This research shares K-12 education-specific findings from the 2022 Gartner CIO and Technology Executive Survey, shining a spotlight on the issues and challenges for CIOs in the current environment. CIOs can use the slides internally to align investments and prepare for unpredictable conditions.

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Overview

**Key findings**

- Gartner research has demonstrated how highly composable organizations achieve superior results, especially in times of uncertainty and adversity.
- Organizations identified as highly composable are more likely to say they are ahead or far ahead of their peers in terms of overall performance.

**Recommendations**

K-12 education CIOs involved with digital transformation should:

- Improve business composability by increasing accountability across IT and its partners in the ecosystem, creating digitally supported feedback loops, and optimizing communications and ownership across the teams.
- Build autonomous, self-organizing teams by creating clear, shared goals and purpose.
- Create and support continuous idea sharing by creating low-risk opportunities to experiment with, can be successful.

**Survey Objective**

The 2022 Gartner CIO and Technology Executive Survey was conducted to inform CIOs and other technology executives on how composability can improve business performance during times of volatility.

Data Insights

This survey analysis overview complements the 2022 Gartner CIO and Technology Executive Survey with education-specific findings and recommendations (see The 2022 CIO and Technology Executive Agenda: Master Business Composability to Succeed in Uncertain Times). The analysis is based on data from the 2022 CIO and Technology Executive Agenda Survey that was conducted online from 3 May 2021 through 19 July 2021 among Gartner Executive Programs members and other technology executives. A total of 2,387 respondents participated worldwide, including 30 from K-12 education. The respondents are members of Gartner Executive Programs and other IT leaders, primarily CIOs.

This CIO and Technology Executives K-12 Education Perspective is divided into the following sections:

1. Business Composability Defined
2. Why Business Composability Matters
3. Business Composability Revealed
4. Composable Enterprises Follow Key Practices
5. 2022 Spending Plans and Technology Trends
6. Industry-Specific Software
7. Demographics and Survey Methodology
Section 1: Business Composability Defined

As K-12 education CIOs face a barrage of new challenges and pressures, they are dealing with not only the challenges of the recent past, but how to leverage all the chaos for a better future. The ability for K-12 education to pivot quickly and adapt in an agile manner has become a key indicator of those who will thrive in this “new normal” future. External forces, including a still uncertain COVID-19 pandemic, fluctuating economies globally and even extreme weather, have forced K-12 organizations to revert and reinvent how faculty, staff and students deliver and receive instruction respectively — whether virtually, in person or through a combination of both.

One approach we see some organizations use to deliver results in the face of disruption is defined by Gartner as “business composability.” Organization leaders use business composability as a means of strengthening the ability to thrive amid uncertainty and achieve improved results as a consequence.

Business composability is designed to enable the organization to be more agile, deliver better performance and offer improved value in the face of disruption. Business composability applies modularity to particular organizational assets — people, processes, technologies and even physical assets — so that leaders can easily and safely “recompose” them in new ways and create new value in times of flux. Gartner introduced business composability as a singular approach at the 2020 Gartner symposium (see Seize the Moment to Compose a Resilient Future: Key Insights From the 2020 Gartner IT Symposium/Xpo Keynote).

While the concept of composability is not new, Gartner built a framework to guide implementation in an enterprisewide approach (see Figure 1). This framework contains the following core elements:

- Composable thinking
- Composable business architecture
- Composable technologies

But the question remains, does business composability deliver?

Figure 1 provides a closer look at an abbreviated version of all nine practices. The survey indicates that it is not individual practices that are the key, but following enough of them to achieve synergistic impact.
Figure 1. What Is Business Composability?

Composable Business

Source: Gartner
Section 2: Why Business Composability Matters

The 2022 Gartner CIO and Technology Executive Survey was designed to answer this question (see The 2022 CIO and Technology Executive Agenda: Master Business Composability to Succeed in Uncertain Times).

First, we identified a cohort of “highly composable” enterprises by asking to what extent they use the three principles of composable thinking, business architecture and technology. Only those who answered “widely” or “extensively throughout the enterprise” (6 and 7 on a seven-point scale) qualified (see the Methodology section).

Business composability does deliver business benefits. Sixty-three percent of CIOs of “highly composable” enterprises said that they were ahead or far ahead of their peers and competitors in overall business performance. This is better than moderate and low composability enterprises, and it is better than reported by the K-12 education CIOs (see Figure 2). Survey respondents rated their enterprise in these areas:

- Increased revenue and funding
- Reduced business risk
- Lower operating costs

In each area, highly composable enterprises outpace K-12 education with one exception this year. Likely due to a significant outpouring of education stimulus money in countries around the world, K-12 reported a larger-than-normal number of organizations with increased revenue and funding this year. Note the survey representation this year, and that 53% of respondents are from the U.S.

Though the concept of composability may on its face appear to be only relevant to profit-based organizations, in fact, K-12 can see great benefit to these practices. Translating “increased revenue” to “improved organizational outcomes” (for example, student learning and optimized business practices) can help illuminate the opportunities here.
Q: Considering the past 12 months, rate your enterprise’s business performance compared with its peers or competitors.

Source: 2022 Gartner CIO and Technology Executive Survey

Notes: pp = percentage points; because of small K-12 sample size, results are directional.

**Enterprise Business Performance**

Percentage of Respondents Ahead or Far Ahead of Peers and Competitors

<table>
<thead>
<tr>
<th>Category</th>
<th>High Composability (n = 145)</th>
<th>K-12 Education (n = 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Business Performance</td>
<td>63%</td>
<td>57%</td>
</tr>
<tr>
<td>Increase Revenue/Funding</td>
<td>60%</td>
<td>61%</td>
</tr>
<tr>
<td>Reduce Business Risk</td>
<td>50%</td>
<td>48%</td>
</tr>
<tr>
<td>Reduce Operating Costs</td>
<td>47%</td>
<td>32%</td>
</tr>
</tbody>
</table>

Q: Considering the past 12 months, rate your enterprise’s business performance compared with its peers or competitors.

Source: 2022 Gartner CIO and Technology Executive Survey

Notes: pp = percentage points; because of small K-12 sample size, results are directional.
So how can K-12 education organizations become more composable? Go more digital in one or both of the axes in Figure 3, either with internally or externally facing digital resources.

Figure 3 shows digital processes on the x-axis, with the percentage of enterprises’ internal processes optimized using digital means. Digital business, on the Y-axis, depicts the percentage of the budget earmarked to digital services for external constituencies. Though obviously the K-12 sector is one where the bulk of its processes are internally facing, one could translate the term “external constituencies” to roughly represent anything the organization invests in that is externally facing. For example, this area could include investments in remote K-12 education programs, community campaigns or services that have been added to enable new conveniences for parents.

Two years ago, in 2019, K-12 education was, on average, slightly under 30% in digital processes (internally facing) and under 20% in digital business (externally facing). Contrast this with high-composability enterprises, which were, on average, ahead by at least 10 percentage points, respectively, then.

In the last two years, K-12 education has made progress on one axis (just under 40% internal, but still just over 20% external), but during the same time, the high composability enterprises sprinted ahead.

For high-composability enterprises, that growth trajectory will continue through 2023, perhaps even accelerating in the digital business dimension. At the same time, we see K-12 education digital progress, but at a much slower pace (especially digital processes), likely leaving K-12 further and further behind. For an industry experiencing so much upheaval, one might hope to see more aggressive push into more digital investments and strategies to address these needs.

Remember that composable organizations accelerate digital processes to unlock the full potential of both analog and digital capabilities.

Several factors might explain this, but see the following research for more detail:

- 2021 CIO Agenda: A Higher Education Perspective
- 2021 CIO Agenda: Industry Perspectives Overview
- Engage Stakeholders in Building a Digital Business Roadmap
- Presentation Slides: Resilience and Beyond In Higher Education

In this context, enterprises that apply business composability extensively have better business outcomes than those that do not. They are also more digital as a result of doing that. So digital is correlated with composability and business outcomes. A key reason for this is likely that digital assets are, on average, easier to compose, decompose and recompose, at least relative to physical assets (see the bulleted references above). K-12 education has made a lot of investments to date in digital assets — this suggests its potential as a highly composable industry, despite its relatively low progress to date on composable technologies (see Figure 3).
Figure 3. Highly Composable Enterprises Have, and Expect, High Digital Progress

n = ~126 (high composability), ~27 (K-12 education) CIOs and technology executives answering, excluding “don’t know”

x-axis: Q. What percentage of your enterprise’s processes have been optimized (made more efficient) through digital means?
y-axis: Q. How much of your enterprise’s total turnover/budget can be attributed to digital services (or products) delivered to your external constituents (e.g., citizens, students, patients, other agencies)?

Source: 2022 Gartner CIO and Technology Executive Survey
Section 3: Business Composability Revealed

There is more to business composability than being digital. But in order to identify best practices for becoming a highly composable enterprise, we need to unpack the components of composability and what it means for K-12 education.

Composable enterprises use three key principles (see Figure 4):

- Composable thinking: Encouraging exploration and creating key business capabilities
- Composable business architecture: Business elements that include products, teams and processes, and create new value
- Composable technologies: Assets and capabilities that include automated modular components

Figure 4: Composable Enterprises Utilize Three Principles

<table>
<thead>
<tr>
<th>Extent of Composability</th>
<th>Average Scores on Scale of 1 (Not at All) to 7 (Extensively Throughout the Enterprise)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composable Thinking:</td>
<td>High Composability (n = 150) K-12 Education (n = 30)</td>
</tr>
<tr>
<td>Our culture encourages the continuous exploration and creation of game-changing business capabilities</td>
<td>6.4</td>
</tr>
<tr>
<td>Composable Business Architecture:</td>
<td>Business elements (e.g., capabilities, products, teams, processes, services) dynamically evolve to create new value</td>
</tr>
<tr>
<td>Composable Technologies:</td>
<td>Technology assets and capabilities consist of modular components where assembly and reassembly are automated</td>
</tr>
</tbody>
</table>

n varies by segment. CIOs and technology executives answering Q. Which of these practices does your enterprise follow completely and consistently? Source: 2022 Gartner CIO and Technology Executive Survey
In this survey, the definition of a highly composable enterprise is one that uses all three principles “widely” or “extensively” throughout the enterprise (corresponding to a 6 or 7 on a seven-point scale from “not at all” to “extensively”). Figure 4 shows that highly composable enterprises average 6.4, 6.4 and 6.2, respectively, which follows from the definition.

For the K-12 education respondents, the highest average is in composable thinking (4.3), followed closely by composable business architecture (4.2) and composable technologies (3.3). This order is not surprising. K-12 education is as composable by its nature as any other industry (albeit K-12 is a bit of a slower mover). For example, its business architecture might include aspects such as the typical K-12 organizational structure — some variant of federal or state organizations governing intermediate and/or local organizations governing schools. Though it might seem like the opposite of a composable architecture, in reality, many aspects of these structures can be changed and recomposed. Drivers such as the addition of more virtual schools, the global shortage of teachers, the migration of populations from more remote locales — any of these and more — might create opportunities to recompose the traditional business architecture of K-12.

It is not surprising that composable technologies are last both for K-12 education and highly composable enterprises, since most technology to date still requires resources to make the investments and successful implementation possible. These resources are often not available in K-12 or have to be built in stages over long periods of time. This often means a fair amount of upfront investments before accruing any visible benefits to the organization. Rather than falling for following rigid, traditional paths of sequence, CIOs can use a composable approach that improves the speed of change and flexibility for the future. Investing in composable technologies seems to have long-term, business accelerating benefits, as Figures 2 and 3 suggest.

Overall, out of the 2,387 respondents, 6% qualified as highly composable enterprises, 80% as moderate and 13% as low. Of the 30 K-12 education survey respondents, 3% qualified as highly composable enterprises, 83% as moderate and 13% as low (see Figure 5). The K-12 sample is very small, and may well create some distortion in its numbers, but is likely at least directionally useful. K-12 may well be positioned to move more toward highly composable business practices sooner than one might think.
Figure 5. The High-Composability Cohort Is Emergent

Distribution of Survey Respondents Into Business Composability Groups

Percentage of Respondents

<table>
<thead>
<tr>
<th>Total (n = 2,387)</th>
<th>K-12 Education (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13% Low Business Composability</td>
<td>6% High Business Composability</td>
</tr>
<tr>
<td>81% Moderate Business Composability</td>
<td>3% High Business Composability</td>
</tr>
<tr>
<td>13% Low Business Composability</td>
<td>3% High Business Composability</td>
</tr>
<tr>
<td>84% Moderate Business Composability</td>
<td>84% Moderate Business Composability</td>
</tr>
</tbody>
</table>

High-composability enterprises utilize the principles of composable thinking, business architecture and technologies “widely” or “extensively throughout the enterprise”

n varies by segment. CIOs and technology executives answering Q. To what extent does your enterprise utilize these principles? Source: 2022 Gartner CIO and Technology Executive Survey
As we can see, being a highly composable enterprise is an emergent profile overall, and K-12 education certainly has a long way to go to get there. But K-12 has the potential to get there. Figure 6 compares the proportion of highly composable enterprises in various industries, showing a range from 0% (U.S. healthcare payers) to 19% (high tech), with an overall aggregate response of 6%. K-12 education is toward the bottom of the pack, with 3% of respondents that are categorized as highly composable. There is plenty of room for improvement, but certainly not starting from zero.

There are likely a number of factors that impact the ultimate composability potential in an industry, as well as the current level of composability within that industry.

At the lower end of the spectrum, we have a set of five industries (including healthcare and education) rooted in civic missions that are all people-intensive on both sides of the service provided. These are typically high-stakes services that have a fundamental impact on people’s lives and, thus, resist commoditization. These industries are typically highly regulated to foster democratized access to the services. The lack of profitability as a typical high-pressure driver in for-profit industries limits the speed of innovation in these nonprofit industries. And this is further influenced by organizational cultural inertia created by the same factors. For these industries to be more composable, technology needs to enable truly scalable, mass-customizable services based on complex data input and capable of bypassing organizational inertia.
It is clear that K-12 needs to get more composable to serve more learners at scale, and more effectively. The fast pace of societal and workforce change, and the expectations it imposes on agencies and organizations leading K-12 schools, actually requires faster, continuous, lower-stakes learning opportunities. Insights in time and skills at scale require a more-composable approach to learning itself, such as more-rapid and continuous formative assessments, analytics insights, or use of adaptive learning technologies.

These are the types of investments that improve mission-critical outcomes and save time and money.

**Section 4: Composable Enterprises Follow Key Practices**

A main purpose of the 2022 Gartner CIO and Technology Executive Survey was to identify which practices contributed the most to business composability. To do that, we tested 30 practices over the three domains — composable thinking, business architecture and technology — to discover which ones highly composable businesses are most likely to use and that have the most impact on composability.

Out of the 30 practices, 12 were used by more than 50% of the highly composable enterprises. Out of those 12, we identified the top nine that were aligned with the highest average composability of the respondents (see Figure 7).

The nine practices (placed under three categories) to improve composability are:

**Composable Thinking**
- Practice adaptive strategy to spot and respond to opportunities and threats.
- Promote a high-trust culture that empowers employees to independently make decisions.
- Empower internal functions, product teams, external allies and/or business partnerships to work together through autonomous self-organizing networks.

**Composable Business Architecture**
- Shape multidisciplinary teams to align on value, promote transparency, drive accountability and collaborate on demand.
- Design business processes in parallel with technology capabilities.
- Distribute accountability for digital outcomes beyond the traditional IT organization to other business units/business leaders.

**Composable Technologies**
- Establish continuous and effortless sharing of ideas and access to platforms, tools and know-how across internal functions, product teams, external allies and/or business partnerships.
- Establish iterative development techniques (such as DevOps) as the default approach to development.
- Create dynamic and easily deployable integration capabilities for connecting data, analytics and application components.

The full list of practices is in Note 1.
Nine Practices Distinguish Highly Composable Enterprises

Average Composability for High-Composability Respondents Who Follow This Practice (1-7 Scale)

n = 148 CIOs and technology executives from highly composable enterprises answering
Q: Which of these practices does your enterprise follow completely and consistently? Multiple responses allowed.
Source: 2022 Gartner CIO and Technology Executive Survey
Key Composable Thinking Practices

In composable thinking, these practices are (in order of use, see Figure 8):

• Practice adaptive strategy to spot and respond to opportunities and threats.
• Promote a high-trust culture that empowers employees to independently make decisions.
• Empower internal functions, product teams, external allies and/or business partners to work together through autonomous self-organizing networks.

The common theme here is creating agility through empowering employees and crossfunctional teams to be able to respond quickly to changing conditions. Keywords include empower, independent and self-organizing, leading to the practice of adaptive strategy.

All three practices are far more uncommon within K-12 (and often absent in administration) than other industries, perhaps due to the long-standing overtasked and underresourced nature of K-12 organizations. The temptation is to worry more about what appears to be a faster way of getting things done, but in the long haul, becomes an impediment.

One other reason K-12 education seems behind in overall performance is likely a lack of a common strategy across the divisions of the organization. This would serve to help guide a common direction of empowered individuals and teams, assuming an organization has them.

Composable thinking could be a highly important part of K-12 education core culture, but it requires a great deal of rethinking of common practices. Investing in building on this overarching organizing principle can make these practices more pervasive and drive many individuals toward a common goal.

Figure 8: Key Composable Thinking Practices

<table>
<thead>
<tr>
<th>Key Thinking Practices to Improve Business Composability</th>
<th>Percentage of Respondents Who Perform It</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice adaptive strategy to spot and respond to opportunities and threats</td>
<td>64%</td>
</tr>
<tr>
<td>Promote a high-trust culture that empowers employees to independently make decisions</td>
<td>56%</td>
</tr>
<tr>
<td>Empower internal functions, product teams, external allies and/or business partnerships to work together through autonomous, self-organizing networks</td>
<td>51%</td>
</tr>
</tbody>
</table>

n varies by segment. CIOs and technology executives answering Q. Which of these practices does your enterprise follow completely and consistently? Source: 2022 Gartner CIO and Technology Executive Survey Note: Because of small K-12 sample size, results are directional.
Key Composable Business Architecture Practices

In composable business architecture, these practices are (in order of use, see Figure 9):

• Shape multidisciplinary teams to align on value, promote transparency, drive accountability and collaborate on demand.

• Design business processes in parallel with technology capabilities.

• Distribute accountability for digital outcomes beyond the traditional IT organization to other business units/business leaders.

The common theme here is creating business outcomes by co-creation between business and support functions in particular IT. Keywords include multidisciplinary and accountability to design business and technology in parallel.

These three practices are becoming more common in K-12 education than the other six, but are by no means prevalent yet. One reason could be that it is relatively easy to form teams and work on specific business processes in a business that is highly composable by nature. But that does not mean it is done in a complete and consistent way, as is done in highly composable businesses.

Again, the lack of an overall guiding strategy and coordination is diminishing the full benefit of these practices. In K-12, the practice that has the lowest percent of use (by a significant margin) is “distribute accountability beyond traditional IT.” In K-12, this stems from a long-standing practice of centralizing IT, but not distributing the ownership of initiatives to the departments and divisions that should own them. IT is then often left with the responsibility for initiatives over which they actually do not have full control or the requisite expertise in that specific operation.

K-12 education could benefit tremendously by digitalization to unlock its inherent business composability and potential. But K-12 as a community suffers from a big digitalization backlog (again, historically limited resources), significant hesitance and risk aversion in organizations that are still trying to figure out an uncertain and rapidly changing future and what role digital should play in it.
Figure 9: Key Composable Business Architecture Practices

### Key Business-Architecture-Related Practices to Improve Composability
Percentage of Respondents Who Perform It

<table>
<thead>
<tr>
<th>Practice</th>
<th>High Composability (n = 147)</th>
<th>K-12 Education (n = 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape multidisciplinary teams to align on value, promote transparency, drive accountability and collaborate on demand</td>
<td>67%</td>
<td>54%</td>
</tr>
<tr>
<td>Design business processes in parallel with technology capabilities</td>
<td>64%</td>
<td>59%</td>
</tr>
<tr>
<td>Distribute accountability for digital outcomes beyond the traditional IT organization to other business units/business leaders</td>
<td>53%</td>
<td>33%</td>
</tr>
</tbody>
</table>

n varies by segment, CIOs and technology executives answering
Q: Which of these practices does your enterprise follow completely and consistently?
Source: 2022 Gartner CIO and Technology Executive Survey
Note: Because of small K-12 sample size, results are directional.
Key Composable Technology Practices

In composable technologies, the key practices are (in order of use, see Figure 10):

- Establish iterative development techniques (such as DevOps) as the default approach to development.
- Establish continuous and effortless sharing of ideas and access to platforms, tools and know-how across internal functions, product teams, external allies and/or business partnerships.
- Create dynamic and easily deployable integration capabilities for connecting data, analytics and application components.

The common theme here is creating a stream of innovation by iteration and a combination of ideas and data. Keywords include iterative development, sharing and integration to achieve combinatorial effects in composability.

As noted previously, the area of composable technologies is the least pervasive principle overall in K-12 education (see Figure 4), perhaps in part influenced by the significant reduction in in-house application and system development for most K-12 organizations today. The ongoing challenge with integration practices is reflected in these responses as well (the smallest percentage of K-12 respondents selected the one referencing integration capabilities).

Even though these three practices are used to a similar degree to the top composable thinking practices, the sheer volume and variation of technology and data used in K-12 education organizations creates a challenge. Identifying the right level of abstraction to create reusable components that are transferable between departments and schools could represent a significant push in this area. It is not a lack of understanding of the principles to apply, but an overwhelming variation of situations to apply it to, that resist easy automation of application of composable technologies. This is a challenge that K-12 must incorporate into its thinking and planning for the future.
Figure 10: Key Composable Technology Practices

Key Technology-Related Practices to Improve Composability
Percentage of Respondents Who Perform It

- Establish iterative development techniques (e.g., DevOps) as the default approach to development
  - High Composability (n = 142): 60%
  - K-12 Education (n = 28): 38%

- Establish continuous and effortless sharing of ideas and access to platforms, tools and know-how across internal functions, product teams, external allies and/or business partnerships
  - High Composability (n = 142): 59%
  - K-12 Education (n = 28): 44%

- Create dynamic and easily deployable integration capabilities for connecting data, analytics and application components
  - High Composability (n = 142): 58%
  - K-12 Education (n = 28): 28%

n varies by segment. CIOs and technology executives answering Q: Which of these technology-related practices does your enterprise follow completely and consistently?
Source: 2022 Gartner CIO and Technology Executive Survey
Note: Because of small K-12 sample size, results are directional.
Section 5: 2022 Spending Plans and Technology Trends

The bottom line in many organizations comes down to funding. Even mission-driven organizations, such as K-12 education, need a sustainable and reliable funding model for all they want to and should achieve, and this has not been the historical pattern for schools in the past.

Figure 11 shows that there is a clear correlation between the degree of composability and expected budget increases for 2022. This applies both or overall enterprise budgets as well as IT budgets.

Though K-12 (at least on the public side) does not traditionally control increasing its revenue, one can see how the benefits of high composability could improve budget opportunities, even in the public domain. The ability of the IT organization to deliver on the most high-value initiatives of the organization and effectively tie itself to the top priorities of its leadership lends itself naturally to increasing funding in areas where the executive team perceives those things must be done. And it will be the ones to deliver them.

But the funding situation varies widely by industry (see Figure 12), and the bad news is that, once again, we find K-12 education near the bottom of the list for expected total budget change (on average +1.5%). The good news for the K-12 education CIO is that the IT budget is expected to increase considerably more than the total budget (on average +3.1%). This indicates that there is a continued shift from other budgets in the institution toward IT, again, likely associated with delivering those high-value targets with digital.

Figure 11: High-Composability Enterprises Increase Revenue/Budget Faster and Leverage IT Better
Figure 12: Budget Changes for 2022 Will Vary Widely by Industry

**Expected Change in Revenue/Overall Budget and Change in IT Budget From 2021 to 2022**

Average Percentage Change

<table>
<thead>
<tr>
<th>Revenue/Overall Budget</th>
<th>IT Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation (n = 64)</td>
<td>6.0%</td>
</tr>
<tr>
<td>Retail (n = 73)</td>
<td>4.9%</td>
</tr>
<tr>
<td>Banking (n = 242)</td>
<td>4.3%</td>
</tr>
<tr>
<td>High Composability (n = 130)</td>
<td>4.2%</td>
</tr>
<tr>
<td>Automotive (n = 53)</td>
<td>3.3%</td>
</tr>
<tr>
<td>Life Sciences (n = 55)</td>
<td>5.2%</td>
</tr>
<tr>
<td>Asset-Intensive Manufacturing (n = 248)</td>
<td>3.3%</td>
</tr>
<tr>
<td>Oil and Gas (n = 34)</td>
<td>5.0%</td>
</tr>
<tr>
<td>Consumer Goods (n = 132)</td>
<td>4.5%</td>
</tr>
<tr>
<td>Insurance (n = 89)</td>
<td>2.7%</td>
</tr>
<tr>
<td>Medium Composability (n = 1,699)</td>
<td>3.6%</td>
</tr>
<tr>
<td>CSP (n = 36)</td>
<td>2.1%</td>
</tr>
<tr>
<td>Low Composability (n = 285)</td>
<td>3.1%</td>
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<tr>
<td>Healthcare Providers (n = 109)</td>
<td>3.0%</td>
</tr>
<tr>
<td>High Tech (n = 58)</td>
<td>1.8%</td>
</tr>
<tr>
<td>U.S. Healthcare Payers (n = 28)</td>
<td>1.5%</td>
</tr>
<tr>
<td>K-12 Education (n = 28)</td>
<td>3.1%</td>
</tr>
<tr>
<td>Utilities (n = 72)</td>
<td>3.7%</td>
</tr>
<tr>
<td>Government (n = 217)</td>
<td>2.5%</td>
</tr>
<tr>
<td>Higher Education (n = 204)</td>
<td>2.7%</td>
</tr>
</tbody>
</table>

n = varies by segment, CIOs and technology executives answering, excluding "not sure"

Q: By what percentage do you expect your enterprise’s revenue/overall budget/turnover to increase or decrease from 2021 to 2022?
Q: By what percentage do you expect your enterprise’s IT budget to increase or decrease from 2021 to 2022?

Source: 2022 Gartner CIO and Technology Executive Survey
It is important to bear in mind that these numbers are averages, and as Figure 13 shows, 61% of K-12 education respondents expect an increase in budget, 32% expect staying the same and 7% expect a decrease. (Again, with a small sample size, this might also suggest an outsized influence of significant stimulus fund programs being injected into K-12 education in several countries around the globe.) Even among the highly composable enterprises there is variation, with 13% actually expecting a decrease in IT budget.

So how do K-12 education CIOs use their budgets? The story in the data is an interesting one. The No. 1 response (by a fairly large margin) is focused on investment in cybersecurity. This is not surprising, in that K-12 has taken the position as the No. 1 target of cybercriminals in the past couple years, particularly focused on ransomware.

**Figure 13: High-Composability Enterprises Plan, on Average, a 4.2% Increase in 2022 IT Spending**

<table>
<thead>
<tr>
<th>Expected Change in IT Budget in 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of Respondents</td>
</tr>
<tr>
<td>Increase</td>
</tr>
<tr>
<td><strong>High Composability (n = 130)</strong></td>
</tr>
<tr>
<td>63%</td>
</tr>
<tr>
<td><strong>K-12 Education (n = 28)</strong></td>
</tr>
<tr>
<td>61%</td>
</tr>
</tbody>
</table>

n varies by segment. CIOs and technology executives answering Q: By what percentage do you expect your enterprise’s IT budget to increase or decrease from 2021 to 2022? Source: 2022 Gartner CIO and Technology Executive Survey

Note: Because of small K-12 sample size, results are directional.
K-12’s next several top priorities (see Figure 14) make particular sense in light of the changes wrought by the pandemic in the last two years. The increased pressure to further invest in analytics and the continued drive into the cloud are a logical result of the massive learning loss experience in K-12 and the need to create remote/hybrid learning capabilities. This necessitated both an increased need for insights into existing data to map out more effective responses and strategies to bring students back to grade level, as well as the shift to cloud to make all resources remotely accessible. These investments parallel the trends noted in Gartner’s Top 5 K-12 Education Trends.

The largest reduction in investment is in “legacy infrastructure and data center technologies,” which likely makes sense with all this migration to cloud-hosted solutions. Surprisingly, the second-highest response for budget reductions is “None.” This perhaps evidences more dependence on IT — 31% of respondents do not expect to reduce spending anywhere. This is perhaps a two-edged sword. On the one hand, the typical broad budget cuts K-12 typically faces each year are not in evidence here. On the other hand, the lack of cutting suggests that things are perhaps not being strategically abandoned as they should be. If, at the end of the day, the technology portfolios just keep growing without appropriate investments to support them, that could be a problem as well. K-12 CIOs would be well-served to scrutinize investments to ensure the momentum and energy of the organization is pointed toward the most beneficial choices.
Figure 14: Enterprises Will Rebalance Their Technology Portfolios

### Changes in Technology Investments
Percentage of K-12 Education Respondents

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage of K-12 Education Respondents Decreasing Investment (n = 28)</th>
<th>Percentage of K-12 Education Respondents Increasing Investment (n = 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyber/Information Security</td>
<td>0%</td>
<td>79%</td>
</tr>
<tr>
<td>Business Intelligence/Data Analytics</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>Cloud Platforms</td>
<td>0%</td>
<td>43%</td>
</tr>
<tr>
<td>Legacy Application Modernization</td>
<td>12%</td>
<td>43%</td>
</tr>
<tr>
<td>Connectivity</td>
<td>4%</td>
<td>39%</td>
</tr>
<tr>
<td>Digital Workplace</td>
<td>4%</td>
<td>29%</td>
</tr>
<tr>
<td>Integration Technologies/APIs/API Architecture</td>
<td>0%</td>
<td>29%</td>
</tr>
<tr>
<td>Business Continuity Management</td>
<td>4%</td>
<td>21%</td>
</tr>
<tr>
<td>Digital Business Transformation Initiatives (Including Digital Marketing)</td>
<td>12%</td>
<td>21%</td>
</tr>
<tr>
<td>Enterprise Resource Planning</td>
<td>8%</td>
<td>21%</td>
</tr>
<tr>
<td>Total Experience Solutions</td>
<td>8%</td>
<td>18%</td>
</tr>
<tr>
<td>Digital Media</td>
<td>8%</td>
<td>14%</td>
</tr>
<tr>
<td>Legacy Infrastructure and Data Center Technologies</td>
<td>42%</td>
<td>14%</td>
</tr>
<tr>
<td>Containerization and Orchestration of Application Workloads</td>
<td>4%</td>
<td>11%</td>
</tr>
<tr>
<td>Product Portfolio Management Tools</td>
<td>4%</td>
<td>11%</td>
</tr>
<tr>
<td>Artificial Intelligence/Machine Learning</td>
<td>4%</td>
<td>7%</td>
</tr>
<tr>
<td>Hyperautomation</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>Human Augmentation</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>Internet of Things</td>
<td>19%</td>
<td>0%</td>
</tr>
<tr>
<td>Next-Generation Compute Technology</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>None</td>
<td>31%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Note: Because of small K-12 sample size, results are directional.

n varies by question. K-12 education respondents, excluding “not sure”

Q: What are the technology areas where your enterprise will be spending the largest amount of new or additional funding in 2022 compared with 2021?
Q: What are the technology areas where your enterprise will be reducing funding by the highest amount in 2022 compared with 2021?
Source: 2022 Gartner CIO and Technology Executive Survey
It is worth noting that the top 10 list of increased spending for highly composable enterprises differs a bit from that of K-12 education respondents. Most obvious is that AI is at the top of the list for highly composable enterprises while really still in the very nascent stages of use in K-12. Surprisingly, investments in the move to the cloud are tied with legacy application modernization at 43% of K-12 respondents, a category clearly not a priority for most high-composability enterprises. This likely suggests another area where K-12 may need to look much more closely at the future of these investments (see Figure 15).

Figure 15: High-Composability Enterprises’ 2022 Investment Priorities

| Top 10 Technology Investment Areas for 2022 Among Highly Composable Enterprises |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Percentage of Respondents       | High Composability (n = 145) | K-12 Education (n = 28) |
| Artificial Intelligence/Machine Learning | 57% | 7% |
| Business Intelligence/Data Analytics | 50% | 57% |
| Cyber/Information Security | 47% | 79% |
| Integration Technologies/APIs/API Architecture | 41% | 29% |
| Cloud Platforms | 43% | 47% |
| Digital Business Transformation Initiatives | 39% | 21% |
| Total Experience Solutions | 31% | 18% |
| Hyperautomation | 26% | 7% |
| Legacy Application Modernization | 43% | 24% |
| Digital Workplace | 23% | 29% |

n varies by segment. CIOs and technology executives answering Q: What are the technology areas where your enterprise will be spending the largest amount of new or additional funding in 2022 compared with 2021? Source: 2022 Gartner CIO and Technology Executive Survey. Note: Because of small K-12 sample size, results are directional.
When we look at implementation behavior for emerging technologies, we can also see that highly composable enterprises are more aggressive in their deployment than K-12 education respondents. This indicates that being a highly composable enterprise also means an appetite for testing technology early, which is not known as being the forte of K-12 education. The risk-benefit analysis of many of these technologies makes K-12 much more prone to waiting to see its success in other areas and seeing other use cases specific to K-12 before investing (see Figure 16).

Figure 16: Composable Enterprises’ 2022 Activities Around Emerging Technologies

<table>
<thead>
<tr>
<th>State of Deployment for Emerging Technologies</th>
<th>Percentage of Respondents Who Will Deploy Within Next 12 Months or Have Already Deployed</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Composability (n = 148)</td>
<td>K-12 Education (n = 29)</td>
</tr>
<tr>
<td>Artificial Intelligence/Machine Learning</td>
<td>21%</td>
</tr>
<tr>
<td>Distributed Cloud</td>
<td>55%</td>
</tr>
<tr>
<td>Responsible AI</td>
<td>49%</td>
</tr>
<tr>
<td>Secure Access Service Edge (SASE)</td>
<td>34%</td>
</tr>
<tr>
<td>Edge Computing</td>
<td>28%</td>
</tr>
<tr>
<td>Composable Enterprise</td>
<td>14%</td>
</tr>
<tr>
<td>Multiexperience Development Platform</td>
<td>14%</td>
</tr>
<tr>
<td>MLOps</td>
<td>7%</td>
</tr>
<tr>
<td>5G</td>
<td>3%</td>
</tr>
<tr>
<td>Digital Twin</td>
<td>14%</td>
</tr>
</tbody>
</table>

n varies by segment, CIOs and technology executives answering, excluding “not sure”
Q: What are your enterprise’s plans for the following digital technologies and trends?
Source: 2022 Gartner CIO and Technology Executive Survey
Note: Because of small K-12 sample size, results are directional.
Section 6: Industry-Specific Software

Technology dependence is not only about general emerging technology or infrastructure. All industries have specific software that carries a lot of weight in operating an enterprise. In K-12 education, that list continues to increase as more software matures and becomes established as tools in everyday operation. Figure 17 lists the most common software in K-12 education today, together with some emerging software with specific relevance for K-12 education.

Most noteworthy is the shift toward ever-more investments in instructional technology systems. Established software, such as learning management systems, student information systems, finance and HR remain stalwarts, but their life cycles appear to be less lengthy than is traditional, perhaps impacted by pandemic-related changes. Some education-specific software, such as digital assessment and analytics, continues to increase in adoption, while others, such as immersive technologies and conversational user interfaces, have slowed, likely awaiting product maturity in K-12. The reasons for variation are many, but the implication for the CIO is that it is important to plan the overall life cycle of software, as there is an opportunity cost to everything.
Figure 17: Technology Investment Plans for K-12 Education

### Investment Plans for Education — Specific Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Information System (SIS)</strong></td>
<td>11% 11% 67%</td>
</tr>
<tr>
<td><strong>Digital Learning Resources</strong></td>
<td>19% 30% 48%</td>
</tr>
<tr>
<td><strong>Learning Management System (LMS)</strong></td>
<td>7% 11% 26% 48%</td>
</tr>
<tr>
<td><strong>Student Devices</strong></td>
<td>11% 15% 33% 41%</td>
</tr>
<tr>
<td><strong>ERP (HR/Finance Systems)</strong></td>
<td>15% 7% 15% 56%</td>
</tr>
<tr>
<td><strong>Data Analytics</strong></td>
<td>7% 15% 22% 22% 30%</td>
</tr>
<tr>
<td><strong>Curriculum Management System</strong></td>
<td>19% 7% 11% 15% 11% 37%</td>
</tr>
<tr>
<td><strong>Digital Assessment</strong></td>
<td>15% 7% 11% 15% 11% 33%</td>
</tr>
<tr>
<td><strong>Cybersecurity Solutions</strong></td>
<td>7% 44% 15% 33%</td>
</tr>
<tr>
<td><strong>Data Integration as a Service</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Adaptive Learning</strong></td>
<td>22% 7% 11% 22% 11% 26%</td>
</tr>
<tr>
<td><strong>Learning Analytics</strong></td>
<td>11% 30% 22% 15% 19%</td>
</tr>
<tr>
<td><strong>Organization Analytics</strong></td>
<td>7% 19% 15% 37% 11% 11%</td>
</tr>
<tr>
<td><strong>Immersive Technologies</strong></td>
<td>26% 37% 19% 11%</td>
</tr>
<tr>
<td><strong>Artificial Intelligence/Machine Learning (AI/ML)</strong></td>
<td>26% 41% 15% 7% 7%</td>
</tr>
<tr>
<td><strong>Conversational User Interfaces</strong></td>
<td>30% 33% 22% 7%</td>
</tr>
</tbody>
</table>

n = 27 K-12 Education CIOs and technology executives answering
Q: Please indicate your enterprise’s interest or activity regarding investments in the following education-sector-specific technologies (including totally new investments and replacing existing ones)
Source: 2022 Gartner CIO and Technology Executive Survey
Notes: Not showing data labels for values equal to 5% or less; because of small sample size, results are directional.
Section 7: Demographics and Survey Methodology

Figure 18 shows the distribution of respondents by country.

Survey Demographics

Location

United States: 53%
Australia: 17%
Canada: 17%
Brazil: 7%
Spain: 3%
United Kingdom: 3%

n = 30 All K-12 Education respondents
Q: Where is your primary worksite located?
Source: 2022 Gartner CIO and Technology Executive Survey
Additional Research Contribution

Melissa Rossi Wood

Evidence

Research Methodology

The 2022 Gartner CIO and Technology Executive Survey was conducted online from 3 May 2021 through 19 July 2021 among Gartner Executive Programs members and other technology executives. The total sample is 2,387, with representation from all geographies and industry sectors (public and private), including 30 from K-12 education. The survey was developed collaboratively by a team of Gartner analysts, and was reviewed, tested and administered by Gartner’s Research Data and Analytics team. Disclaimer: Results do not represent global findings or the market as a whole but reflect sentiment of the respondents and companies surveyed.

The 2022 CIO and Technology Executive Agenda report segments respondents based on self-reported extent of utilization of principles of composability. This segmentation allows a group of “high composability” enterprises to be identified as a best practices group to contrast the performance of others.

We define high-composability enterprises (n = 150) as those that utilize the principles of composable thinking, business architecture and technologies “widely” or “extensively throughout the enterprise.”

Low-composability enterprises (n = 316) utilize the principles of composable thinking, business architecture and technologies “not at all,” “rarely” or “somewhat.”

Moderate-composability enterprises (n = 1,921) encompass the rest of the sample.
Note 1: Full List of Practices

1. Create courses of action through minimal viable strategies that link to long-term goals.
2. Fund at the capabilities level, instead of at discrete projects/products levels.
3. Practice decentralized decision making across functions throughout the enterprise.
4. Respond to changes by planning and prioritizing immediately to pivot execution (such as priorities, resources, funding and key performance indicators).
5. Employ microlearning via small, scalable steps or on-the-job simulations for new skills development.
6. Empower internal functions, product teams, external allies and/or business partnerships to work together through autonomous self-organizing networks.
7. Establish continuous and effortless sharing of ideas and access to platforms, tools and know-how across internal functions, product teams, external allies and/or business partnerships.
8. Distribute accountability for digital outcomes beyond the traditional IT organization to other business units/business leaders.
9. Approach planning as a learning-oriented, continual and forward-looking process.
10. Shape multidisciplinary teams to align on value, promote transparency, drive accountability and collaborate on demand.
11. Develop a pipeline for expertise and partners to accelerate innovation and improve execution to meet unplanned future demand.
12. Continuously monitor and share insights about execution with stakeholders to reconfigure enterprise components.
13. Practice adaptive strategy to spot and respond to opportunities and threats.
14. Implement business processes as modular services to achieve business agility.
15. Cascade business transformation into resources (such as talent, assets, funds and tools) and execution priorities.
17. Flatten the organization to accelerate execution.
18. Measure and make widely available progress metrics for organizational priorities.
19. Design reusable business platforms and services to rapidly define and adapt work across the ecosystem.
20. Promote a high-trust culture that empowers employees to independently make decisions.
21. Define a framework to rapidly match alternative talent sources (such as, partners, gig workers and an internal skills development plan) to expertise not available in the enterprise.
22. Establish a culture where there are no assigned roles, and employees have the flexibility to take on various tasks and move between teams freely.

23. Embed accountability for ensuring modularity and reuse in key performance metrics for use across the enterprise.

24. Employ an “as a service” procurement model that easily scales up and down based on demand.

25. Dynamically provision technology services across the ecosystem to accelerate business value delivery.

26. Design technical components with minimal interdependency.

27. Create dynamic and easily deployable integration capabilities for connecting data, analytics and application components.

28. Create mechanisms that allow employees across the enterprise to easily find and deploy technical assets.

29. Establish adaptive governance to minimize redundancies and technical debt.
Actionable, objective insight

Explore these additional complimentary resources and tools for CIOs and other senior technology executives:

- **eBook**
  Top Strategic Technology Trends for 2022
  12 Trends Shaping the Future of Digital Business
  - Download Now

- **Roadmap**
  2021-2023 Emerging Technology Roadmap
  Benchmark your plans and make investment decisions with confidence
  - Download Now

- **Webinar**
  The Gartner 2022 CIO Agenda: Make Composability Your Superpower
  Use composable business efforts to architect for resilience
  - Watch Now

- **Resource Hub**
  CIO Insights & Tools
  Drive stronger performance on your most critical priorities
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