and developing countries. Most of them are designed for consumers, but there are products on the market designed for the schools.

By the end of 2015, Asia had 131 Mobile Learning VAS products, more than any other region and 42% of all Mobile Learning VAS products on the global market. India had the most with 19 products on the market (13 were English language learning products), followed by China at nine, and South Korea and the Philippines with six each. Bangladesh had four Mobile Learning VAS products and Japan had two.

Figure 13 - 2008-2015 Explosion of Mobile Learning Value Added Services (VAS) Products Across the Planet



Of the 21 countries in Asia Pacific, 17 had operational Mobile Learning VAS products on the market by early 2016. There are Mobile Learning VAS products in New Zealand, Taiwan, Australia, and Singapore. Clearly, Mobile Learning VAS is no longer isolated to developing economies.

By the end of 2015, there were 38 commercial Mobile Learning VAS products on the market across Latin America; 13 of them were in Brazil. Kantoo and Urban Planet Mobile are major digital English language learning content suppliers to the MNOs in the region.

The 2016-2021 Worldwide Self-paced eLearning Market: The Global eLearning Market is in Steep Decline

In March 2013, the telecom Zain launched the Cloud Campus Mobile Learning VAS in Kuwait with content from UAE-based Hamdan Bin Mohammed e-University (HBMeU). The content catalog had 1,950 Mobile Learning apps at launch; this is the largest collection of Mobile Learning content sold via subscription in the world. ***The collection includes over 600 digital English language learning apps.***

MTN, Safaricom, and Airtel operate dozens of Mobile Learning VAS products in Africa using digital English content from suppliers like US-based Urban Planet Mobile. Tigo launched a new Mobile Learning VAS product called EduMe English in Rwanda in July 2014.

Urban Planet Mobile announced in July 2014 that they had new deals with MNOs across Africa including Ghana, Kenya, Morocco, Nigeria, Rwanda, Tanzania, South Africa, and Uganda. Airtel signed a deal in mid-2014 to distribute Urban Planet Mobile's digital English language learning products in 17 African countries.



"We Put Research into Practice"
www.ambientinsight.com