# The Total Economic Impact™ Of Microsoft 365 Education

Improving Student Learning While Reducing Cost And Effort

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## ABOUT FORRESTER CONSULTING

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# Executive Summary

Microsoft provides an education platform that helps school districts provide better instruction to students while reducing IT and teacher effort. Microsoft commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) school districts may realize by deploying Microsoft 365 Education (Microsoft 365). The purpose of this study is to provide readers with a framework to evaluate the potential financial and non-financial impacts of Microsoft 365 on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed five school districts using Microsoft 365. The benefits they received from moving to the Microsoft 365 cloud-based solution include lower IT costs and effort, improved student outcomes, transformative learning experiences, and more satisfied teachers. While the primary objective was to improve student learning and performance, cost savings was also a major consideration because of budget limitations.

Prior to using Microsoft 365, the schools typically had on-premises solutions that were more limited in features and were not made available to all faculty, staff and students. Also, devices were not given to students on anything approaching a 1 to 1 basis. Moving to Microsoft 365 and putting more devices into students' hands helped teachers improve student engagement and teach the 21st century skills that students need upon graduation.

## Key Findings

**Benefits.** The following risk-adjusted quantified present value (PV) benefits are representative of those experienced by the schools interviewed and applied to a composite organization of 60,000 students and 5,500 teachers and projected forward for three years:

› **Improved student learning and outcomes.** The primary reason the interviewed school districts adopted Microsoft 365 was to provide better educational experiences for their students. All interviewees stated that the Microsoft 365 solution allows for students to be more engaged in their studies. Additionally, the anytime/anywhere nature of the cloud-based solution, means that students can access their coursework from home or mobile phone as well as at school. Giving students a personal device, whether it remains on campus or can be taken home, further engages them in learning and developing the 21st century skills that will be required upon graduation — either within higher education or the workplace. This benefit was not quantified in the study.

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**ROI**
**95%**
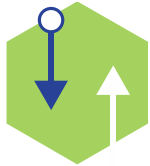
**Payback**
**14 months**

"Nothing replaces good teaching, and Microsoft 365 gives teachers the tools they need to be better at their jobs."
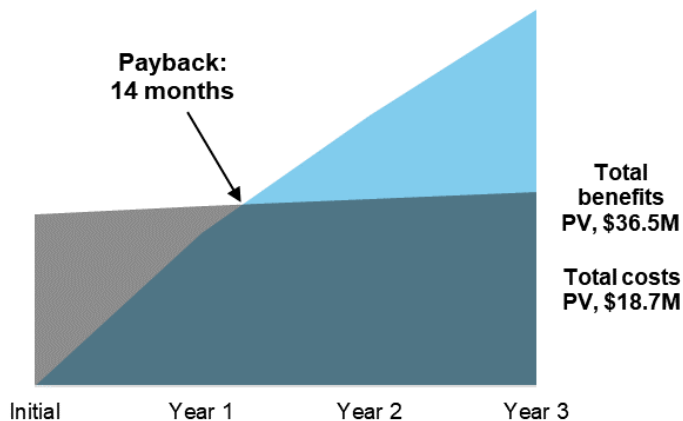
*Executive director, IMS*

› **Increased teacher satisfaction and more teaching time.** The Microsoft 365 solution greatly benefits teachers by allowing them to work with the latest technologies which increases their skills development as well as their work satisfaction. Many school districts are also implementing the Microsoft 365 solution for teachers' professional development training. It also automates and streamlines many administrative tasks which means more time can be spent teaching. For the 5,500 teacher composite organization, this equates to 1.18 million hours per year. Since associated learning outcomes cannot be quantified, Forrester included the implied cost savings in the financial analysis as a proxy. Time saved setting up rosters and classes each semester (5 minutes per student) and grading tests were included (6 hours per week). After reducing the benefit by 75% because not all productivity gains translated into financial results, the total savings over three years was $17.61 million.

› **Reduced and more predictable IT costs along with better performance availability and security.** Moving to the Microsoft 365 cloud solution greatly reduces IT costs and effort by shifting infrastructure out of the school district's data center. Because the Microsoft 365 solution is free for students (paid licenses are only required for faculty and staff), overall Microsoft 365 license costs are usually lower. Also, the spikes in spend from upgrading hardware and software are eliminated and replaced with a predictable and stable software-as-a-service (SaaS) model. The total IT savings over three years was $5.38 million. Additionally, moving to the Microsoft 365 cloud-based solution means better overall solution performance and uptime. Schools benefit from always being up-to-date on software versions and not having to roll out big upgrades every few years. IT security was also generally viewed as better than what the school district could do given budget limitation.

› **Increased device adoption at a lower cost including student use benefit.** School districts are trying to get as close as possible to a 1 to 1 student/faculty to device ratio. The new devices that run Microsoft 365 are very affordable and may cost less than the other solutions being considered. Also, with Intune for Education and other automation tools that are built into Microsoft 365, the time to set up these devices is much faster. End-user security is also much better than their previous, on-premises solution, reducing security remediation efforts. Additionally, students get free use of the Office 365 for Education A1 solution along with a student use benefit including InTune for Education, Minecraft: Education Edition, and some security solutions which saves school districts money; together this is almost comparable to the Microsoft 365 Education A3 solution. For the financial analysis, Forrester included a one-time $33 per device bundled solutions savings, 2.5 hours per device setup time savings, 720 fewer security remediation events each year, and a $4.25 per student per month student use benefit. The savings over three-years was $13.52 million.

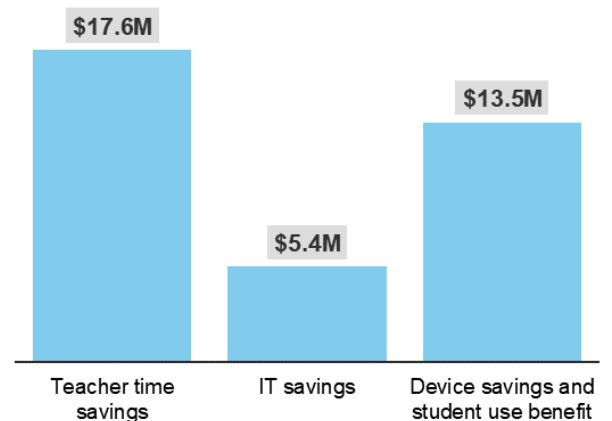**Costs.** The interviewed organizations experienced the following risk-adjusted costs:

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› **Initial deployment of Microsoft 365.** Setting up Microsoft 365, typically email, Teams, and SharePoint, is fast and simple process. The ongoing development of Teams sites for classes and SharePoint sites for other shared functions becomes part of business as usual for faculty and staff. For the financial analysis, Forrester included internal resources and professional services that were specific to the deployment, which consisted of four FTEs for nine months as well as some professional services. Many other roles, such as learning development and training, were involved as part of their ongoing responsibilities and not included as incremental costs. The total costs were $2.86 million

› **Microsoft 365 Education licenses.** Faculty and staff are using the Microsoft 365 A3 licenses. Students are using free Office 365 A1 licenses and receive other student use benefits such as Office 365 ProPlus and InTune for Education (because faculty and staff have paid Microsoft 365 A3 licenses). For the financial analysis, 7,000 faculty and staff operate on A3 licenses at a cost of $69 per year. The total cost over three years was $1.20 million.

› **Student and faculty devices.** School districts' ultimate goal is a 1 to 1 student/faculty to device ratio. In all cases, teachers each had their own device. For students, some school districts were already at 1 to 1 across all schools and others were still in a phased rollout that was closer to 1.5 to 1. The approach to deploying devices varied greatly depending on current device penetration rates for faculty and students and budget availability. This ranged from an initial big bang approach to following existing device refresh schedules. For the financial analysis, a big bang approach was included for simplicity. All costs were included in the initial period even though financing options are often used to spread the costs out over multiple years. At an average price of $200 per device, the total cost for 65,500 devices was $13.76 million.

Forrester's interviews with five school districts using Microsoft 365 and subsequent financial analysis found that an organization based on these interviewed organizations experienced present value benefits of $36.5 million over three years versus costs of $18.7 million, adding up to a net present value (NPV) of $17.8 million and an ROI of 95%.

**Financial Summary**

Payback: 14 months

Total benefits PV, $36.5M

Total costs PV, $18.7M

Initial   Year 1   Year 2   Year 3

**Benefits (Three-Year)**

$17.6M

$5.4M

$13.5M

Teacher time savings | IT savings | Device savings and student use benefit

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## TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing Microsoft 365 Education.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that Microsoft 365 Education can have on an organization:

**DUE DILIGENCE**
Interviewed Microsoft stakeholders and Forrester analysts to gather data relative to Microsoft 365 education.

**CUSTOMER INTERVIEWS**
Interviewed ten individuals across five school districts using Microsoft 365 Education to obtain data with respect to costs, benefits, and risks.

**COMPOSITE ORGANIZATION**
Designed a composite organization based on characteristics of the interviewed organizations.

**FINANCIAL MODEL FRAMEWORK**
Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.

**CASE STUDY**
Employed four fundamental elements of TEI in modeling Microsoft 365 Education's impact: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

> The TEI methodology helps organizations demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

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# The Microsoft 365 Education Customer Journey

**BEFORE AND AFTER THE MICROSOFT 365 EDUCATION INVESTMENT**

## Interviewed Organizations

For this study, Forrester conducted 10 interviews across five school districts using Microsoft 365 Education. Interviewed organizations include the following:

| DISTRICT TYPE | INTERVIEWEES | STUDENTS | EDUCATORS |
|---|---|---|---|
| Public, K-12 | • Executive director, Information Management Services (IMS) | 52,000 | 4,500 |
| Private, K-12 | • Head of digital transformation<br>• Digital transformation team member | 80,000 | 8,000 |
| Public, K-12 | • Manager of institutional technology<br>• Technology network coordinator | 75,000 | 6,000 |
| Alternative education campus | • CIO | 3,800 | 330 |
| Public, Pre-K–12 | • Director of technology<br>• Sixth grade math teacher<br>• Director of accountability, assessment, and professional development<br>• District technology integration specialist | 6,100 | 700 |

## Key Challenges

The interviewed school districts had many challenges that they wanted to address with Microsoft 365 Education.

› **Existing solutions could not deliver the desired learning experiences.** The on-premises and other cloud-based solutions that were replaced with Microsoft 365 Education did not fully meet the schools' needs in terms of providing collaborative learning experiences and teaching 21st century skills, such as computer programming and applied creativity. Additionally, providing each student with their own device could not be achieved because of cost and manpower limitations. "We needed to figure out how to service our students better. With Windows computers, we could do everything we needed. As we uncovered more problems, we solved them with Microsoft 365."

› **There was insufficient security and digital rights management.** Moving to a digitally-driven teaching model requires improved IT security. Further, digital rights management needs to be solid to avoid copyright and contract violations. "I inherited a dumpster fire of infrastructure. There was not enough security and there was no digital rights management. Digital rights management with file level permissions needed to be added quickly."

> "Our past solution was not collaborative. It was extremely difficult to work on documents together in real time. It was very important for us to move in this direction."
>
> *Executive director, IMS*

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› **Technology costs were outpacing available budget.** Technology costs were increasing significantly because of the move to digital teaching models and providing modern IT experiences to students and faculty. Budgets were not increasing fast enough to meet these new demands. "As the second largest operating expenditure for schools, (largest after salaries), it is imperative that current and future technology needs are managed from a holistic perspective, to ensure that intended outcomes are achieved, budgets respected, and timelines met."

## Solution Requirements

The interviewed organizations searched for a solution that would provide many capabilities and address their challenges. Some of what Forrester heard included:

› "We needed workflow management for all our people processes and to support coaching visits. We were looking for everything in one platform along with learning experiences for students."

› "Better student collaboration was a main objective."

› "We wanted students and staff to be able to install Microsoft 365 at home."

› "Students and staff needed the same access no matter where they were located."

› "Data privacy and security were absolutely essential."

› "There needed to be a great user experience."

› "We had student data in many different databases and apps that didn't integrate. With Microsoft 365 we can bring all the data together to create better learning journeys."

› "Staying on the latest version of technology is a best practice we wanted to adopt."

› "The solution had to help us meet the new state standards which included more collaboration, critical thinking, and creativity."

## Key Results

The interviews revealed that key results from the Microsoft 365 investment include:

› **Student learning has improved.** Improved student outcomes were the most important result for school districts. All the interviewed districts stated that adopting Microsoft 365 Education helps them deliver better teaching. "We have the highest test scores we've ever had. Our graduation rate is the highest it has ever been."

› **A modern IT environment reduced operating costs and effort.** Moving a lot of the infrastructure and systems to Microsoft's data centers freed up IT staff to work on other projects. System performance and uptime were also improved while ongoing costs were lowered. "We are saving around $250,000 per year in staff and hosting. We had to evolve peoples' roles to tasks, like cloud identity, from things we just don't need any more such as backup and disaster recovery. We avoided growing the IT team."

"Students have a modern computing environment at home, and they want to see the same thing at school."

*Director of technology*

"One of the things we continue to emphasize is that compared to other productivity platforms, many of the applications in Microsoft 365 were developed by educational experts."

*Head of digital transformation*

"We have seen a 10% improvement across the board — test scores, competencies, and concurrent enrollment participation. And, it is only our second quarter using Microsoft 365."

*CIO*

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> **Schools have more flexibility in determining how to best serve their students.** Different schools in the same district have their own unique needs. And these can vary based on the type of school, whether a special needs program exists, the area's socioeconomic status, etc. The solutions in Microsoft 365 can be tailored to meet the local needs of those students and teachers from both a system and device perspective. "Schools have the autonomy to determine how they use the various solutions and what their device policy and ratio will be based on type of school and community."

> **Teachers save time and have tools to more effectively teach.** Microsoft 365 includes many educator-designed best practices to teach more effectively and efficiently. Teachers were using these to increase student engagement and streamline their own efforts. "Microsoft 365 simplified the teaching environment. Teachers go to Teams to find their classes, and everything is associated in one place. Everyday productivity increases."

## Composite Organization

Based on the interviews, Forrester constructed a TEI framework, a composite organization, and an associated ROI analysis that illustrates the areas financially affected. The composite organization is representative of the five school districts that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization that Forrester synthesized from the customer interviews has the following characteristics:

> **Description of composite.** The composite organization is a K through 12 public school district. There are 60,000 students and 5,500 teachers, all of which use Microsoft 365. There are an additional 1,500 staff and administrators using Microsoft 365. The district operates many different types of schools including traditional elementary, middle, and high schools, as well as schools for special needs students and vocational training. The district is launching an online only school built on Microsoft 365.

> **Deployment characteristics.** The composite school district rollout was a big bang approach. (Interviewed school districts varied in how they rolled out Microsoft 365, and Forrester used this approach for model simplicity and clarity.) Microsoft 365 Education A3, which includes InTune for Education, was deployed for teachers and staff, and Exchange, Teams, and SharePoint were made available to everyone very soon after. New devices were provided to all teachers and students. There was ongoing work building more SharePoint and Teams sites, which was part of business as usual operations. Students had free use of Office 365 Education A1 plus student use benefits such as InTune for Education, Minecraft: Education Edition, and a range of other solutions. More details are in the Costs section of the study.

> *"If you are a district that wants to go all in with improved processes and student learning, this is the way to go."*
>
> *Executive director, IMS*

**Key assumptions**
60,000 students
5,500 teachers
1,500 additional users

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# Financial Analysis

**BENEFIT AND COST DATA AS APPLIED TO THE COMPOSITE**

## Total Benefits

| REF. | BENEFIT | YEAR 1 | YEAR 2 | YEAR 3 | TOTAL | PRESENT VALUE |
|------|---------|--------|--------|--------|-------|---------------|
| | Improved student outcomes | | (non-quantified) | | | |
| Atr | Teacher time savings | $2,439,424 | $9,757,696 | $9,757,696 | $21,954,816 | $17,612,971 |
| Btr | Improved IT and cost savings | $3,863,700 | $1,168,650 | $1,202,400 | $6,234,750 | $5,381,662 |
| Ctr | Device savings and student use benefit | $10,014,338 | $2,800,332 | $2,800,332 | $15,615,002 | $13,522,199 |
| | Total benefits (risk-adjusted) | $16,317,462 | $13,726,678 | $13,760,428 | $43,804,569 | $36,516,832 |

## Improved Student Outcomes

This first benefit is one that was not quantified but was considered the most important by all the interviewees. The school districts adopted Microsoft 365 to provide better learning experiences to students and to help teach them 21st century skills. Student performance and experience improved in many ways, and some of what Forrester heard is included below.

**Personalized Learning**

› "Personalized learning has improved a lot. We started the first virtual school last year. The students go completely at their own pace and have face-to-face sessions one time per week. The rest is all virtual. There is a pacing guide tailored specifically for each student. They can complete an entire course early and progress on if they choose to. This is done with Teams and Office 365."

› "Students with different learning needs have a couple of different approaches to learning. We have a centralized team that helps the schools figure out how to use the software in different ways. For example, we are using OneNote learning tools for students with reading problems."

**Anytime/Anywhere Learning**

› "Learning experiences have extended outside of the classroom because everything is in the cloud. Learning happens beyond the school borders more often than in the past."

› "We are using Skype for Business to teach languages in remote areas for the second language requirement."

› "Students are using Microsoft 365 from their phones off campus. It makes homework more efficient."

**Student Engagement**

› "We've seen an increase in student engagement. We send a survey each year, and 67% of students said this technology helps them be better engaged."

> The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of more than $36.5 million.

> "This year, I am using Microsoft Teams with each of my classes. I post assignments within Teams such as PowerPoint, forms (for assessments), Word documents, web links for games or activities, video links, etc. This has allowed my students to be self-motivated when accessing and completing work on the computer. It also gives me the freedom to work with other students while some are on Teams."
>
> *Sixth grade math teacher*

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- "My students love creating presentations and sharing their work with others to collaborate on projects."

- "This helps a lot with student engagement. You put a device in their hands every day and teach them about Bing searches and internet usage."

- "Teaching them to use internet searches for math has made them a lot more creative. They want to create things like Sway projects. It's been a big positive for us."

- "Kids are more comfortable so are they taking their studies more seriously. The same instructions are being read, but because they are on a computer the students are reading them."

- "There is more accountability. You can't say 'I forgot my flash drive' because everything is saved automatically to the cloud."

## 21st Century Skills

- "Before Microsoft 365, our instructional handbooks did not include 21st century skills. We use coaching visits to train teachers on 21st century skills. Last year alone we did over 32,000 coaching visits in the classroom. We can do more of them because of Microsoft 365."

- "There are many opportunities for 21st century learning in Minecraft. Some classes are using Minecraft to teach coding and as part of the STEM pathway."

- "Nationally and locally, schools are interested in going beyond the core curriculum to include creativity. There are now more ways for students to demonstrate learning."

- "This gives students more options to produce and demonstrate what they learned in the classroom. It makes them more digitally agile."

- "Our county has the highest number of engineers per capita in the country. The students are now using in school what they are expected to use in the workplace."

- "We have seen an increase in the number of students pursuing STEM careers. I think it is tied to having better access to these technologies."

- "The state test is on the computer. So, having kids use a computer every day helps them when they take the test."

- "Microsoft is the right platform to make sure students are using the tools they will need in the real world."

## Planning And Decision Making

- "We make better, well informed decisions because we measure everything and visualize it in Power BI… We are now looking at multi-dimensional relationships for behavior management to reduce absences."

- "We make decisions differently because we relate data to one another."

- "Because everyone is now on the same platform, secondary schools use their resources to support the local primary schools. There is a consortium to get resources and support collectively rather than each school individually."

> "Because we get telemetry, we can measure how teachers and students are using the system and their outcomes. We provide feedback and best practices on what's working well."
>
> *Head of digital transformation*

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> "The data aggregation opportunity within Microsoft 365 is huge. My team uses it for pulling data for all of our reports."

## Improved Teacher Experiences

Teachers have benefited greatly from Microsoft 365. In addition to helping them create more engaging ways to teach, it has freed up time from administrative tasks and grading, and it has also improved their professional development and training. Some examples Forrester heard include:

**Time Savings**

> "The more devices in the classroom, the more time teachers are saving. Technology creates efficiency in giving assignments and autoscoring."

> "Everyday productivity increases. Teachers don't have to go in and manually add students to rosters and create groups. In the past, it took 4 or 5 minutes per student at the start of every semester and for student transfers."

> "I save a lot of time on administrative efforts. When I did not have to create rosters at the start of the year it was amazing."

> "Teachers with all their students on personal devices are probably saving 15 minutes per day in classroom management."

**Professional Development**

> "Teachers get their professional growth from the same platform. It is more time efficient."

> "We are also using the solution for teacher professional development. In the past teachers would travel to the city for face-to-face experiences which meant time was very limited. A lot of schools could not afford to send teachers as much as they wanted. Now there are a wider range of professional learning possibilities."

> "We are providing more online courses and webinars for staff than ever before using Skype for Business. We also use Skype for Business for curriculum conference calls."

**Other**

> "It is difficult to recruit teachers in remote areas. Now teachers have better connectivity both for work and personal use, so they don't feel so disconnected."

> "We have 52,000 Teams that have been created. Within and beyond schools, people are collaborating. It has become a part of how teachers work together every day. They have definitely gravitated to it."

> "Teachers loved going back to Microsoft Office. The game changing product, outside of Intune, was Microsoft Teams. It drove engagement with students. Teams allow teachers to facilitate quicker video interactions, which means quicker lessons, which means better engagement."

For the financial analysis, Forrester included the time that was saved scoring tests and setting up class rosters as a proxy for the value realized from additional in-class instructional time, and assumes that:

> "I use Microsoft Forms quite a bit for assessments. I add a link to the form in Teams. Forms automatically grades the students' exams and sends me an Excel spreadsheet. It saves me 6 hours per week."
>
> *Sixth grade math teacher*

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- Teachers save 5 minutes per student, setting them up in the class systems at the start of each semester.

- Teachers save 6 hours per week by not having to manually score tests.

- Twenty-five percent of the total savings was realized in Year 1 to account for change management and rolling out of devices to all students.

- These time savings can be used to deliver additional instruction to students, complete professional development, or accrue less overtime costs.

- In addition to improved student learning, this productivity gain may allow for financial benefits in a school district to be implemented in one or more ways. For example, it can lead to an increase in the teacher student ratio, and it can reduce staff turnover and the associated costs of onboarding new teachers.

- Only 25% of the total time and cost savings was included because not all increases in productivity result in more work being completed or the ability to realize quantifiable savings.

- An average base salary of $45,000 was used.

This benefit can vary greatly depending on how teachers are using Microsoft 365 for tasks like autoscoring. It can also vary based on the teacher compensation model. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year risk-adjusted total PV of $17.61 million.

> Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

## Teacher Time Savings: Calculation Table

| REF. | METRIC | CALC. | YEAR 1 | YEAR 2 | YEAR 3 |
|------|--------|-------|--------|--------|--------|
| A1 | Number of students | | 60,000 | 60,000 | 60,000 |
| A2 | Number of teachers | | 5,500 | 5,500 | 5,500 |
| A3 | Time saved setting up classes (hours) | A1*5 minutes/60*2 semesters (25% realized in Year 1) | 1,250 | 5,000 | 5,000 |
| A4 | Time saved grading tests | A2*6 hours*36 weeks (25% realized in Year 1) | 297,000 | 1,188,000 | 1,188,000 |
| A5 | Average teacher fully burdened cost (hourly) | ($45,000+30%)/(38 weeks*40 hours) | $38.49 | $38.49 | $38.49 |
| A6 | Productivity capture adjustment | | 25% | 25% | 25% |
| At | Teacher time savings | (A3+A4)*A5*A6 | $2,869,911 | $11,479,643 | $11,479,643 |
| | Risk adjustment | ↓15% | | | |
| Atr | Teacher time savings (risk-adjusted) | | $2,439,424 | $9,757,696 | $9,757,696 |

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## Improved IT And Cost Savings

Moving to Microsoft 365 Education cloud solution eliminates many costs associated with an on-premises solution. It also delivers, in many cases, better performance, availability, and security than what a school district could achieve with their on-premises solution or other cloud-based solutions being considered.

Regarding cost savings, interviewees said:

› "We expect cost recovery within two years and then being able to put $7 million to $8 million per year [back into the coffers]."

› "Having the solution in the cloud makes it easier for us, and our IT team is stretched thin. Microsoft 365 is also more user friendly and has better self-service tools, so IT professionals don't have to be the one to do everything."

› "We got rid of other systems for web conferencing and learning management. That saves us $125,000 per year."

› "It would have been $4 million to upgrade our on-premises systems. Instead, we are spending $400,000 per year [for Microsoft 365 Education]."

› "It would have been cost prohibitive to build this out ourselves. We had 20MB mailboxes when on-premises and we're looking at implementing 1GB or 2GB mailboxes. The storage piece alone was 4x to 5x the money we would have gotten. I wasn't going to take on a project we couldn't do right."

›  "We would have spent several million dollars up front on windows licenses plus 6,000 user licenses had we stuck with our past, in-house solutions."

› "If we did everything on-premises, at least one more person would have been needed just to maintain the exchange servers and keep up with email accounts and security."

› "To replace the Exchange server and licenses would have been $50,000 that year. That is more than I wanted to pay when I could move it to the cloud."

› "With Microsoft 365 Education licenses, you buy it for employees, and it is free for the students. Our past solution cost $35 per student."

› "Microsoft 365 is so easy to manage. It is a force multiplier. It is still me and one other person managing the tenants, including Azure."

› "We have removed at least four or five people around system administration tasks and reassigned them to more valuable activities [such as instructional learning]."

› "We used to have a disaster recovery solution. Now we don't need it so that cost has gone away."

Interviewees had the following things to say about improved performance, availability, and security:

> "Once development is complete, the results of this new transformative digital platform will see a minimum 20% annual IT savings."
>
> *Head of digital transformation*

- "No matter how much money we would pour into security, Microsoft's data centers are more secure than our infrastructure was."

- "We had a lot of data leaks before and now there's a strong need for digital rights management (DRM). Also, student privacy is very important. For example, nurses can now send emails with student information that only the intended person can read."

- "Microsoft 365 is easily scalable and future ready. No matter how many users we add, we don't have to add hardware."

- "It increased the whole security of the platform. Previously, schools were struggling with securing their data."

- "Information rights management is baked into the Microsoft world. We have Azure rights management turned on, and our default setting is to have One Drive locked. We also use drive encryption."

For the financial analysis, Forrester included cost savings described by interviewees and scaled them for the composite organization size. Forrester assumes that:

- Upgrading an on-premises solution would have cost $3.5 million upfront in hardware and licenses. There would be an additional $250,000 per year spent on increasing storage and compute power as well as a 15% maintenance contract cost.

- On-premises hosting and cooling would cost $75,000 per year.

- Four FTEs could be redeployed, avoiding future hires. This was lower in Year 1.

- Other webconferencing and learning management solutions could be eliminated, creating savings of $125,000 per year. This is less in Year 1 to account for the cutover and contract periods.

The savings from one school district to another can vary greatly depending on their previous solutions and approaches to IT management. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $5.38 million.

> "Anytime you move to a cloud solution the size of Microsoft, uptime is better. Our users demand that."
>
> *Executive director, IMS*

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**IT Savings: Calculation Table**

| REF. | METRIC | CALC. | YEAR 1 | YEAR 2 | YEAR 3 |
|------|--------|-------|--------|--------|--------|
| B1 | Avoided infrastructure uplift | | $3,500,000 | $250,000 | $250,000 |
| B2 | Avoided infrastructure maintenance | B1(sum through current year)*15% | $525,000 | $562,500 | $600,000 |
| B3 | On premises hosting savings | | $75,000 | $75,000 | $75,000 |
| B4 | FTE savings (future hires and reassignments) | | 2 | 4 | 4 |
| B5 | IT fully burdened cost | $55,000+30% | $71,500 | $71,500 | $71,500 |
| B6 | Eliminated other technologies | | $50,000 | $125,000 | $125,000 |
| Bt | IT savings | B1+B2+B3+(B4*B5)+B6 | $4,293,000 | $1,298,500 | $1,336,000 |
| | Risk adjustment | ↓10% | | | |
| Btr | IT savings (risk-adjusted) | | $3,863,700 | $1,168,650 | $1,202,400 |

## Device Savings And Student Use Benefit

Providing each student with a personal device to access learning content and tools was a major goal of the interviewed school districts. Because of the volumes involved the cost to purchase and provision these devices was quite high. Regarding cost and effort savings, interviewees said:

› "Purchasing windows computers was $33 less out the door than our other options. This includes hardware, licenses, accessories, warranty, and the collaboration platform."

› "We manage the entire fleet with Intune including deploying software and pushing security policies."

› "It used to take 3 hours to get a computer ready to ship, now it takes just 21 minutes."

› "We have multiple groups with different categories of students. We can deploy packages based on what a teacher is needing. For example, dictation software for three kids in the southwest corner of the state. We created a group, assigned it, downloaded the software and licenses from [the vendor], and then had Intune deploy it. If we didn't have Intune, students would have had to ship the devices back, or we would contract locally with a mobile device management company to touch the machines."

› "Intune for Education allowed us to run a single deployment configuration using one master image to every computer that we have organization-wide. That cut our deployment time from months down to weeks."

› "There were no security events on student devices this year. In the past we had them every week. Technicians would have to reimage a machine or clean it up. Cleaning it could take several hours."

> "Previously, device management was entirely manual. That meant we had to touch all the devices. Now we are using Intune for inventory management and pushing out software. It saves us a lot of time. We only have four technicians to support all students and employees."
>
> *Director of technology*

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- "One of the big driving factors for moving to Microsoft 365 was the configuration manager for endpoint security. We haven't had a major security event since migrating, and can use System Center to reimage badly infected machines if there is a problem."

- "Microsoft 365 give us better security which means less time remediating effort."

Microsoft 365 Education also provides a student use benefit. In addition to students using the free Office 365 A1 solution, they also get free use of the following solutions:

- Office client apps

- Office 365 Cloud App Security

- Advanced Threat Protection

- Intune for Education

- Windows 10 Education

- Azure Active Directory Premium (Plans 1 & 2)

- Advanced Threat Analytics

- Minecraft: Education Edition

Taken together, the Office 365 Education A1 solution and the student use benefit is almost on par with the Microsoft 365 Education A3 solution which is priced at $4.25 per student per month.

For the financial analysis, Forrester included cost and times savings described by the interviewees. Forrester assumes that:

- Each fully configured Windows device (software and hardware) costs $33 less than other alternatives.

- The time to fully configure a device using InTune for Education was reduced by 2.5 hours, an 84% time savings.

- Devices last for more than three years and do not need to be replaced or touched again during the life of the study. Any costs in this category would be covered by a four-year warranty.

- Twenty security remediation events are eliminated during each week of the school year.

- There is a $4.25 per month student use benefit because a Microsoft 365 Education A3 license is not needed to deliver the desired solutions to students.

- For model simplicity, all devices were added at the start of the project in a big bang approach. A phased approach would spread out the benefits and costs over a longer period.

The savings will vary based on: 1) how devices were previously managed, 2) how volume discounts were negotiated to buy devices and phasing, and 3) how many students take advantage of the student use benefit. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $13.52 million.

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## Device Savings And Student Use Benefit: Calculation Table

| REF. | METRIC | CALC. | YEAR 1 | YEAR 2 | YEAR 3 |
|------|--------|-------|--------|--------|--------|
| C1 | Device hardware savings | (A1+A2)*$33 | $2,161,500 | | |
| C2 | Device setup time savings | (A1+A2)*2.5 hours*$35.75 | $5,854,063 | | |
| C3 | Device security remediation savings | 720 incidents*2 hours*$35.75 | $51,480 | $51,480 | $51,480 |
| C4 | Student use benefit | A1*$4.25*12 months | $3,060,000 | $3,060,000 | $3,060,000 |
| Ct | Device savings | C1+C2+C3 | $11,127,043 | $3,111,480 | $3,111,480 |
| | Risk adjustment | ↓10% | | | |
| Ctr | Device savings and student use benefit (risk-adjusted) | | $10,014,338 | $2,800,332 | $2,800,332 |

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## Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement Microsoft 365 Education and later realize additional uses and business opportunities. Examples shared by interviewees included:

› Rolling out to additional student groups if not part of the original deployment, e.g., elementary school students.

› Creating more tailored solutions for students using Sway and other applications.

› Increased data synchronization with other back-end systems.

› Expand the usage of Teams.

› Provide professional development training for employees (if not already in place).

› Add PSTN calling within Skype for Business.

› Move more systems into the Azure data center.

› Rolling out Microsoft Dynamics.

› Building out additional data analytics capabilities using Power BI and MyAnalytics.

None of these future opportunities are included in the financial analysis.

> Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so.

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## Total Costs

| REF. | COST | INITIAL | YEAR 1 | YEAR 2 | YEAR 3 | TOTAL | PRESENT VALUE |
|------|------|---------|--------|--------|--------|-------|---------------|
| Dtr | Deployment | $2,860,200 | $0 | $0 | $0 | $2,860,200 | $2,860,200 |
| Etr | Microsoft 365 licenses | $0 | $483,000 | $483,000 | $483,000 | $1,449,000 | $1,201,150 |
| Ftr | Devices | $13,755,000 | $0 | $0 | $0 | $13,755,000 | $13,755,000 |
| Gtr | Ongoing management | $0 | $369,600 | $369,600 | $369,600 | $1,108,800 | $919,140 |
| | Total costs (risk-adjusted) | $16,615,200 | $852,600 | $852,600 | $852,600 | $19,173,000 | $18,735,490 |

## Deployment

The time and effort required to deploy Microsoft 365 Education varied greatly across the interviewed organizations. Some of the main variables were: if Microsoft solutions such as Exchange were previously in use; the size of the IT team; number of schools to be deployed; and available budget. Typically, Exchange and other solutions such as SharePoint and Teams were rolled out quickly, and there was then a long tail for adoption.

From a staffing perspective, the deployment team was comprised of existing internal resources and sometimes professional services were used. Internally, most of the people worked on the deployment as part of their regular duties, e.g., training, and worked on this part-time. The project was spearheaded by the IT organization.

Below are deployment timeline examples from the interviewed organizations.

### 52,000 Student School District

› "We worked with two companies that provided the devices with managed installation and asset recovery. Part of the project was getting rid of the junk we had. We would migrate a school over the weekend."

› "We got our licenses in September 2014. On October 20th everyone was on [Microsoft 365]. Most of the time was spent in testing to make sure things were working better, e.g., synchronization and identity data. Fifteen people worked part-time."

› "Creating SharePoint sites took longer. We worked with Microsoft consulting and didn't complete that until May 2015.

### 80,000 Student School District

› "We created new credentials in April of this year. Everyone had access then. Schools that previously had Office on-premises or nothing could use Microsoft 365 right away. Those moving from other tools are being migrated and receiving training through the rest of 2017. We are migrating ten schools per week."

› "It took around six months to migrate 163 tenants and the data."

› "The integration/migration team consisted of eight people, mainly contractors."

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of more than $18.7 million.

"Teachers like being upgraded. They like to be on the latest and greatest technology."

*Technology network coordinator*

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### 75,000 Student School District

> "Two of us managed the migration. We did five schools each night for about one month. It was pretty easy because we already had Active Directory in place."

> "Once the email transition was done, we worked on updating work stations. We built a couple of images, and the schools upgraded as they had time using System Center."

> "Because everything was scripted using PowerShell, we were able to let the computers do most of the work for us."

> "We handled the change management piece ourselves. If you offer new solutions that people want, they'll teach themselves how to use it. School-based technical associates work with the local staff, and it is business as usual."

### 6,100 Student School District

> "We did an email migration previously, and that took one week. We also stood up Office 365 then."

> "We are doing a phased rollover. This year was middle schools. We deployed 2,000 laptops in four weeks. We replace hardware every four years, and buy devices with a four-year warranty."

> "We are used to outside vendors including help on the [Microsoft 365] rollout."

For the financial analysis, Forrester based the deployment on the larger interviewed school districts. A big bang approach was used for rolling out Microsoft 365 Education and devices to all students, teachers, and administrators. This was done, in part, to keep the financial model simple. Forrester made the following assumptions:

The main deployment lasted nine months. This included standing up Microsoft 365 and adding all the users. Ongoing SharePoint and Teams increased rollout is considered business as usual and not included.

> Four internal technology FTEs were managing and doing most of the work on the deployment. Additional resources were involved on a part-time basis from across the organizations, e.g., training, learning development, and school technology champions. Most of this additional effort was around change management and adoption.

> Outside professional services cost $150,000. They assisted mainly with configuration, applying best practices, and training the IT team.

As shown above, there are a wide variety of approaches to rolling out Microsoft 365 and the level of effort required. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of $2.86 million

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

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## Deployment: Calculation Table

| REF. | METRIC | CALC. | INITIAL |
|------|--------|-------|---------|
| D1 | Number of months | | 9 |
| D2 | Number of internal FTEs | | 4 |
| D3 | IT fully burdened cost | =B5 | $71,500 |
| D4 | Professional services | | $150,000 |
| Dt | Deployment | D1*D2*D3+D4 | $2,724,000 |
| | Risk adjustment | ↑5% | |
| Dtr | Deployment (risk-adjusted) | | $2,860,200 |

# Microsoft 365 Education Licenses

Microsoft 365 Education is a SaaS solution based on an annual recurring fee. This is charged for faculty and staff users, and students can use Microsoft 365 for free. There are a couple of different flavors of Microsoft 365 Education with different prices, so the reader is encouraged to work with their implementation partner to determine which solution is best for them.

Forrester made the following assumptions:

> Microsoft 365 was adopted by 5,500 teachers and 1,500 other school district employees. The number of users was kept constant throughout the study for simplicity.

> They all use the Microsoft 365 A3 license, which has a list price of $69 per user per year.

Because list pricing was used, no risk adjustment was applied to this cost. The three-year total PV cost was $1.2 million

## Microsoft 365 Education Licenses: Calculation Table

| REF. | METRIC | CALC. | INITIAL | YEAR 1 | YEAR 2 | YEAR 3 |
|------|--------|-------|---------|--------|--------|--------|
| E1 | Number of teachers | | | 5,500 | 5,500 | 5,500 |
| E2 | Number of other staff users | | | 1,500 | 1,500 | 1,500 |
| E3 | Microsoft 365 A3 license costs | $5.75*12 months | | $69 | $69 | $69 |
| Et | Microsoft 365 licenses | (E1+E2)*E3 | | $483,000 | $483,000 | $483,000 |
| | Risk adjustment | 0% | | | | |
| Etr | Microsoft 365 licenses (risk-adjusted) | | | $483,000 | $483,000 | $483,000 |

## Devices

To realize the full student learning benefits from Microsoft 365 Education, students need to have devices to use. Ideally, this is a 1 to 1 ratio. Some school districts let the students take the devices home, and others check the devices in and out each day.

Device costs can vary based on specifications and volume discounts. Typically, the school districts planned for the devices to last four years and purchased them with a four-year warranty. One school district that made a bulk purchase of more than 4,000 laptops negotiated a price of $194 which included the hardware, licenses, accessories, warranty, and collaboration platform. Other districts reported spending between $200 and $400, depending on the device.

There were also different approaches to rolling out the devices. Some school districts did everything at once, and others did a rollout over a couple of years. For example, high schools might be rolled out as part of the initial deployment, followed by middle schools, and then primary schools. This is dependent on budget, staff capacity, and change management issues. Device vendor financing could be used to spread out the costs, allowing for more devices to be deployed faster.

Adding these devices and having people use the internet more can result in increased bandwidth usage. However, most schools reported that there was not that much of a change, and that the incremental costs were very small and often subsidized. One interviewee said, "We added bandwidth, going from 300MB to 900MB. E-rate pays for most of the increase, so the price hasn't gone up much." Another interviewee said: "We already had pretty high bandwidth because of online testing. We analyzed bandwidth differences since moving to Microsoft 365 and saw very little increase in bandwidth utilization."

For the financial analysis, Forrester made the following assumptions:

› Devices were deployed in a big bang approach for all students and teachers. For simplicity, all purchase costs are shown in the initial period. In reality, a school district may use financing options to spread the costs out over multiple years.

› The average cost per device was $200. This included a four-year warranty, so any replacement costs during the life of the study are born by the warranty.

› Configuration and deployment services were largely done by the hardware vendor and their partners, along with internal IT resources.

School districts may pay more for hardware depending on the specifications and volume discounts. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of $13.75 million.

| Devices: Calculation Table | | | |
|------|--------|-------|---------|
| REF. | METRIC | CALC. | INITIAL |
| F1 | Student devices | A1*$200 | $12,000,000 |
| F2 | Teacher devices | A2*$200 | $1,100,000 |
| Ft | Devices | F1+F2 | $13,100,000 |
|  | Risk adjustment | ↑5% | |
| Ftr | Devices (risk-adjusted) | | $13,755,000 |

## Ongoing Management

The IT labor savings from not having to manage on-premises infrastructure is discussed in the Benefits section of the study. Ongoing internal effort switched from keeping the lights on to other activities, such as helping to rollout additional SharePoint sites and Teams sites. There are also ongoing efforts to configure Microsoft 365, handle new users, device management, and rollout new features.

Overall, the added efforts and eliminated ones tend to equate basically no change in overall IT staff. "We have not had to add additional resources yet. We are supporting more technology, but still have same staff number as 15 years ago," said one interviewee at a school district with 75,000 students. Another district with 6,100 students reported, "one FTE is dedicated to Microsoft 365."

Additionally, there are a lot of other roles across the district that are working on Microsoft 365. These are mainly business as usual activities that moved over from other learning support activities. For example, one school district with 52,000 students reported that they have "nine instructional training people, one data scientist, and two data analysts that are all working with Microsoft 365 now." They also have four resources that are, "working on ongoing SharePoint adoption." Overall, this district added around four FTEs, involved in managing the solution.

For the financial analysis, Forrester made the following assumptions:

› Four internal FTEs are dedicated to supporting Microsoft 365 and the ongoing rollout of solutions such as SharePoint and Teams sites. Although these are not new hires, they are included as part of a total cost of ownership analysis.

› Other internal efforts around adoption and support are carried out by resources across the organization, and this time replaced past activities. Therefore, there is no incremental increase in headcount.

› On average, $50,000 per year is spent on professional services around deploying new Microsoft 365 solutions and ongoing best practice adoption.

These costs can be higher if a school district's IT department is already understaffed. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of $919,410.

"Microsoft 365 is very user friendly. There are a wide variety of tools that teachers need to be prepared to teach themselves how to use. No matter what my team is looking to do, they can find it in Microsoft 365."

*Manager of institutional technology*

"I encourage everyone to go to Microsoft 365. The ease of management and data synchronization makes a huge difference in how we are better able to assist our students in learning."

*Director of technology*

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**Ongoing Management: Calculation Table**

| REF. | METRIC | CALC. | INITIAL | YEAR 1 | YEAR 2 | YEAR 3 |
|------|--------|-------|---------|--------|--------|--------|
| G1 | Internal resources | 4 FTEs*$71,500 | | $286,000 | $286,000 | $286,000 |
| G2 | Professional services | | | $50,000 | $50,000 | $50,000 |
| Gt | Ongoing management | G1+G2 | | $336,000 | $336,000 | $336,000 |
| | Risk adjustment | ↑10% | | | | |
| Gtr | Ongoing management (risk-adjusted) | | | $369,600 | $369,600 | $369,600 |

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# Financial Summary

**CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS**

## Cash Flow Chart (Risk-Adjusted)
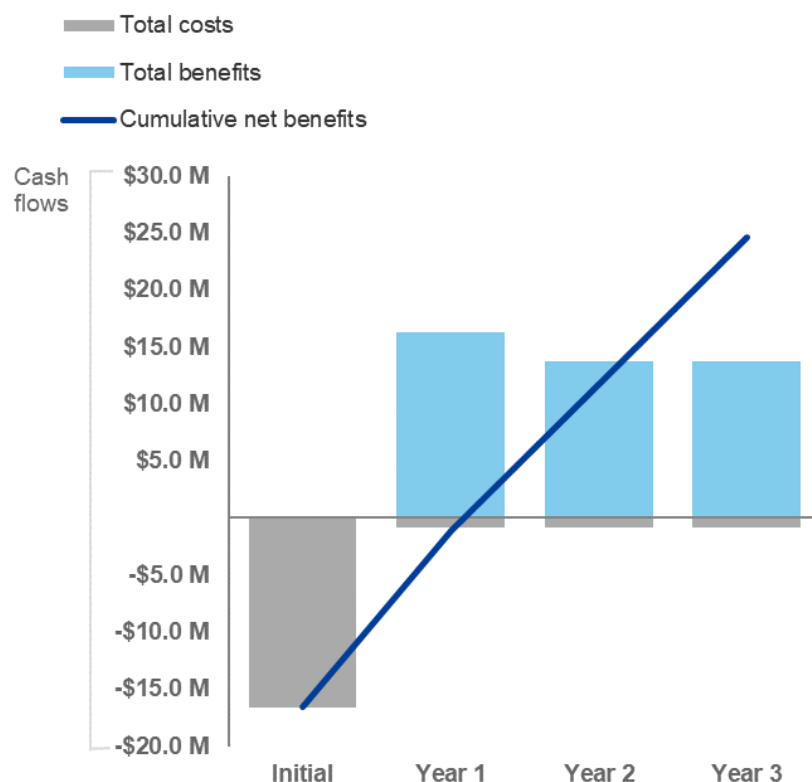
The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.



These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

### Cash Flow Table (Risk-Adjusted)

|  | INITIAL | YEAR 1 | YEAR 2 | YEAR 3 | TOTAL | PRESENT VALUE |
|---|---|---|---|---|---|---|
| Total costs | ($16,615,200) | ($852,600) | ($852,600) | ($852,600) | ($19,173,000) | ($18,735,490) |
| Total benefits | $0 | $16,317,462 | $13,726,678 | $13,760,428 | $43,804,569 | $36,516,832 |
| Net benefits | ($16,615,200) | $15,464,862 | $12,874,078 | $12,907,828 | $24,631,569 | $17,781,342 |
| ROI |  |  |  |  |  | 95% |
| Payback period |  |  |  |  |  | 14 months |

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# Microsoft 365 Education: Overview

The following information is provided by Microsoft Forrester has not validated any claims and does not endorse Microsoft or its offerings.

Microsoft 365 Education empowers educators to unlock creativity, promote teamwork, and provide a simple and safe experience in a single, affordable solution built for education.

## Unlock Creativity In Each Student

› Spark creativity, collaboration, and problem-solving with immersive and engaging apps.

› Enhance independence for students of all abilities with intelligent tools.

› Bring ideas to life in 3D and data visualization tools.

## Promote Teamwork

› Collaborate and save educators time with a single hub for classes and teams.

› Easily connect with others and co-author in real time.

› Meet the needs of individual students with a universal toolkit to connect, share, and communicate in class and out.

## Provide A Simple And Safe Experience

› Manage users, data, and devices with a single dashboard.

› Protect identity, apps, data, and devices with intelligent security enhanced by machine learning.

› Manage data archiving, governance, and discovery.

## Microsoft 365 Education Solutions

| | Per-Device or Per-User licensing | Microsoft 365 A1 Per-Device | Microsoft 365 A3 Per-User | Microsoft 365 A5 Per-User |
|---|---|---|---|---|
| Collaboration & Learning | Office Online: web-based document editing | ● | ● | ● |
| | Office client applications: *Word, Excel, PowerPoint, Outlook* | | ● | ● |
| | Email & calendar, IM, persistent chat, Yammer | ● | ● | ● |
| | Files & content management: *file storage, sharing, Groups, Planner* | ● | ● | ● |
| | Minecraft: Education Edition | | ● | ● |
| Inclusive Classroom Tools | Microsoft Teams with classroom experiences, PLC and Staff teams | ● | ● | ● |
| | OneNote Class Notebook, Sway | ● | ● | ● |
| | Learning Tools, Accessibility Checker, Office Lens | ● | ● | ● |
| Voice, Video, and Meetings | Skype for Business | ● | ● | ● |
| | Cloud PBX & PSTN Conferencing | | | ● |
| Compliance | Legal Hold, eDiscovery search and export | ● | ● | ● |
| | Advanced eDiscovery, Customer Lockbox, Advanced Data Governance | | | ● |
| Management & Basic Security | Intune for Education | ● | ● | ● |
| | School Data Sync, Data Loss Prevention, Office 365 Rights Management | ● | ● | ● |
| | Office 365 A3: *Cloud App Security, Skype Meeting Broadcast, Delve, Bookings* | | ● | ● |
| | EMS A3: *Intune for Education, AADP P1, AIPP P1, Advanced Threat Analytics* | | ● | ● |
| | Windows Auto Pilot | ● | ● | ● |
| | Windows 10 Education A3[1] | | ● | ● |
| Advanced Security, Analytics & Voice | Office 365 A5: *ATP, TI, Adv. Comp., Power BI Pro, MyAnalytics* | | | ● |
| | EMS A5: *AADP P2, AIPP P2, Cloud App Security* | | | ● |
| | Windows 10 Education A5[1]: *Windows Defender ATP* | | | ● |
| Server & CAL Benefits[2] | Productivity Server Licenses & CALs (Exchange, SharePoint, Skype for Business, etc.) | | ● | ● |
| | Windows Server CALs | | ● | ● |
| | System Center Config CML | | ● | ● |
| | System Center Endpoint Protection | | ● | ● |

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# Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

## Total Economic Impact Approach

**Benefits** represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.

**Costs** consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.

**Flexibility** represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

**Risks** measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

**PRESENT VALUE (PV)**

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.

**NET PRESENT VALUE (NPV)**

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

**RETURN ON INVESTMENT (ROI)**

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

**DISCOUNT RATE**

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

**PAYBACK PERIOD**

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

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