

XR INDUSTRY INSIDER

2021 XR Survey

INDUSTRY INSIGHTS INTO THE FUTURE OF IMMERSIVE TECHNOLOGY

JULY | 2021 | VOLUME 5

PRESENTED BY

PERKINScoie

XRA XR
ASSOCIATION



EXECUTIVE SUMMARY

83%
of respondents
say investment
in immersive
technology will
increase in 2021.

In early 2020, immersive technology executives appeared bullish about their industry's future, thinking that the strong investment levels of the past few years would continue for the foreseeable future and perhaps accelerate.

Then, COVID-19 hit—and whole industries were upended.

Yet far from upending the industry's momentum of the past half-decade, the pandemic's effects—namely, forcing millions of people to stay in their homes for months—seem to have strengthened immersive technology's prospects. Its use in some sectors like healthcare, education, retail and workforce development and training understandably increased, and after a year of living and working on Zoom and Teams, consumers are more comfortable than ever with online and virtual experiences.

That is probably why industry leaders in the field of XR—which encompasses virtual, augmented and mixed realities—are largely confident that the post-pandemic world will include more use of immersive technology, according to a survey conducted in April 2021 by Perkins Coie and the XR Association. With project launch runways across the industry being compressed—standard five- to seven-year timelines are now being accelerated to one to four—83% of our respondents say the pace of investment in immersive technology will increase this year.

Our survey of 164 industry stakeholders also finds that automotive, education and retail are expected growth spots; we have highlighted the latter two in this report. Additionally, because our survey pool included a significant sampling of respondents from female- and minority-owned companies—perhaps reflecting growing diversity across the digital media and interactive entertainment industry—we compared that group's responses to the survey questions to the broader survey group.

This report is also informed by a focus group of top executives from the immersive technology industry held in early 2021. In what follows, we analyze their insights along with the survey findings and include key takeaways to help understand this important moment for immersive technology.

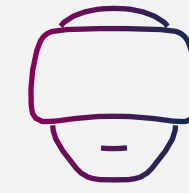


KEY FINDINGS

What Respondents Think About Immersive Technology's Future



Healthcare and medical devices is the area (outside of gaming and entertainment) in which usage changed most since the pandemic, followed by marketing and advertising, education and retail.



Other sectors, led by automotive and including **workforce development and training and commercial real estate**, are poised to see increased usage of immersive technology post-pandemic.



Retail and fashion are seen as great opportunities for the use/emergence of immersive technology, likely a result of consumers' crash course in shopping at home over the past year-plus.



Though immersive technology will also provide **significant advancements in education** over the next five years, it's the sector most challenged by limited immersive technology content.



Lack of content, a common lament, trailed only user experience among barriers to mass adoption. **More accessible software to meet all users' needs** must be developed for broader enterprise use, and availability of and access to open-source software and communities is most needed for increasing consumer adoption.



For the first time, we analyzed sentiment from **female- and minority-owned businesses**—and they are critical of developers' understanding of what consumers think makes compelling content.



STRONG OPTIMISM ABOUT IMMERSIVE TECHNOLOGY

“ Companies in the B2B space are more open to using [immersive] technology to solve problems than ever before. ”

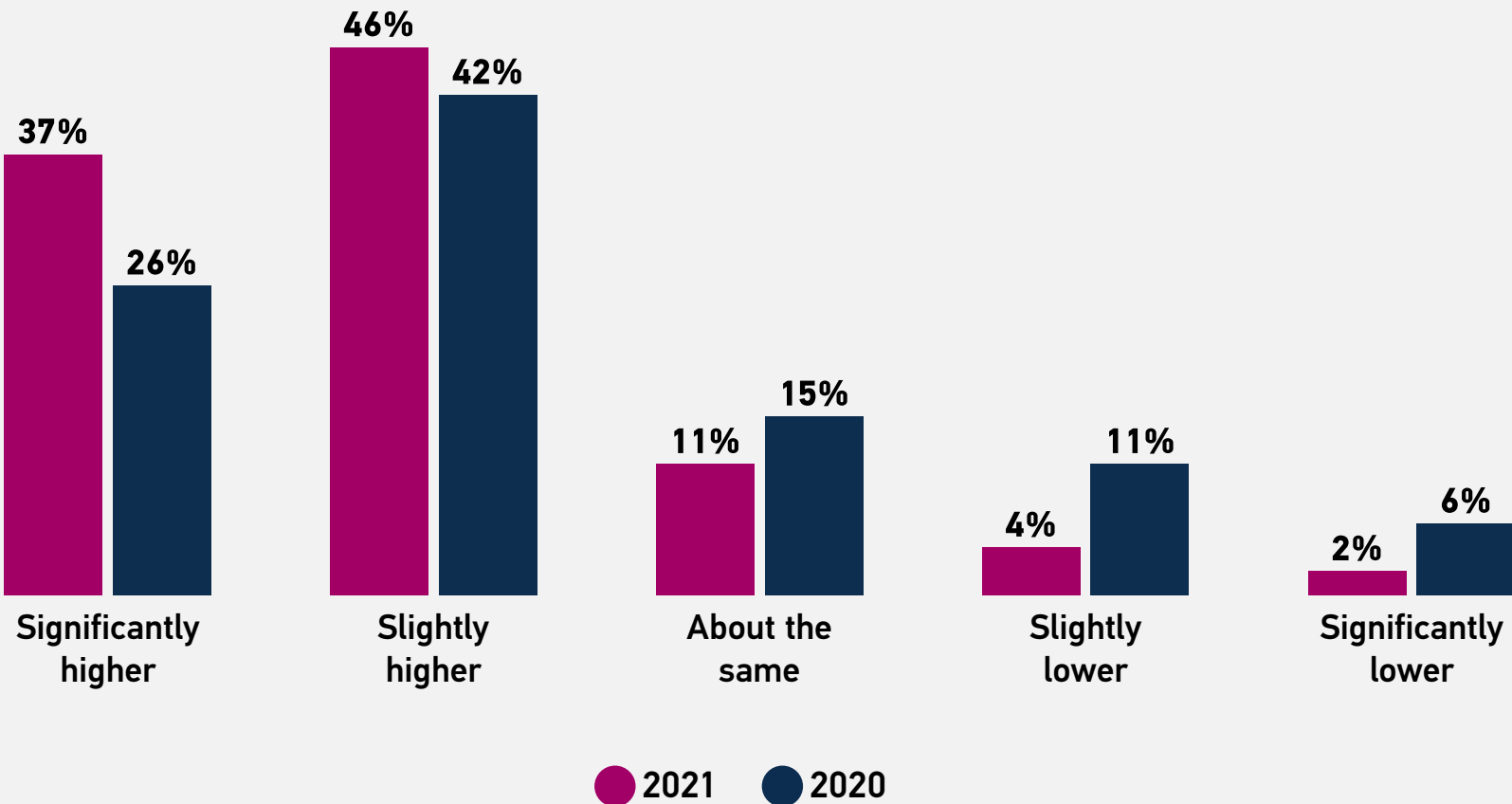
— Founder of creative agency specializing in immersive technology

As in previous years, respondents in 2021 are bullish about the prospects of immersive technology, with more than 8 in 10 predicting an increased pace of investment. That’s higher than 2020’s survey, which was conducted just before the outbreak of the pandemic, and this year’s survey found a notable uptick in the proportion of respondents who expect a significantly higher pace of investment (37% in 2021 compared with 26% in 2020).

The optimism should be considered with an understanding of the impact of the pandemic—“COVID-19 has been an accelerant for digital transformation overall and certainly XR is a component of that,” noted the co-founder of a leading augmented reality platform and creative studio. That bears out in the numbers. Even with all of 2020’s problems, it was the second-highest year on record as far as total value of deals in the augmented and virtual reality sectors, exceeding \$5.2 billion, according to PitchBook. That was down from \$7.7 billion in 2019 but higher than \$4.8 billion in 2018, though the trend of fewer total deals that began in 2019 continued.

Optimism around immersive technologies is higher for some industries, often related to habits established during the pandemic or behavior expected once consumers are no longer stuck at home. The remote work revolution is also having an effect, with 95% of respondents saying their organization plans to increase spending on [immersive technology for better remote collaborations and training](#).

What do you believe the pace of investment by businesses in immersive technologies will be in 2021 as compared to 2020? (Select one option)



THE ROAD TO MASS ADOPTION

65% of respondents say user experience is the top barrier to greater adoption of XR.

Respondents said the adoption of immersive technologies at the enterprise and consumer levels hinges on access to software. Half said development of more accessible* software to meet the needs of all users will be the biggest driver of enterprise adoption, but respondents also thought infrastructure enabling the use of immersive technology (44%) and government funding of research and development (40%) are important. Regarding consumer adoption, respondents listed availability of and access to open-source software and communities (61%), awareness of different content and platforms (48%) and development of infrastructure that enables the use of immersive technology (46%) as the biggest drivers.

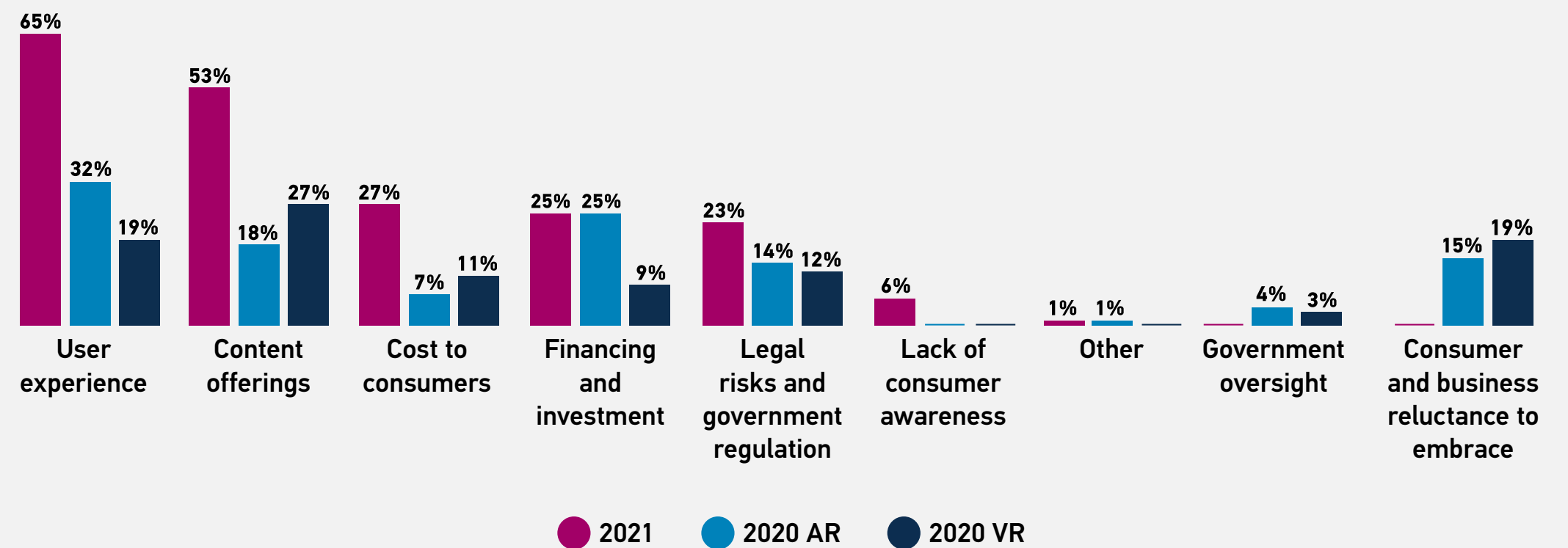
This shows immersive technologies continue on the path to mass adoption, but that challenges remain. Similar to previous years, 65% of respondents said user experience is the top barrier to greater adoption, while content offerings (53%) and costs to consumers (27%) are other hurdles.

Respondents' monetization strategies largely aligned with their plans before the pandemic, with at least one managing director of a leading consulting firm saying there is not enough focus on enterprise products given COVID-19's lasting impacts on workplaces. Others see clear daylight in the consumer space: "Sales of products and in-app purchases are going to reign supreme with the growing consumer market that has been helped by COVID-19 quarantine restrictions," said the founder of a creative agency specializing in immersive technology.

*'Accessible' as mentioned in the survey did not specifically refer to open-source software or software built for persons with disabilities.

Survey Question 2021: What are the top barriers to mass adoption of immersive technology (outside of gaming and entertainment)? (Select all that apply)

Survey Question 2020: What is the biggest obstacle to mass adoption of AR and VR technologies? (Select one for each technology)



HOW CAN IMMERSIVE CONTENT IMPROVE?

61% of respondents think developers should produce more interactive and immersive content.

When asked how to improve existing immersive technology content, most respondents (61%) said developers should focus on making it more interactive/immersive. Respondents also want content that is compatible across different platforms (53%) with more seamless interactions with other users (44%). “All industries will need new, easy-to-access and build content,” said the global head of a virtual reality division of a major tech company, adding that the industry is “still early stages for content.”

Part of the problem appears to stem from a disconnect about what is considered compelling for consumers.

Sixty-four percent of respondents said consumers don’t understand or are not aware of where or how to find compelling content, while 54% said developers don’t understand what makes content compelling from a consumer standpoint. To bridge this gap, developers should work hard to listen to—and educate—consumers, perhaps through better research methods and marketing campaigns.

To what extent do you agree with these statements?

Developers don’t understand what makes for compelling content from the consumer standpoint.



Consumers don’t understand or are not aware of where/how to find compelling content.



THINKING FROM MINORITY- AND FEMALE-OWNED COMPANIES

70% of respondents from minority-owned companies believe content is not interactive or immersive enough.

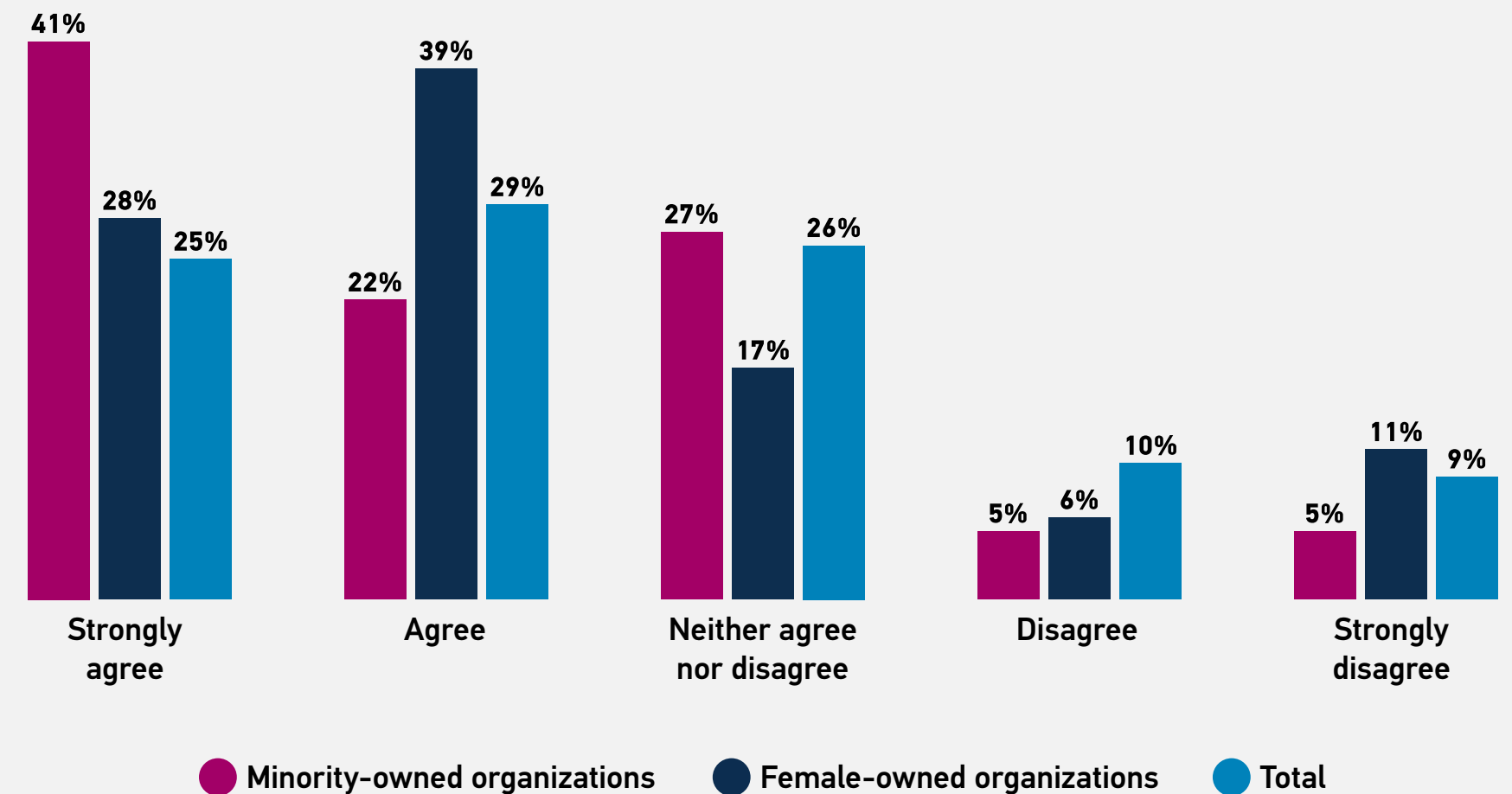
We didn't set out to query particular demographics in this year's survey. But something interesting happened anyway. Six in 10 respondents identified as working for a minority-owned company or a female-owned company or both.

This might validate some anecdotal evidence that the industry is becoming more diverse, but respondents from these groups clearly differ when compared with our general survey pool: Most notably, they're even more convinced that developers don't understand what makes content compelling for consumers. Those from minority-owned companies were more likely to strongly agree that developers don't understand this, while respondents from women-owned businesses were more likely to agree or strongly agree with the statement.

For respondents from minority-owned companies, existing content is especially lacking when it comes to being interactive and immersive. Seventy percent of them answered that way, compared with 61% overall. Meanwhile, 21% of respondents from female-owned companies think educational content is lacking (compared with 17% overall) even though they think the pandemic has affected the use of immersive technology in education more than any other sector except marketing and advertising (the full survey pool chose healthcare).

Finally, there are key differences when it comes to the government's role. Fifty-one percent from minority-owned businesses said strong antitrust laws would increase development and adoption of immersive technology at the enterprise level, compared with 38% overall. Fifty-five percent of respondents from women-owned businesses pointed to government funding and research development, compared with 40% overall.

To what extent do you agree with this statement? Developers don't understand what makes for compelling content from the consumer standpoint.



GOVERNMENT OVERSIGHT INSIGHTS

“ I don't think we need governmental regulations as much as we need a central standards body that can establish ground rules for all. ”

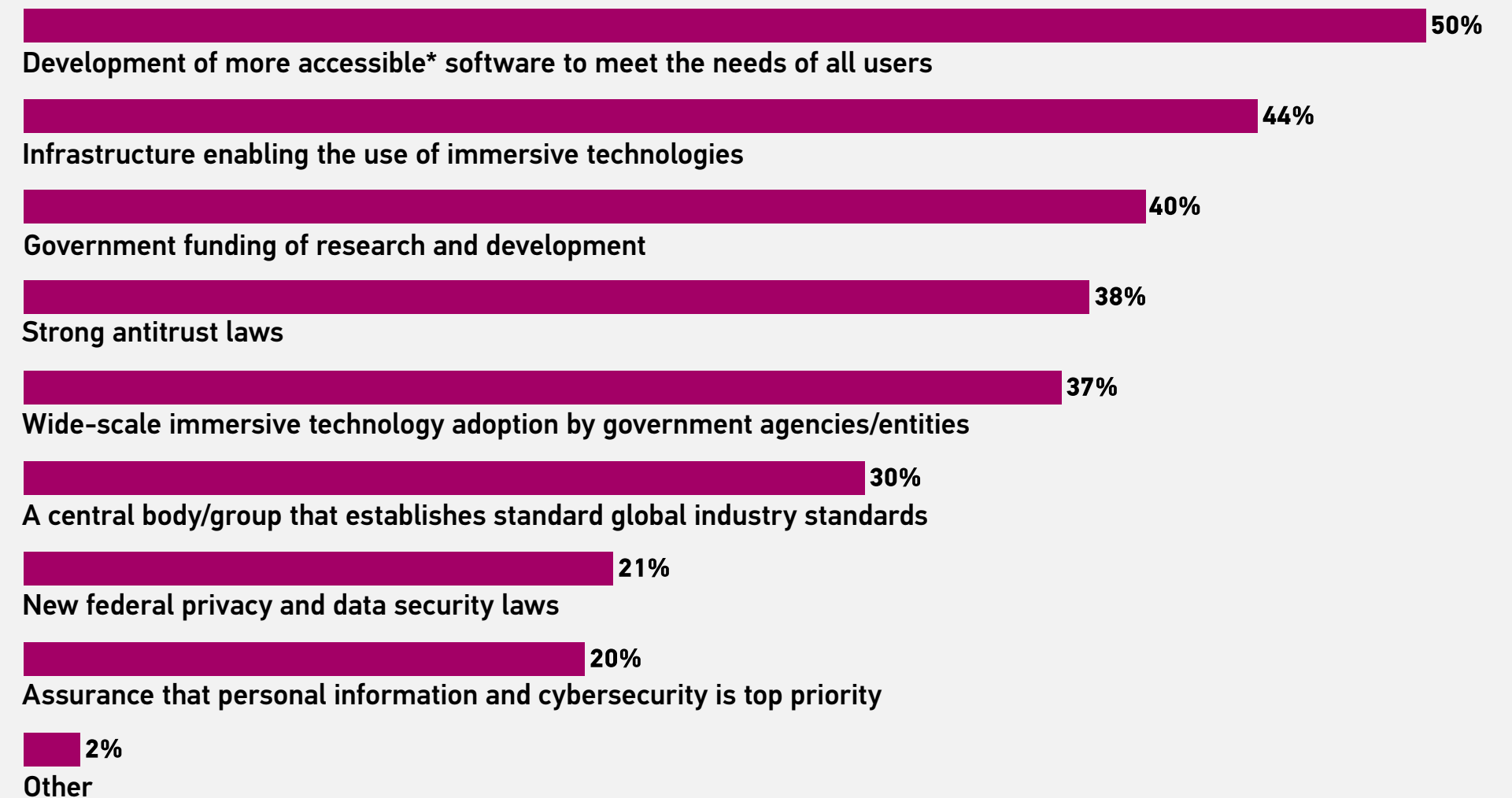
— Head of ecosystem and trend scouting, network equipment manufacturer

Governmental oversight wasn't a top concern for respondents, but it is a significant issue around immersive technology's mass adoption. Many respondents pointed to strong antitrust laws and federal privacy and data security laws as important for enterprise adoption, and about 1 in 5 said policymakers implementing best practices and codes of conduct would influence [greater consumer adoption](#).

Relatedly, a central body or group that establishes global and industry standards was seen as important by about a third of respondents. One expert, who leads VR for a major computer and hardware company, said the industry needs “clearer privacy and understanding of what information the providers are tracking, holding, sharing and selling.”

Some experts stressed additional government funding for XR, but others want government to play a less active role. “I have more faith in the private sector to drive adoption and create real use cases than central government,” said the co-founder and CEO of an XR company. “Accessing government funding for these initiatives can also be hugely time-consuming and onerous and is an art in its own right. But understanding where XR can help central initiatives for government at scale and encouraging best practices—I'd be all for that.” The sentiment tracks with what the technology industry writ large has struggled with—i.e., a desire to operate in a free market. But there is a growing body of evidence that regulation may be needed, though it must be the result of a deliberative process that arises as the industry works to educate lawmakers.

Which factors are key in increasing the development and adoption of immersive technology by enterprises? (Select all that apply)



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PANDEMIC'S EFFECT ON IMMERSIVE HEALTHCARE

“Healthcare is an area where applications seem to spring up, starting with doctors who can make house calls via tablets.”

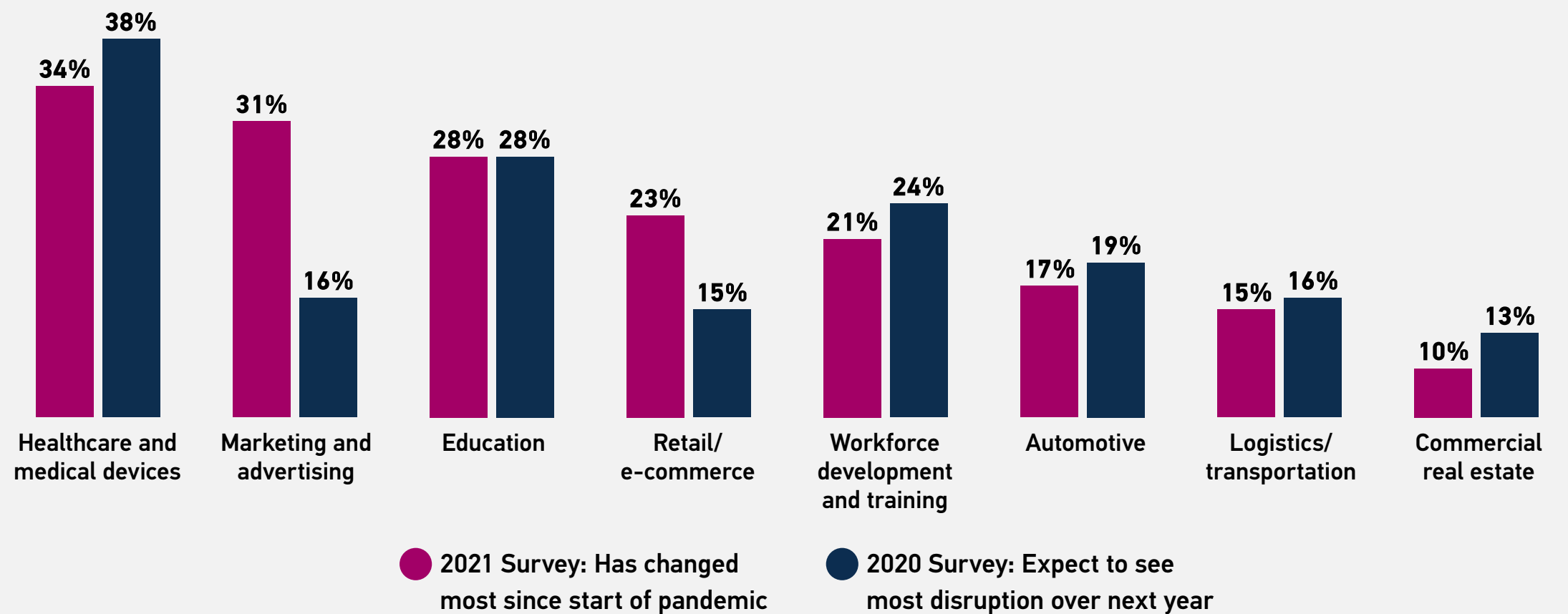
— Chief legal officer of a major technology company

When asked in January 2020, respondents said healthcare was the sector most primed for disruption by immersive technology. But no one who answered that way could have known how prescient COVID-19 was about to make them. “Healthcare is an area where applications seem to spring up, starting with doctors who can make house calls via tablets,” said the chief legal officer of a major technology company. Immersive “applications could become much more common in the healthcare space and extended to healthcare consumers.”

This year, while healthcare topped the list of sectors (outside of gaming and entertainment) that respondents think will be most affected by the pandemic, marketing and advertising wasn't far behind—even though it wasn't an area in which respondents expected much disruption pre-pandemic.

Survey Question 2021: In which sectors (outside of the gaming and entertainment space) has the use of immersive technology most changed since the outbreak of the pandemic? (Select all that apply)

Survey Question 2020: In which sectors (outside of the gaming and entertainment space) do you expect to see the most disruption by immersive technologies in the next 12 months? (Select all that apply)



OPTIMISM IN OTHER SECTORS

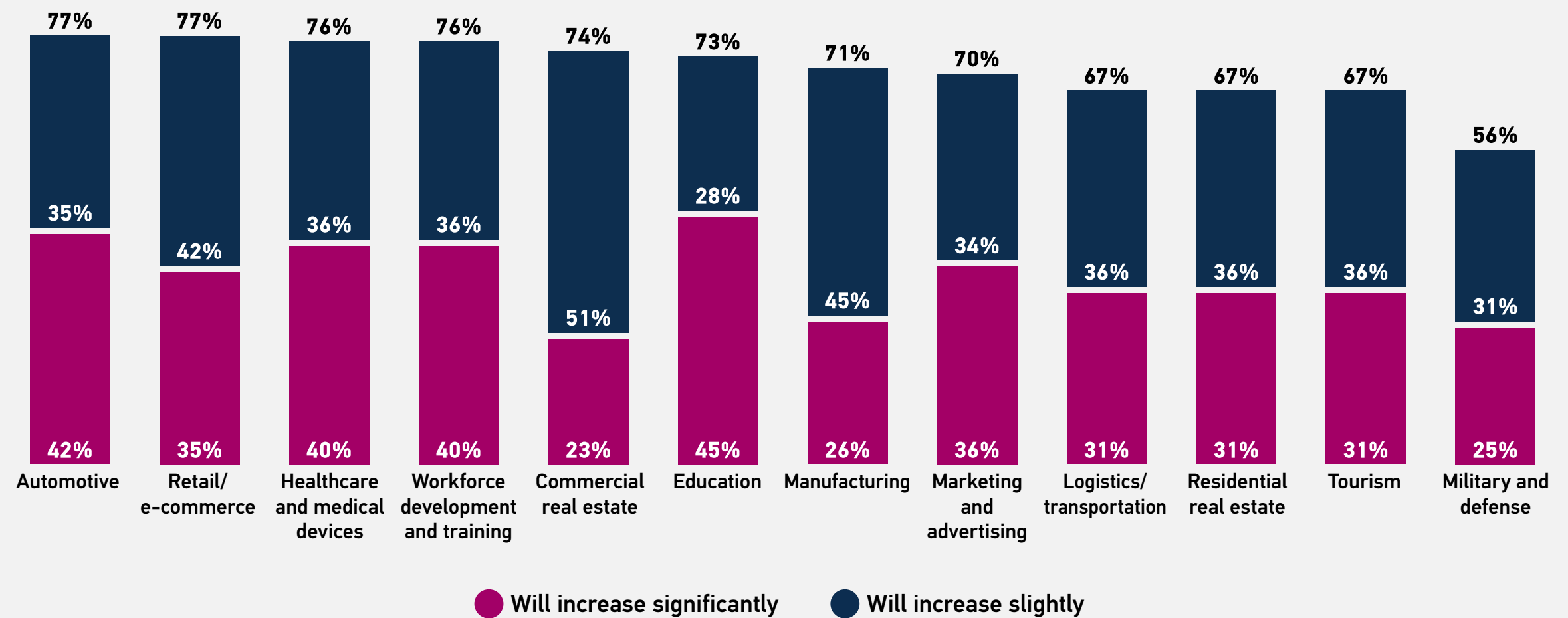
45% of respondents say immersive technology's use in education will increase significantly in the next year.

There are two broad categories for how consumers are expected to change their use of immersive technologies that appear tied to COVID-19. The first category is what consumers are expected to do as and after the pandemic draws to a close. After being stuck at home for most of the past year, respondents appear to expect consumers to hit the road in the coming months—and use immersive technology to buy cars. Indeed, auto sales are quite strong so far this year, with demand being driven by stimulus checks and continued concerns about mass transit.

But consumers and whole sectors also might continue doing things in ways that the pandemic proved possible, maybe even convenient. That would explain the expected high use of immersive technology in retail, workforce development and training and, importantly, education. That latter category was the one that respondents said would increase most significantly in the next year.

“Overall, 2020, despite the economic downturn, was an accelerant for XR,” said the co-founder and CEO of an XR company. “And with a rising tide of technologies increasing its capabilities across the board, we’re going to see this become more of a mainstay for brands and businesses across sectors.”

How do you believe each of the following sectors will fare in terms of immersive technology usage as we emerge from the pandemic/over the next year (April 2021 to April 2022), compared with the previous year? (Select one for each sector)



SPOTLIGHT: EDUCATION

97% of respondents agree that immersive technology will contribute to significant advancements in education through 2026.

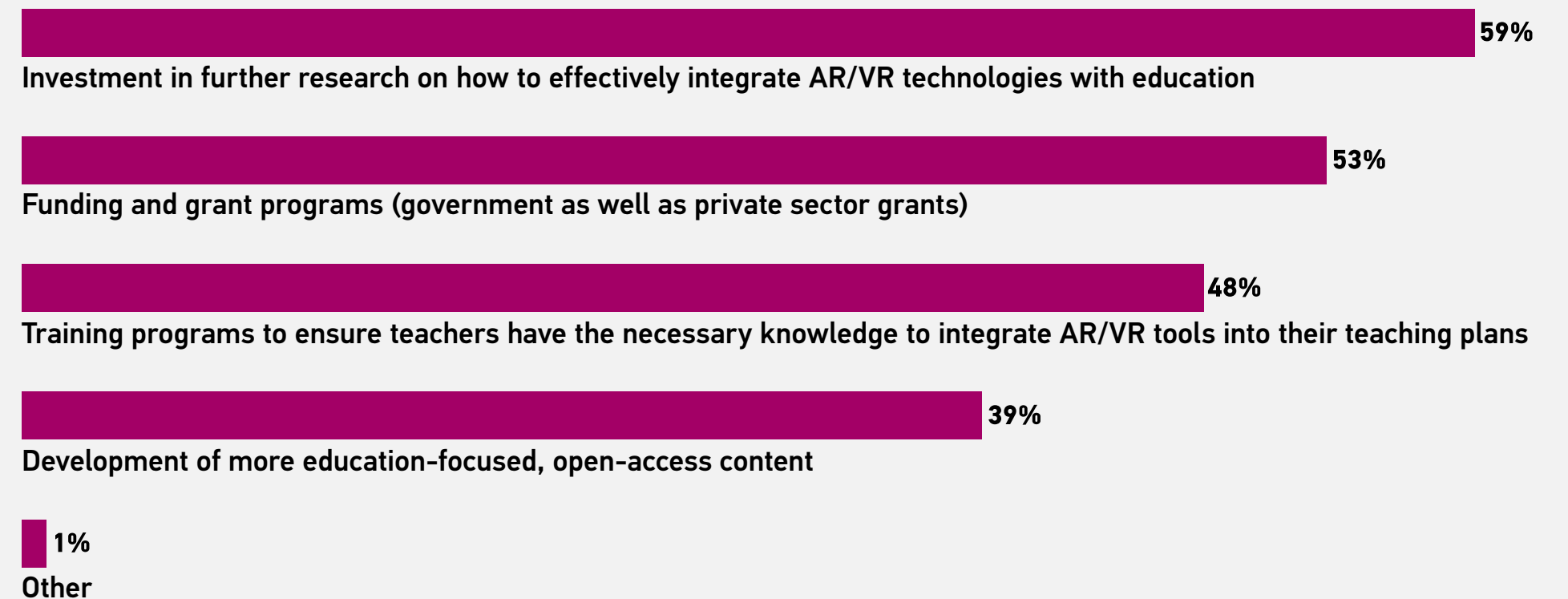
Nearly all (97%) respondents agreed that immersive technology will [contribute to significant advancements in education](#) through 2026—with over half (63%) strongly agreeing. Clearly, the pandemic has proven how immersive technology can help make education more engaging and interactive by creating real-world simulations and field trips. But respondents also said that education was the industry most challenged by a lack of immersive content (though at a low percentage of 17%).

Fifty-nine percent of respondents said investment in further research is needed to efficiently integrate AR/VR into education, while 53% said funding and grant programs—from both government and the private sector—were essential. These findings align with data from a [survey](#) conducted by XRA in September of 2020, in which respondents showed the lowest level of optimism about education when asked about the future for the use of immersive technology in various sectors. An assistant general counsel at a major technology company explained that some of the pessimism facing education in the past “comes from a lack of ‘hero experiences.’”

“Entertainment experiences have been clearly established,” the assistant general counsel said. “Education scenarios need investment and focus.”

Respondents reported postgraduate (66%) and college and university (64%) programs as the [most likely areas to benefit](#) most from advancements in immersive technology. Programs like the University of Maryland’s Institute for [Advanced Computer Studies](#) are making great strides in creating research projects that measure the impact of immersive technologies, as well as applying them to education, like the University of Michigan’s [efforts](#) to implement XR across different colleges.

Which of the following factors will support faster adoption of immersive technology in education? (Select all that apply)



SPOTLIGHT: FASHION AND RETAIL

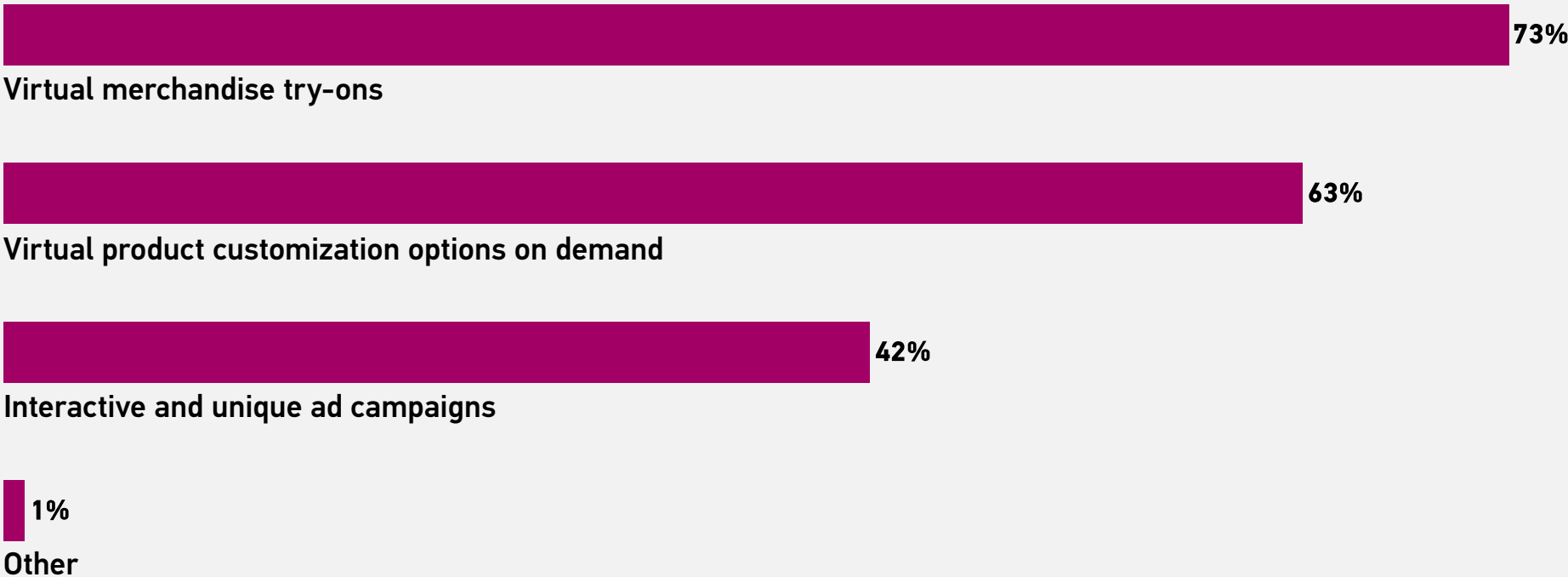
89% of respondents agree that fashion and retail present great opportunities for immersive technology.

Immersive experiences in retail—specifically, in the fashion space—are already increasing as a result of the pandemic. And that change appears to be more than a passing trend. Eighty-nine percent of respondents agreed that fashion and retail [represent great opportunities for immersive technology](#). When asked which solutions could have the most significant impact, 73% said virtual merchandise try-ons, 63% said virtual on-demand customization options and 42% said interactive and unique ad campaigns.

“Brick-and-mortar shops have a sudden need to make digital catalogs and jump right to 3D instead of 2D graphics,” said a product management executive at a multinational software corporation. “However, there will still be those retailers who don’t sell through a catalog and rely on in-person comforts and a designed environment to represent their products [who] will come up with new and exciting experiences that go way beyond what we see today with 3D product shopping.”

Retailers like [Home Depot](#), [IKEA](#) and [Warby Parker](#) are getting into the game, as is high-end fashion designer Balenciaga, which used immersive technology to create an [immersive experience](#) for the brand’s winter show. Meanwhile, more day-to-day retail interactions are likely using immersive technology, solving the “will this jacket/dress/shirt/shoe, fit me” question, said a managing director of a leading consulting firm. “More accurate fittings—fewer returns. Happy customers, happy retailers. I’ve seen a few of these in action and they are close.”

With a shift in consumer shopping behavior caused by the pandemic, which of the following immersive technology solutions could have the most significant impact on retail and fashion? (Select all that apply)



METHODOLOGY AND DEMOGRAPHICS

Respondents identified their affiliation as:

C-Suite (80%)

Engineer/Producer (10%)

Marketing/Business Development Executive (2%)

Consultant/Lawyer (4%)

Senior Vice President/President (4%)

In February 2021, Perkins Coie and the XRA convened 20 leaders in the AR, VR and MR industry (collectively called XR) to take part in an online focus group regarding trends and developments as well as the outlook for the year ahead. Participants included executives from leading global software and technology firms in the consumer and enterprise space.

Key takeaways from those conversations were used to shape an online survey of 164 XR industry executives in April 2021. Respondents indicated they represented an organization best described as an established technology company (73%), a startup (15%), an advisor or an outside consultant (7%), investor (2%) or other (3%). There are two reasons why percentages may not add up to 100% in certain questions. First, In questions where multiple selections were possible, the number of responses may exceed the number of participants, thus adding up to more than 100%. Second, rounding issues in single-response questions may result in the total percentage equating to slightly more or slightly less than 100%.

About Perkins Coie LLP

Perkins Coie is a leading international law firm that is known for providing high value, strategic solutions and extraordinary client service on matters vital to our clients' success. With more than 1,200 lawyers in offices across the United States and Asia, we provide a full array of corporate, commercial litigation, intellectual property, and regulatory legal advice to a broad range of clients, including many of the world's most innovative companies and industry leaders as well as public and not-for-profit organizations. Perkins Coie's Immersive Technology (AR/VR/XR) vertical, which is a part of the newly launched and reimagined Digital Media & Entertainment, Gaming, and Sports (DMEGS) Industry Group, advises pioneers of XR technology building immersive worlds for gaming, education, healthcare, and beyond. Embracing an "all in" commitment to the industry, our attorneys counsel market leaders in immersive technology, products, services, and content. The DMEGS Industry Group is meeting the business and legal needs of our clients by focusing on and leveraging the firm's collective experience in the transformative convergence of the digital media and digital entertainment, gaming, and sports industries.

About XR Association

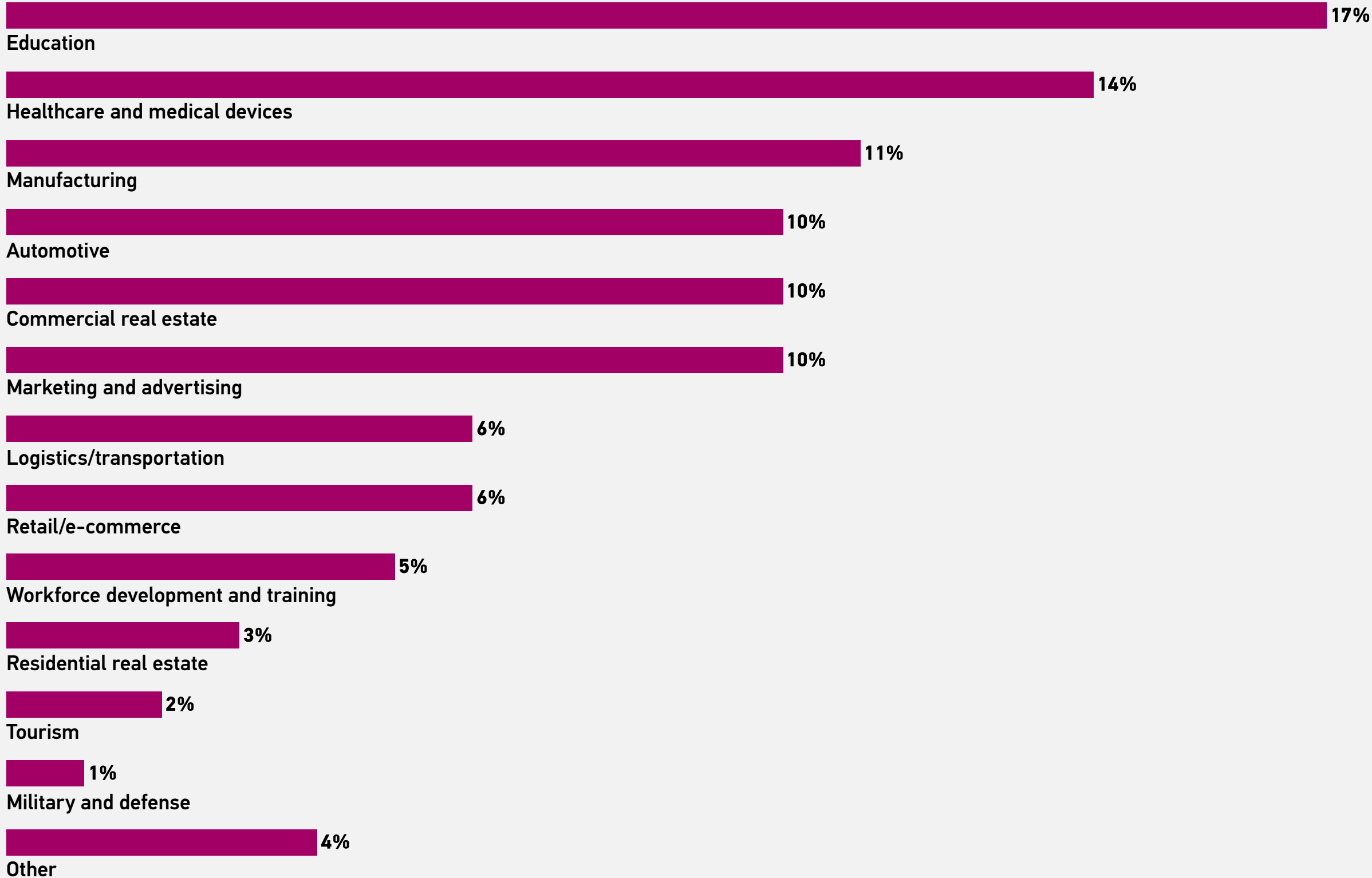
The XR Association promotes the dynamic global growth of the XR industry, which includes virtual reality, augmented reality, mixed-reality, and future immersive technology. XRA is leading the way for the responsible development and adoption of XR by convening stakeholders, developing best practices and research, and advocating on behalf of our members and the greater XR industry.

The XR Association represents the broad ecosystem of the XR industry including headset manufacturers, technology platforms, component and peripheral companies, internet infrastructure companies, enterprise solution providers, and corporate end-users. The founders of XRA are Google, HTC Vive, Microsoft, Oculus from Facebook, and Sony Interactive Entertainment. To learn more about XRA membership, visit xra.org/joinus.



ADDITIONAL FINDINGS

Which of the following industries, in your opinion, is most challenged by limited immersive technology content? (Select one option)



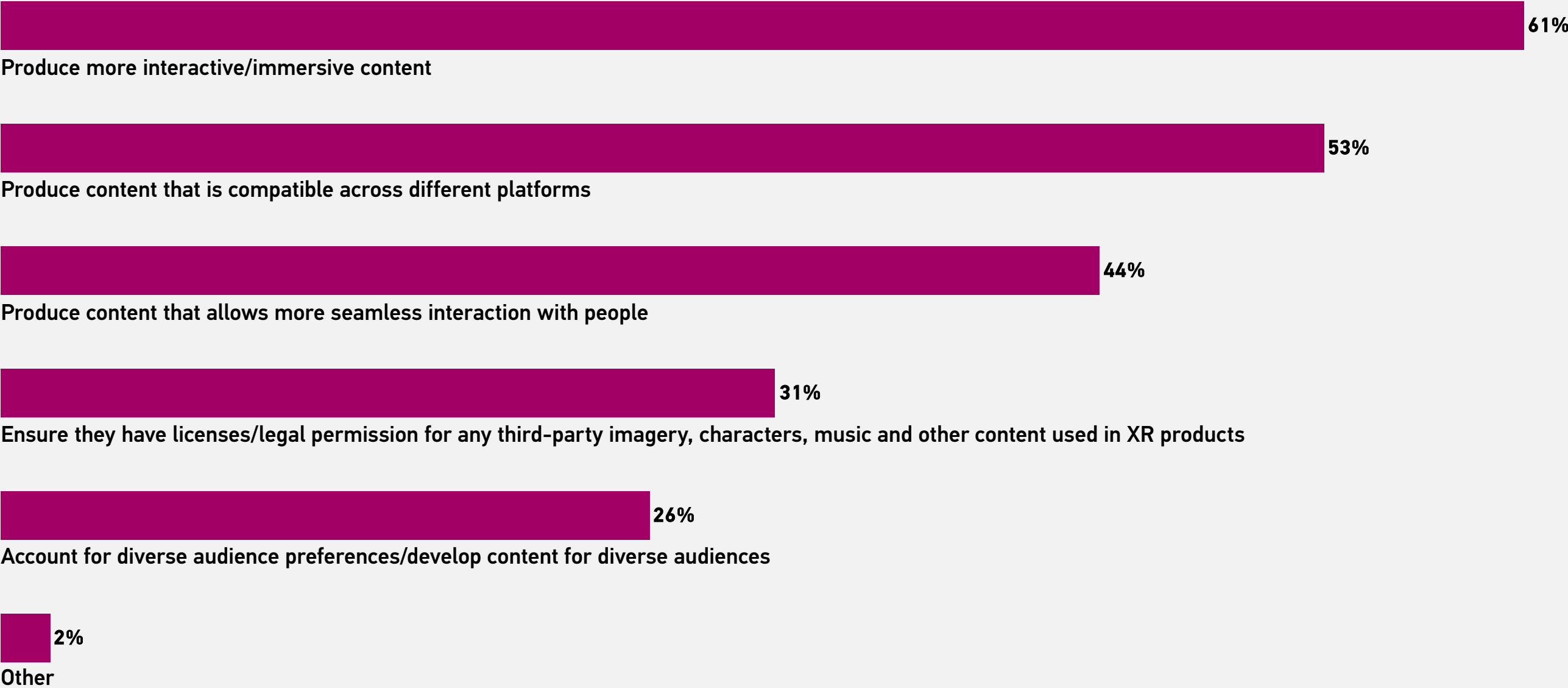
17%
of respondents say education is the most challenged industry by limited immersive technology content.

[RETURN TO PAGE 7: THINKING FROM MINORITY- AND FEMALE-OWNED COMPANIES](#)



ADDITIONAL FINDINGS

In which of the following ways, if any, can existing immersive technology content be improved across industries by content developers? Please finish this sentence with any statements that you believe are true:
Content developers should _____. (Select all that apply)



61%
of respondents think content developers should produce more interactive and immersive content.

[RETURN TO PAGE 6: HOW CAN IMMERSIVE CONTENT IMPROVE?](#)

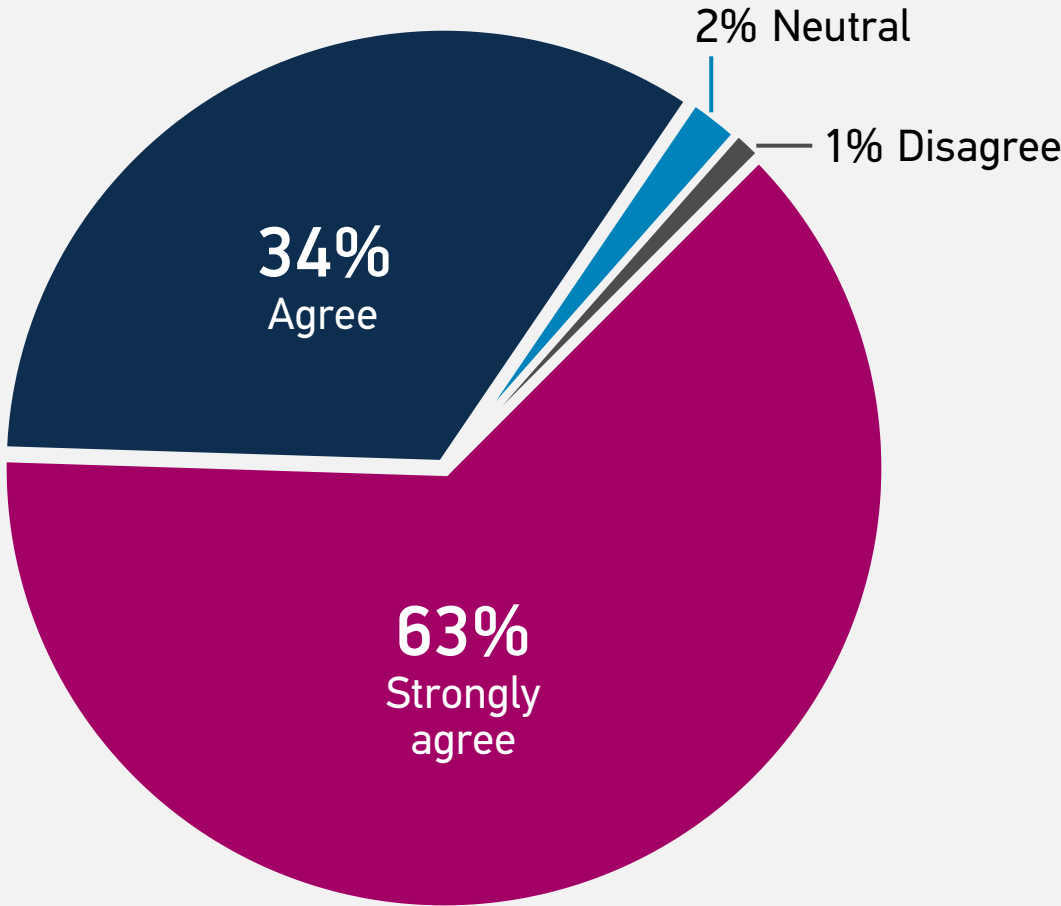


ADDITIONAL FINDINGS

63%

of respondents strongly agree that immersive technology will contribute to significant advancements in education over the next five years.

To what extent do you agree with this statement: Immersive technology will contribute to significant advancements in education over the next five years. (Select one option)



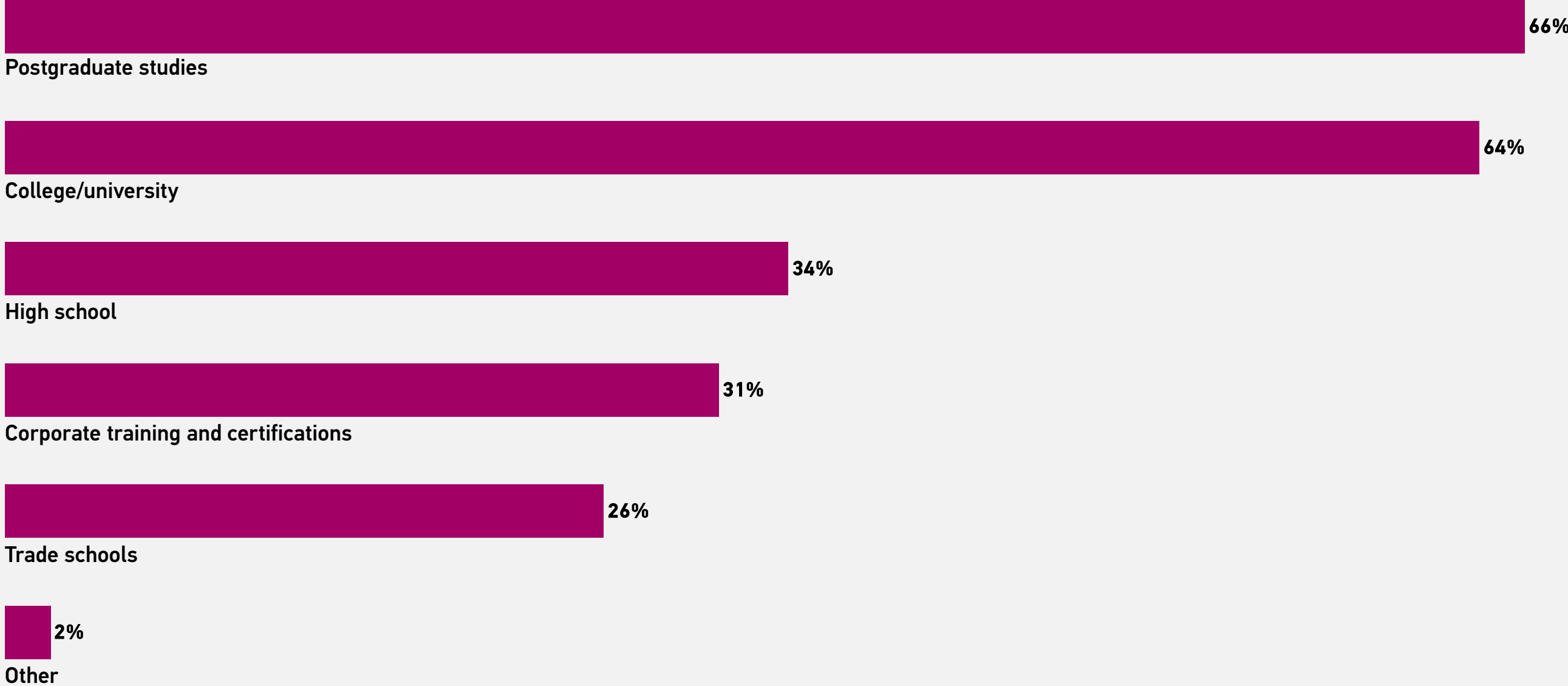
[RETURN TO PAGE 11: SPOTLIGHT: EDUCATION](#)



ADDITIONAL FINDINGS

66%
of respondents think postgraduate studies will benefit most from advancements in AR and VR technologies.

Which age groups/types of education will benefit most from these advancements?
This includes the use of AR and VR technologies for adults, in terms of job training or academic applications, and experiences such as virtual field trips. (Select all that apply)



[RETURN TO PAGE 11: SPOTLIGHT: EDUCATION](#)

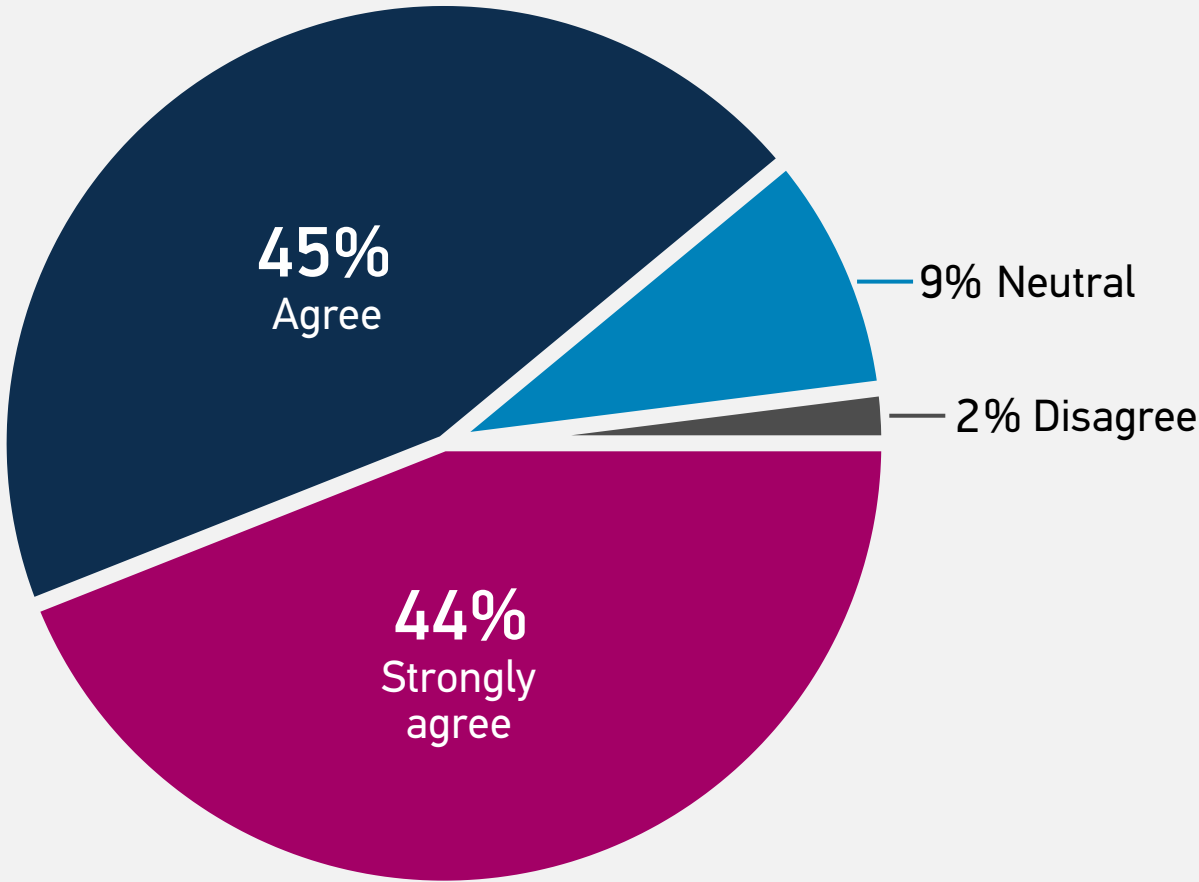


ADDITIONAL FINDINGS

“As the power of AR interactivity for branding, advertising and, increasingly, purchasing, becomes more widely understood, I think we’ll see an XR retail boom.”

— Top officer, network equipment manufacturer

To what extent do you agree with this statement:
Retail and fashion represent a great opportunity for immersive technology. (Select one option)



[RETURN TO PAGE 12: SPOTLIGHT: FASHION AND RETAIL](#)

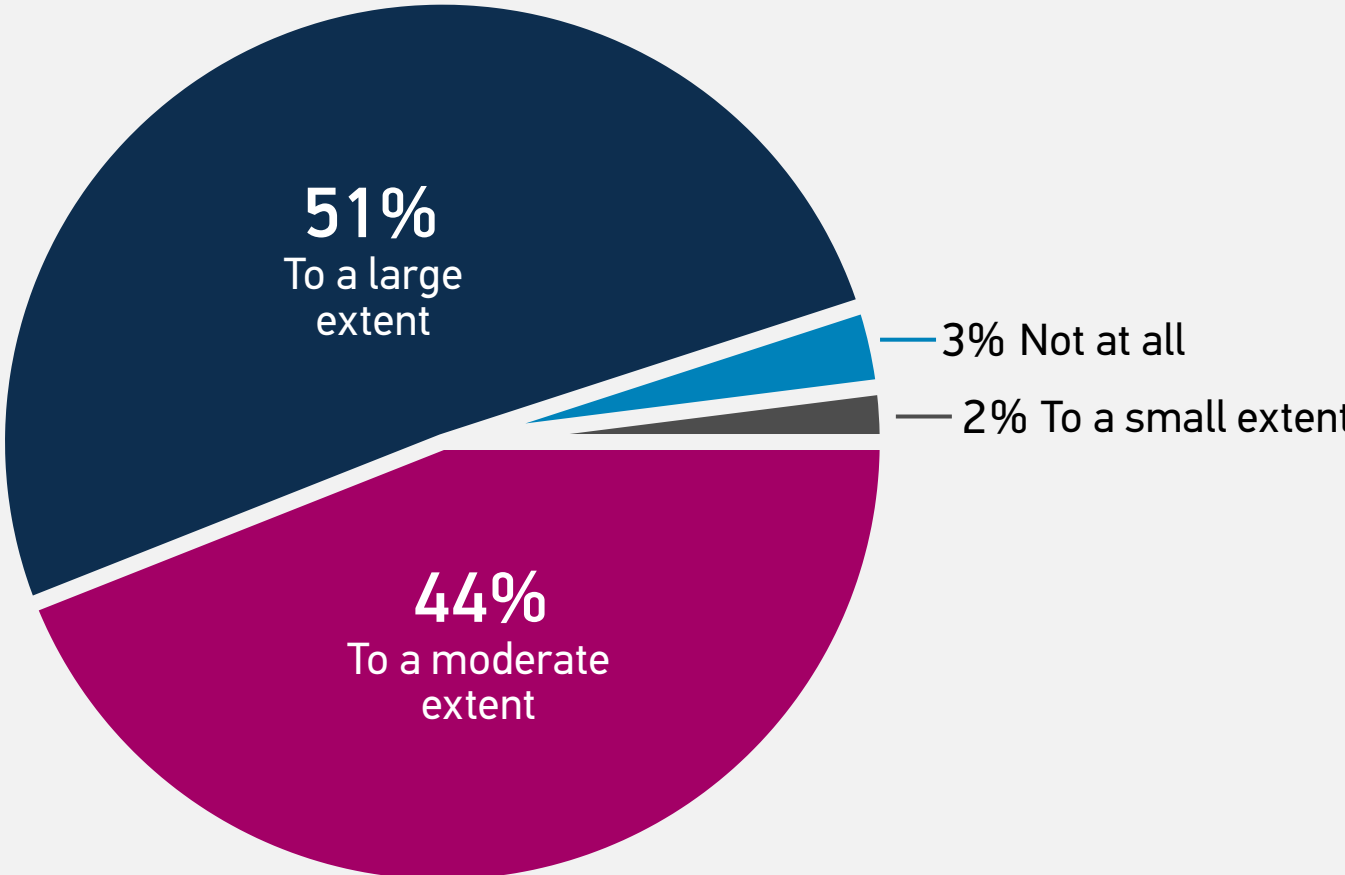


ADDITIONAL FINDINGS

“Job training not only saves money but also solves problems caused by the global pandemic while increasing employee competency.”

— Founder, XR design consultancy

In the next 12 months, to what extent does your organization plan to increase spending on immersive technology solutions for better remote collaborations and training? (Select one option)



[RETURN TO PAGE 4: STRONG OPTIMISM ABOUT IMMERSIVE TECHNOLOGY](#)

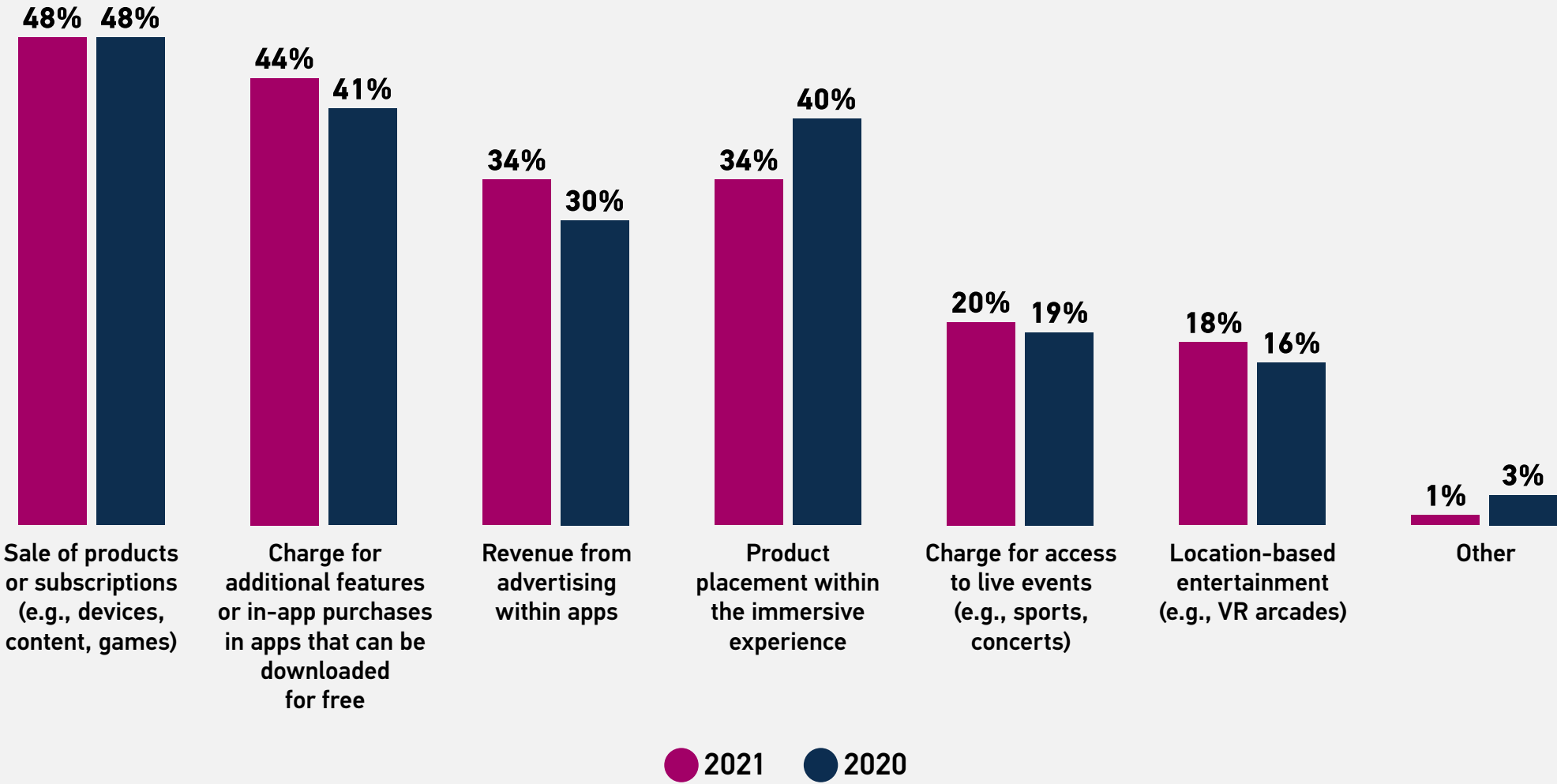


ADDITIONAL FINDINGS

“Sales of products and in-app purchases are going to reign supreme with the growing consumer market that has been helped by COVID-19 quarantine restrictions.”

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In which of the following ways do you plan to diversify monetization strategies for immersive technology after the pandemic? (Select all that apply)

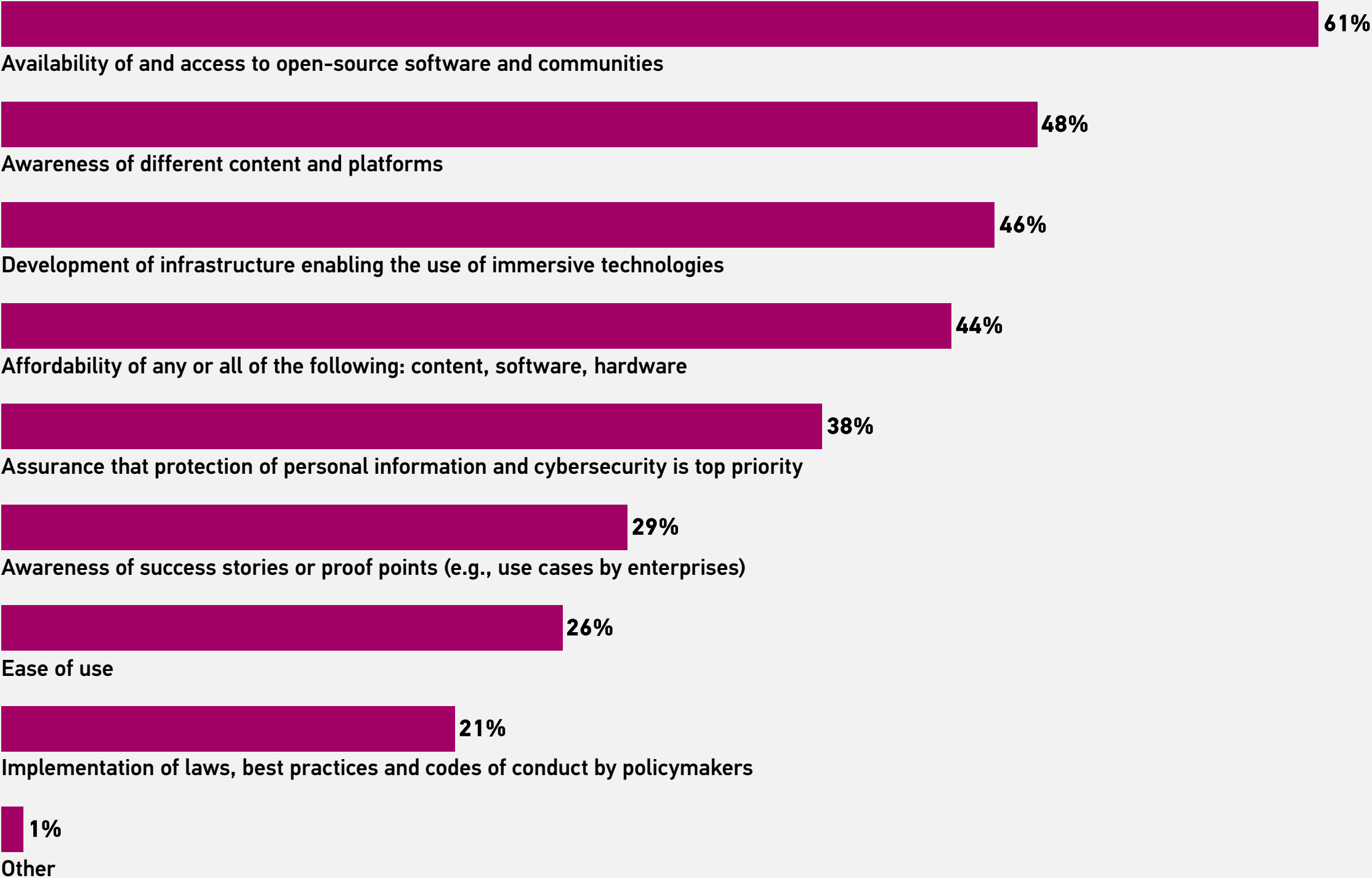


ADDITIONAL FINDINGS

“Open source is vital so that small companies can flourish along with the big ones.”

— Top officer, network equipment manufacturer

Which factors are key in increasing the adoption of immersive technology by consumers? (Select all that apply)



[RETURN TO PAGE 5: THE ROAD TO MASS ADOPTION](#)

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Yet far from upending the industry's momentum of the past half-decade, the pandemic's effects—namely, forcing millions of people to stay in their homes for months—seem to have strengthened immersive technology's prospects. Its use in some sectors like healthcare, education, retail and workforce development and training understandably increased, and after a year of living and working on Zoom and Teams, consumers are more comfortable than ever with online and virtual experiences.

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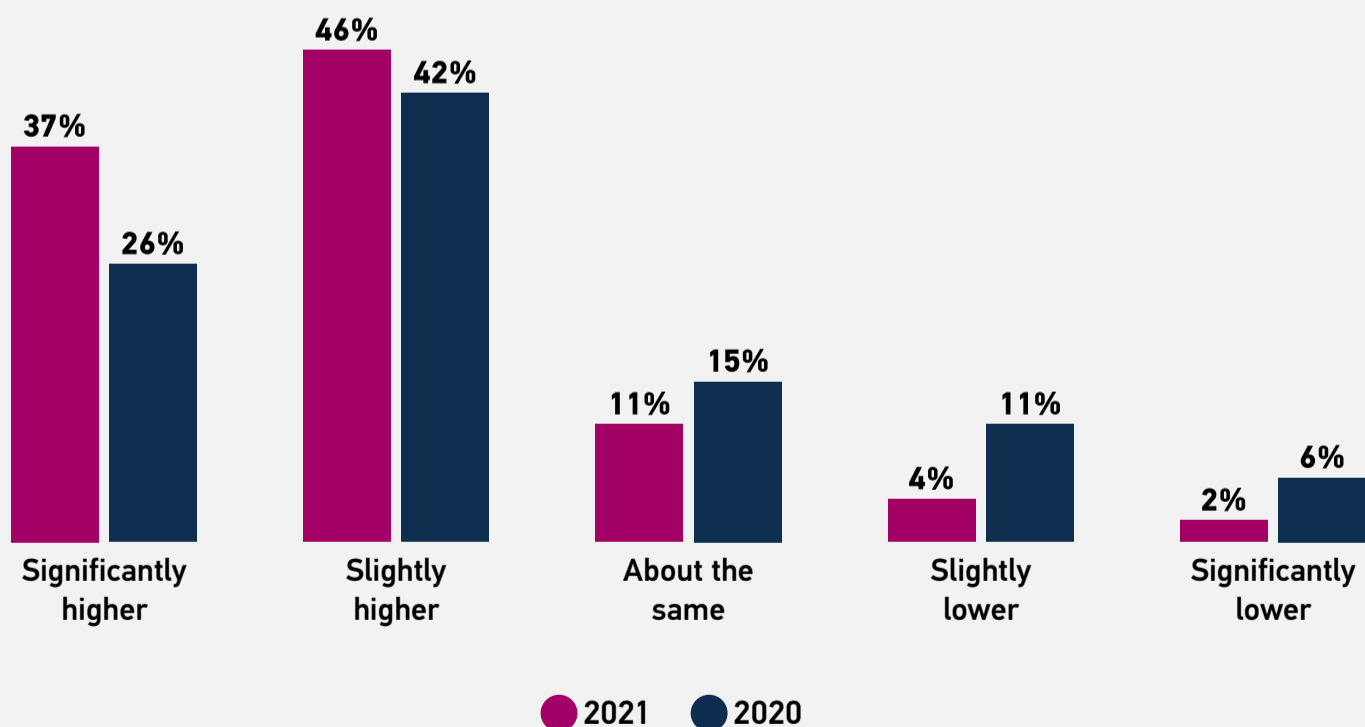
— Founder of creative agency specializing in immersive technology

As in previous years, respondents in 2021 are bullish about the prospects of immersive technology, with more than 8 in 10 predicting an increased pace of investment. That's higher than 2020's survey, which was conducted just before the outbreak of the pandemic, and this year's survey found a notable uptick in the proportion of respondents who expect a significantly higher pace of investment (37% in 2021 compared with 26% in 2020).

The optimism should be considered with an understanding of the impact of the pandemic—"COVID-19 has been an accelerant for digital transformation overall and certainly XR is a component of that," noted the co-founder of a leading augmented reality platform and creative studio. That bears out in the numbers. Even with all of 2020's problems, it was the second-highest year on record as far as total value of deals in the augmented and virtual reality sectors, exceeding \$5.2 billion, according to PitchBook. That was down from \$7.7 billion in 2019 but higher than \$4.8 billion in 2018, though the trend of fewer total deals that began in 2019 continued.

Optimism around immersive technologies is higher for some industries, often related to habits established during the pandemic or behavior expected once consumers are no longer stuck at home. The remote work revolution is also having an effect, with 95% of respondents saying their organization plans to increase spending on [immersive technology for better remote collaborations and training](#).

What do you believe the pace of investment by businesses in immersive technologies will be in 2021 as compared to 2020? (Select one option)



THE ROAD TO MASS ADOPTION

65% of respondents say user experience is the top barrier to greater adoption of XR.

Respondents said the adoption of immersive technologies at the enterprise and consumer levels hinges on access to software. Half said [development of more accessible* software](#) to meet the needs of all users will be the biggest driver of enterprise adoption, but respondents also thought infrastructure enabling the use of immersive technology (44%) and government funding of research and development (40%) are important. Regarding consumer adoption, respondents listed availability of and access to open-source software and communities (61%), awareness of different content and platforms (48%) and development of infrastructure that enables the use of immersive technology (46%) as the biggest drivers.

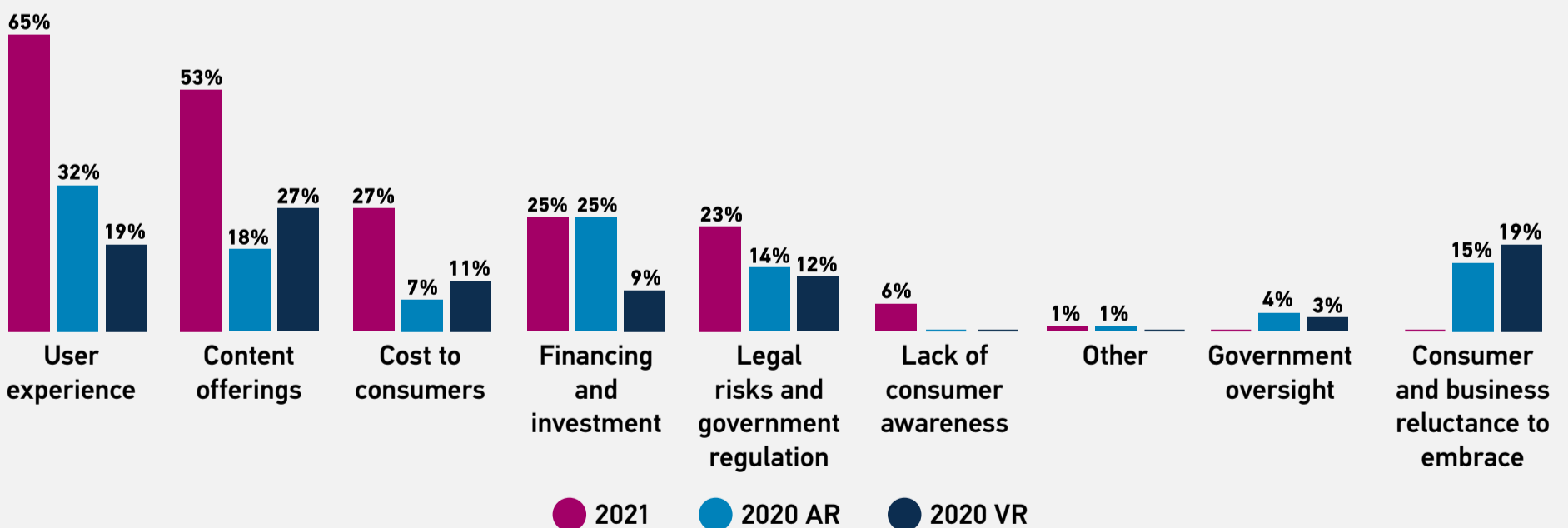
This shows immersive technologies continue on the path to mass adoption, but that challenges remain. Similar to previous years, 65% of respondents said user experience is the top barrier to greater adoption, while content offerings (53%) and costs to consumers (27%) are other hurdles.

Respondents' monetization strategies largely aligned with their plans before the pandemic, with at least one managing director of a leading consulting firm saying there is not enough focus on enterprise products given COVID-19's lasting impacts on workplaces. Others see clear daylight in the consumer space: "Sales of products and in-app purchases are going to reign supreme with the growing consumer market that has been helped by COVID-19 quarantine restrictions," said the founder of a creative agency specializing in immersive technology.

* 'Accessible' as mentioned in the survey did not specifically refer to open-source software or software built for persons with disabilities.

Survey Question 2021: What are the top barriers to mass adoption of immersive technology (outside of gaming and entertainment)? (Select all that apply)

Survey Question 2020: What is the biggest obstacle to mass adoption of AR and VR technologies? (Select one for each technology)



HOW CAN IMMERSIVE CONTENT IMPROVE?

61% of respondents think developers should produce more interactive and immersive content.

When asked how to improve existing immersive technology content, most respondents (61%) said [developers should focus on making it more interactive/immersive](#). Respondents also want content that is compatible across different platforms (53%) with more seamless interactions with other users (44%). “All industries will need new, easy-to-access and build content,” said the global head of a virtual reality division of a major tech company, adding that the industry is “still early stages for content.”

Part of the problem appears to stem from a disconnect about what is considered compelling for consumers.

Sixty-four percent of respondents said consumers don’t understand or are not aware of where or how to find compelling content, while 54% said developers don’t understand what makes content compelling from a consumer standpoint. To bridge this gap, developers should work hard to listen to—and educate—consumers, perhaps through better research methods and marketing campaigns.

To what extent do you agree with these statements?

Developers don’t understand what makes for compelling content from the consumer standpoint.



Consumers don’t understand or are not aware of where/how to find compelling content.



THINKING FROM MINORITY- AND FEMALE-OWNED COMPANIES

70% of respondents from minority-owned companies believe content is not interactive or immersive enough.

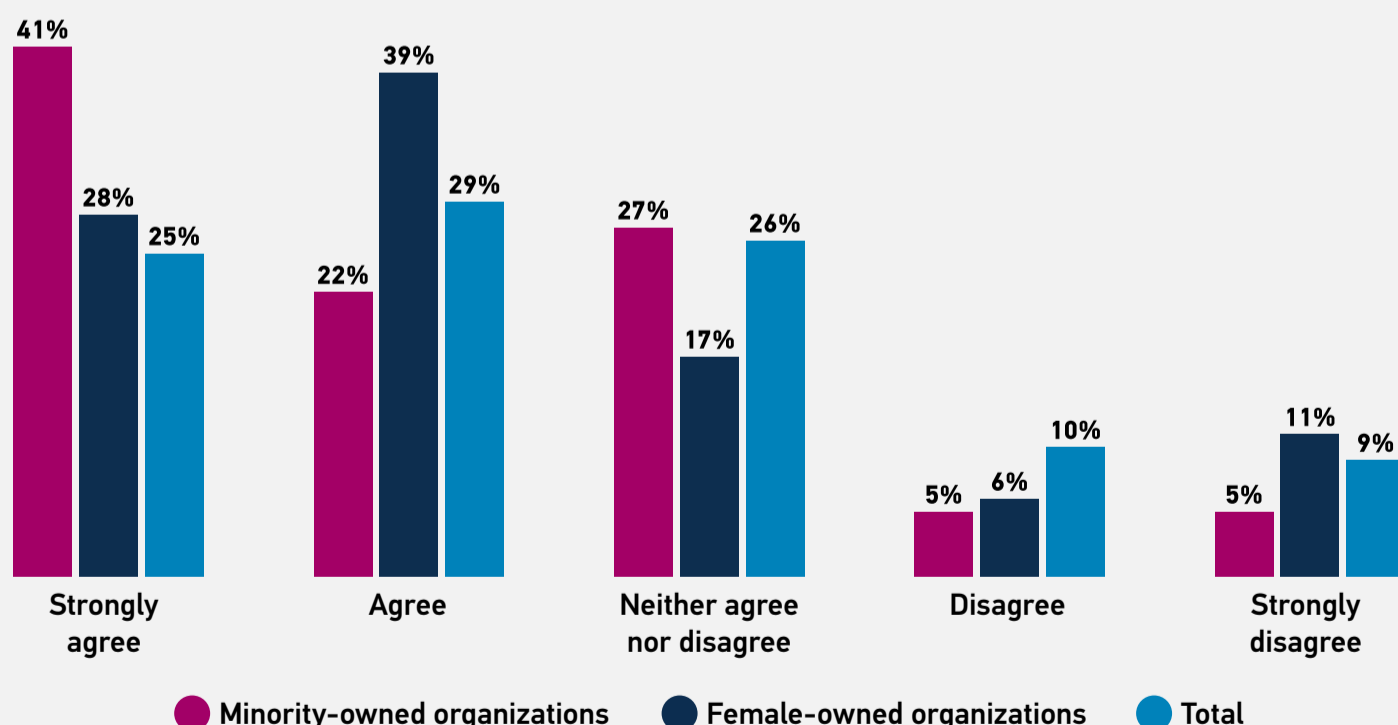
We didn't set out to query particular demographics in this year's survey. But something interesting happened anyway. Six in 10 respondents identified as working for a minority-owned company or a female-owned company or both.

This might validate some anecdotal evidence that the industry is becoming more diverse, but respondents from these groups clearly differ when compared with our general survey pool: Most notably, they're even more convinced that developers don't understand what makes content compelling for consumers. Those from minority-owned companies were more likely to strongly agree that developers don't understand this, while respondents from women-owned businesses were more likely to agree or strongly agree with the statement.

For respondents from minority-owned companies, existing content is especially lacking when it comes to being interactive and immersive. Seventy percent of them answered that way, compared with 61% overall. Meanwhile, 21% of respondents from female-owned companies think educational content is lacking ([compared with 17 percent overall](#)) even though they think the pandemic has affected the use of immersive technology in education more than any other sector except marketing and advertising (the full survey pool chose healthcare).

Finally, there are key differences when it comes to the government's role. Fifty-one percent from minority-owned businesses said strong antitrust laws would increase development and adoption of immersive technology at the enterprise level, compared with 38% overall. Fifty-five percent of respondents from women-owned businesses pointed to government funding and research development, compared with 40% overall.

To what extent do you agree with this statement? Developers don't understand what makes for compelling content from the consumer standpoint.



GOVERNMENT OVERSIGHT INSIGHTS

“ I don't think we need governmental regulations as much as we need a central standards body that can establish ground rules for all. ”

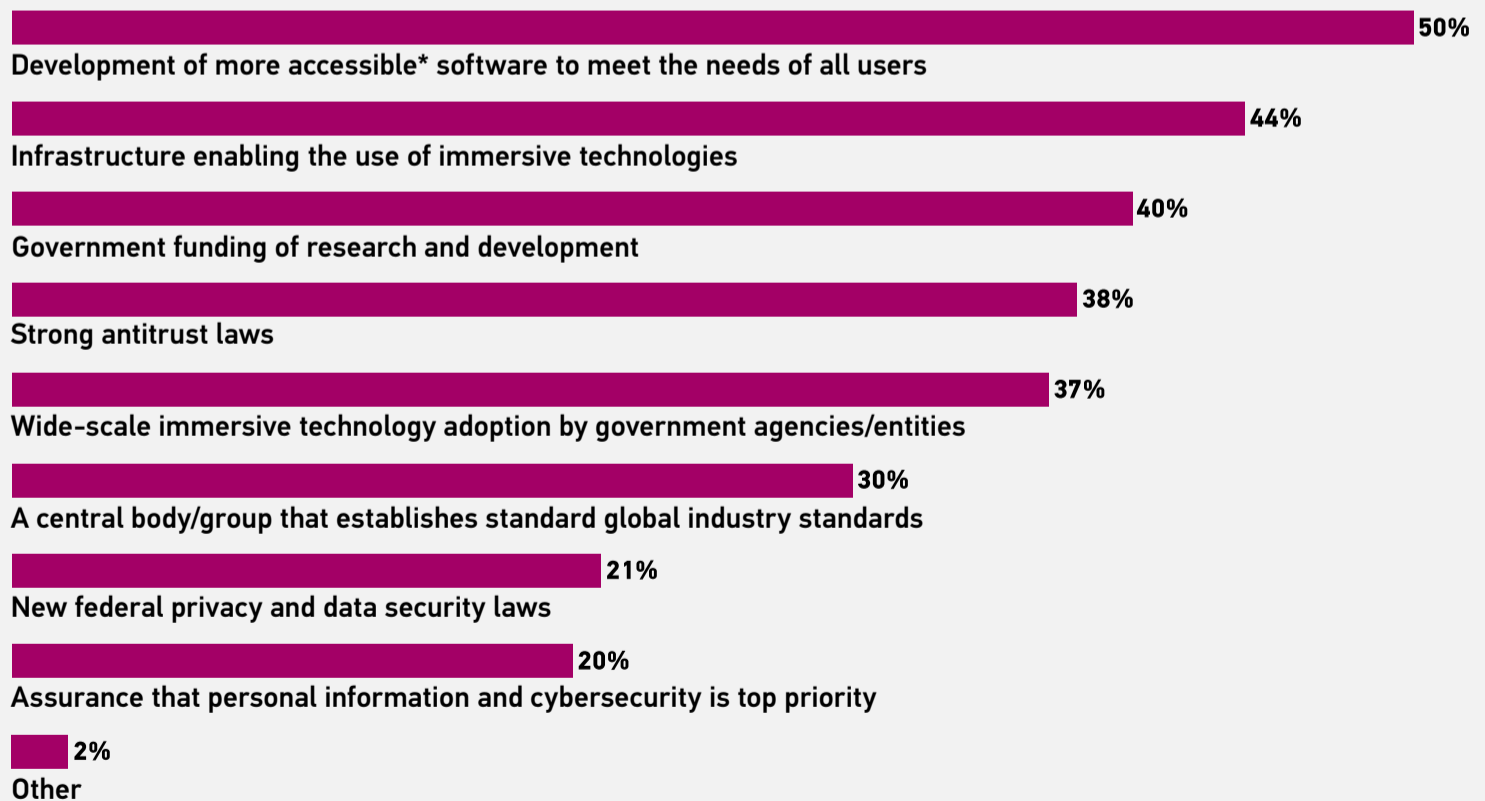
— Head of ecosystem and trend scouting, network equipment manufacturer

Governmental oversight wasn't a top concern for respondents, but it is a significant issue around immersive technology's mass adoption. Many respondents pointed to strong antitrust laws and federal privacy and data security laws as important for enterprise adoption, and about 1 in 5 said policymakers implementing best practices and codes of conduct would influence [greater consumer adoption](#).

Relatedly, a central body or group that establishes global and industry standards was seen as important by about a third of respondents. One expert, who leads VR for a major computer and hardware company, said the industry needs “clearer privacy and understanding of what information the providers are tracking, holding, sharing and selling.”

Some experts stressed additional government funding for XR, but others want government to play a less active role. “I have more faith in the private sector to drive adoption and create real use cases than central government,” said the co-founder and CEO of an XR company. “Accessing government funding for these initiatives can also be hugely time-consuming and onerous and is an art in its own right. But understanding where XR can help central initiatives for government at scale and encouraging best practices—I'd be all for that.” The sentiment tracks with what the technology industry writ large has struggled with—i.e., a desire to operate in a free market. But there is a growing body of evidence that regulation may be needed, though it must be the result of a deliberative process that arises as the industry works to educate lawmakers.

**Which factors are key in increasing the development and adoption of immersive technology by enterprises?
(Select all that apply)**



* 'Accessible' as mentioned in the survey did not specifically refer to open-source software or software built for persons with disabilities.



PANDEMIC'S EFFECT ON IMMERSIVE HEALTHCARE

“Healthcare is an area where applications seem to spring up, starting with doctors who can make house calls via tablets.”

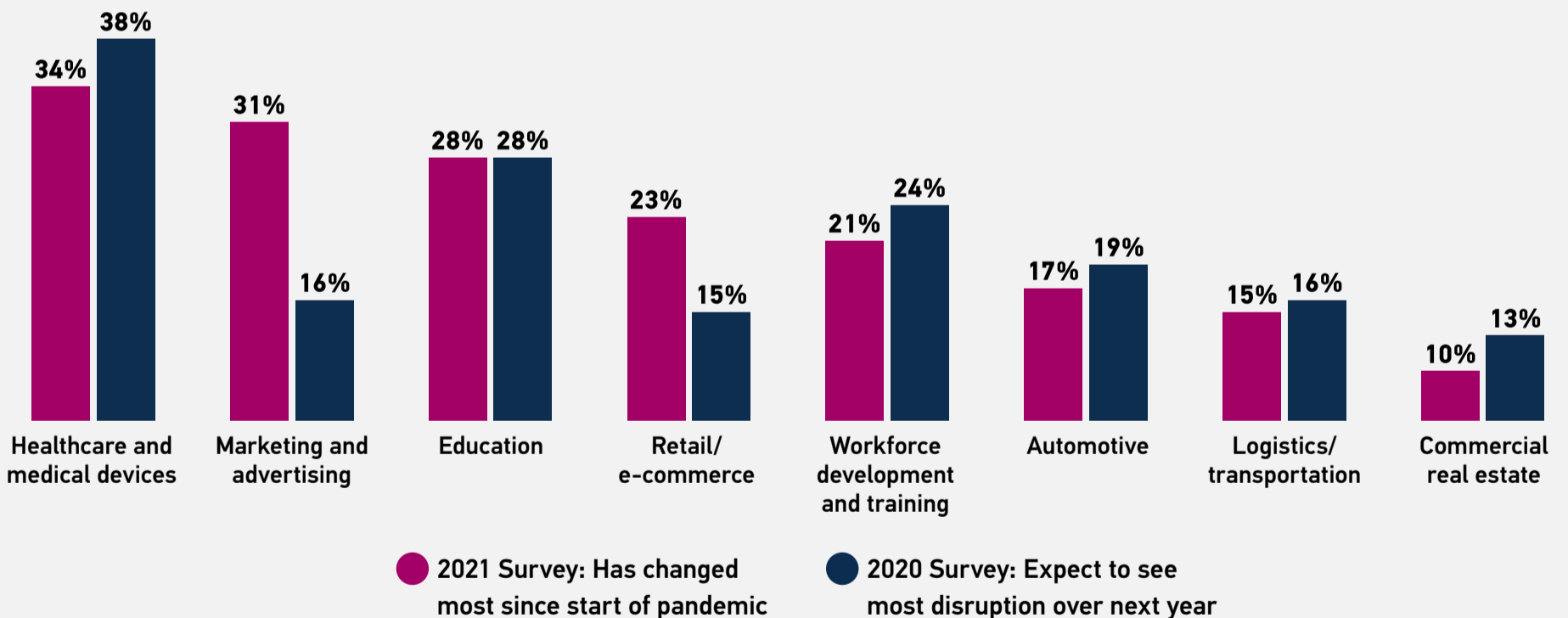
— Chief legal officer of a major technology company

When asked in January 2020, respondents said healthcare was the sector most primed for disruption by immersive technology. But no one who answered that way could have known how prescient COVID-19 was about to make them. “Healthcare is an area where applications seem to spring up, starting with doctors who can make house calls via tablets,” said the chief legal officer of a major technology company. Immersive “applications could become much more common in the healthcare space and extended to healthcare consumers.”

This year, while healthcare topped the list of sectors (outside of gaming and entertainment) that respondents think will be most affected by the pandemic, marketing and advertising wasn't far behind—even though it wasn't an area in which respondents expected much disruption pre-pandemic.

Survey Question 2021: In which sectors (outside of the gaming and entertainment space) has the use of immersive technology most changed since the outbreak of the pandemic? (Select all that apply)

Survey Question 2020: In which sectors (outside of the gaming and entertainment space) do you expect to see the most disruption by immersive technologies in the next 12 months? (Select all that apply)



OPTIMISM IN OTHER SECTORS

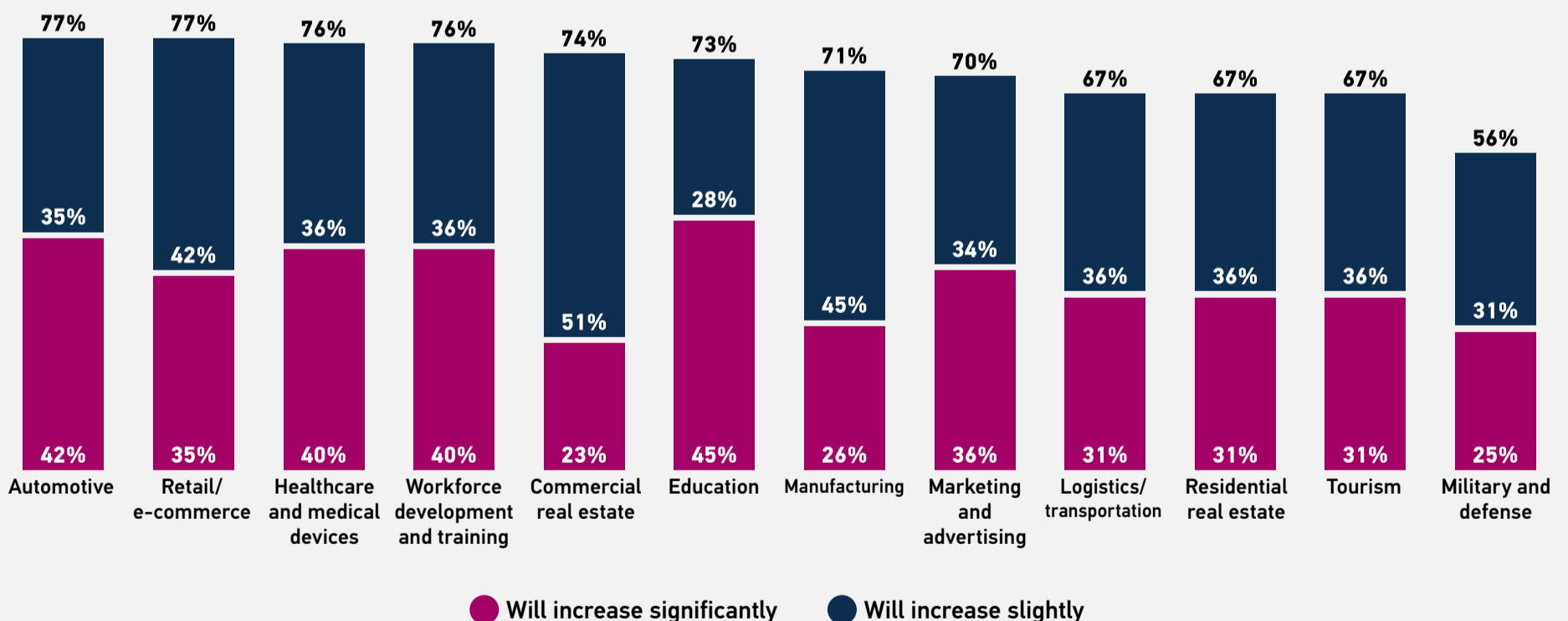
45% of respondents say immersive technology's use in education will increase significantly in the next year.

There are two broad categories for how consumers are expected to change their use of immersive technologies that appear tied to COVID-19. The first category is what consumers are expected to do as and after the pandemic draws to a close. After being stuck at home for most of the past year, respondents appear to expect consumers to hit the road in the coming months—and use immersive technology to buy cars. Indeed, auto sales are quite strong so far this year, with demand being driven by stimulus checks and continued concerns about mass transit.

But consumers and whole sectors also might continue doing things in ways that the pandemic proved possible, maybe even convenient. That would explain the expected high use of immersive technology in retail, workforce development and training and, importantly, education. That latter category was the one that respondents said would increase most significantly in the next year.

“Overall, 2020, despite the economic downturn, was an accelerant for XR,” said the co-founder and CEO of an XR company. “And with a rising tide of technologies increasing its capabilities across the board, we’re going to see this become more of a mainstay for brands and businesses across sectors.”

How do you believe each of the following sectors will fare in terms of immersive technology usage as we emerge from the pandemic/over the next year (April 2021 to April 2022), compared with the previous year? (Select one for each sector)



SPOTLIGHT: EDUCATION

97% of respondents agree that immersive technology will contribute to significant advancements in education through 2026.

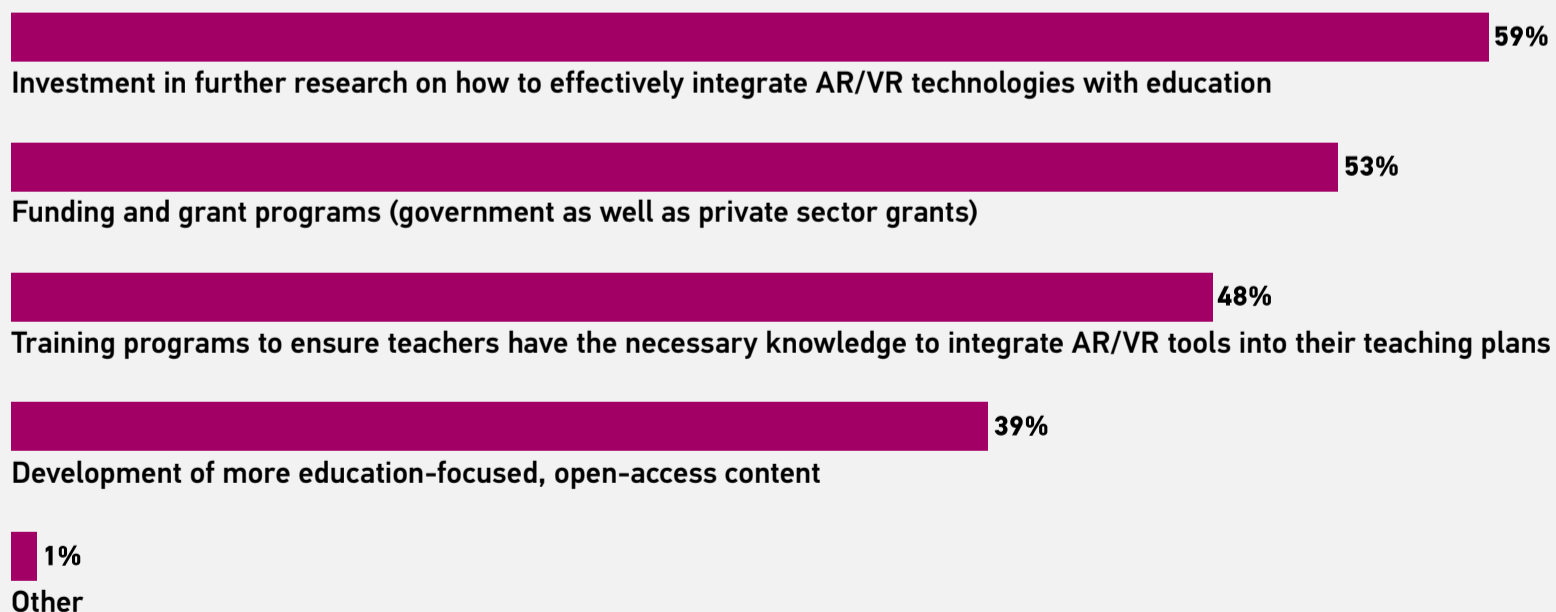
Nearly all (97%) respondents agreed that immersive technology will [contribute to significant advancements in education](#) through 2026—with over half (63%) strongly agreeing. Clearly, the pandemic has proven how immersive technology can help make education more engaging and interactive by creating real-world simulations and field trips. But respondents also said that education was the industry most challenged by a lack of immersive content (though at a low percentage of 17%).

Fifty-nine percent of respondents said investment in further research is needed to efficiently integrate AR/VR into education, while 53% said funding and grant programs—from both government and the private sector—were essential. These findings align with data from a [survey](#) conducted by XRA in September of 2020, in which respondents showed the lowest level of optimism about education when asked about the future for the use of immersive technology in various sectors. An assistant general counsel at a major technology company explained that some of the pessimism facing education in the past “comes from a lack of ‘hero experiences.’”

“Entertainment experiences have been clearly established,” the assistant general counsel said. “Education scenarios need investment and focus.”

Respondents reported postgraduate (66%) and college and university (64%) programs as the [most likely areas to benefit](#) most from advancements in immersive technology. Programs like the University of Maryland’s Institute for [Advanced Computer Studies](#) are making great strides in creating research projects that measure the impact of immersive technologies, as well as applying them to education, like the University of Michigan’s [efforts](#) to implement XR across different colleges.

Which of the following factors will support faster adoption of immersive technology in education? (Select all that apply)



SPOTLIGHT: FASHION AND RETAIL

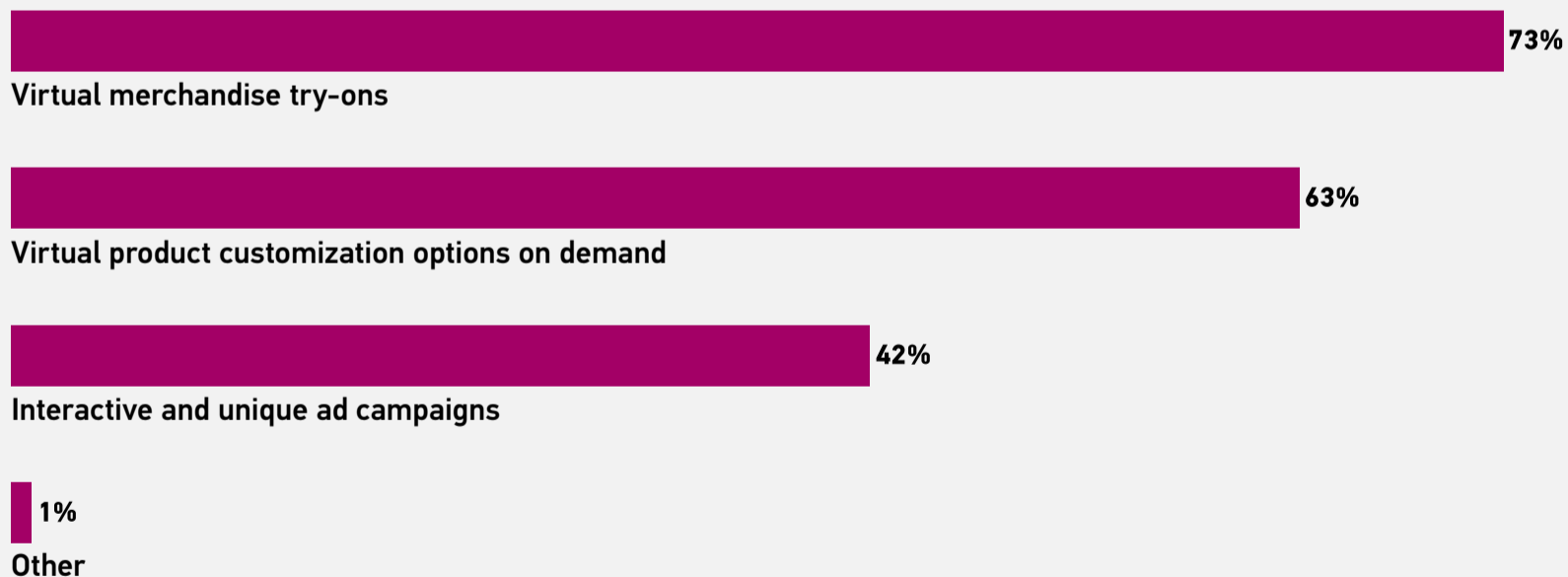
89% of respondents agree that fashion and retail present great opportunities for immersive technology.

Immersive experiences in retail—specifically, in the fashion space—are already increasing as a result of the pandemic. And that change appears to be more than a passing trend. Eighty-nine percent of respondents agreed that fashion and retail [represent great opportunities for immersive technology](#). When asked which solutions could have the most significant impact, 73% said virtual merchandise try-ons, 63% said virtual on-demand customization options and 42% said interactive and unique ad campaigns.

“Brick-and-mortar shops have a sudden need to make digital catalogs and jump right to 3D instead of 2D graphics,” said a product management executive at a multinational software corporation. “However, there will still be those retailers who don’t sell through a catalog and rely on in-person comforts and a designed environment to represent their products [who] will come up with new and exciting experiences that go way beyond what we see today with 3D product shopping.”

Retailers like [Home Depot](#), [IKEA](#) and [Warby Parker](#) are getting into the game, as is high-end fashion designer Balenciaga, which used immersive technology to create an [immersive experience](#) for the brand’s winter show. Meanwhile, more day-to-day retail interactions are likely using immersive technology, solving the “will this jacket/dress/shirt/shoe, fit me” question, said a managing director of a leading consulting firm. “More accurate fittings—fewer returns. Happy customers, happy retailers. I’ve seen a few of these in action and they are close.”

With a shift in consumer shopping behavior caused by the pandemic, which of the following immersive technology solutions could have the most significant impact on retail and fashion? (Select all that apply)



METHODOLOGY AND DEMOGRAPHICS

Respondents identified their affiliation as:

C-Suite (79%)

Engineer/Producer (10%)

Marketing/Business Development Executive (2%)

Consultant/Lawyer (4%)

Senior Vice President/President (4%)

In February 2021, Perkins Coie and the XRA convened 20 leaders in the AR, VR and MR industry (collectively called XR) to take part in an online focus group regarding trends and developments as well as the outlook for the year ahead. Participants included executives from leading global software and technology firms in the consumer and enterprise space.

Key takeaways from those conversations were used to shape an online survey of 164 XR industry executives in April 2021. Respondents indicated they represented an organization best described as an established technology company (73%), a startup (15%), an advisor or an outside consultant (7%), investor (2%) or other (3%). There are two reasons why percentages may not add up to 100% in certain questions. First, In questions where multiple selections were possible, the number of responses may exceed the number of participants, thus adding up to more than 100%. Second, rounding issues in single-response questions may result in the total percentage equating to slightly more or slightly less than 100%.

About Perkins Coie LLP

Perkins Coie is a leading international law firm that is known for providing high value, strategic solutions and extraordinary client service on matters vital to our clients' success. With more than 1,200 lawyers in offices across the United States and Asia, we provide a full array of corporate, commercial litigation, intellectual property, and regulatory legal advice to a broad range of clients, including many of the world's most innovative companies and industry leaders as well as public and not-for-profit organizations. Perkins Coie's Immersive Technology (AR/VR/XR) vertical, which is a part of the newly launched and reimagined Digital Media & Entertainment, Gaming, and Sports (DMEGS) Industry Group, advises pioneers of XR technology building immersive worlds for gaming, education, healthcare, and beyond. Embracing an "all in" commitment to the industry, our attorneys counsel market leaders in immersive technology, products, services, and content. The DMEGS Industry Group is meeting the business and legal needs of our clients by focusing on and leveraging the firm's collective experience in the transformative convergence of the digital media and digital entertainment, gaming, and sports industries.

About XR Association

The XR Association promotes the dynamic global growth of the XR industry, which includes virtual reality, augmented reality, mixed-reality, and future immersive technology. XRA is leading the way for the responsible development and adoption of XR by convening stakeholders, developing best practices and research, and advocating on behalf of our members and the greater XR industry.

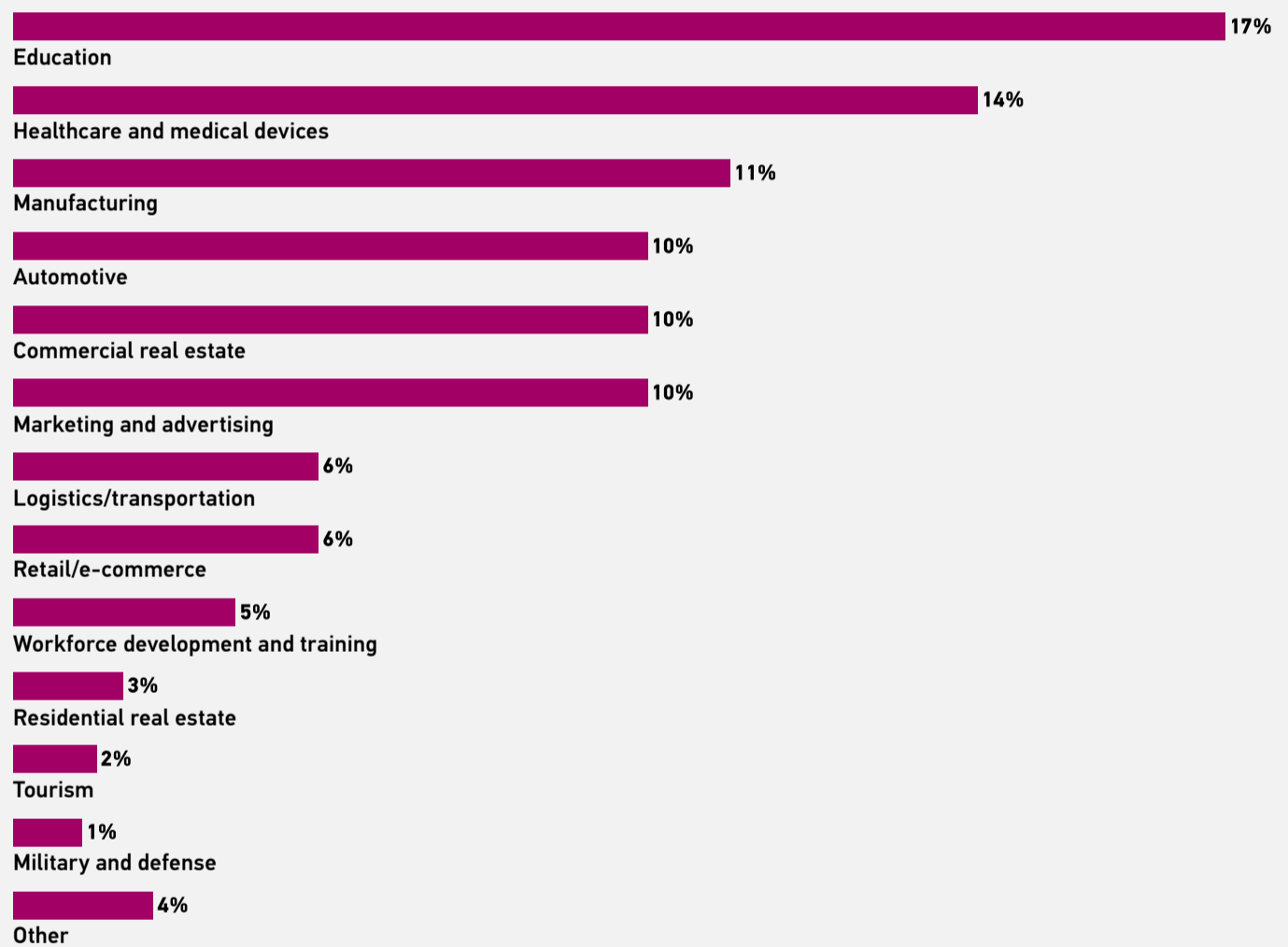
The XR Association represents the broad ecosystem of the XR industry including headset manufacturers, technology platforms, component and peripheral companies, internet infrastructure companies, enterprise solution providers, and corporate end-users. The founders of XRA are Google, HTC Vive, Microsoft, Oculus from Facebook, and Sony Interactive Entertainment. To learn more about XRA membership, visit xra.org/joinus.



ADDITIONAL FINDINGS

17%
of respondents say
education is the
most challenged
industry by
limited immersive
technology content.

Which of the following industries, in your opinion, is most challenged by limited immersive technology content? (Select one option)



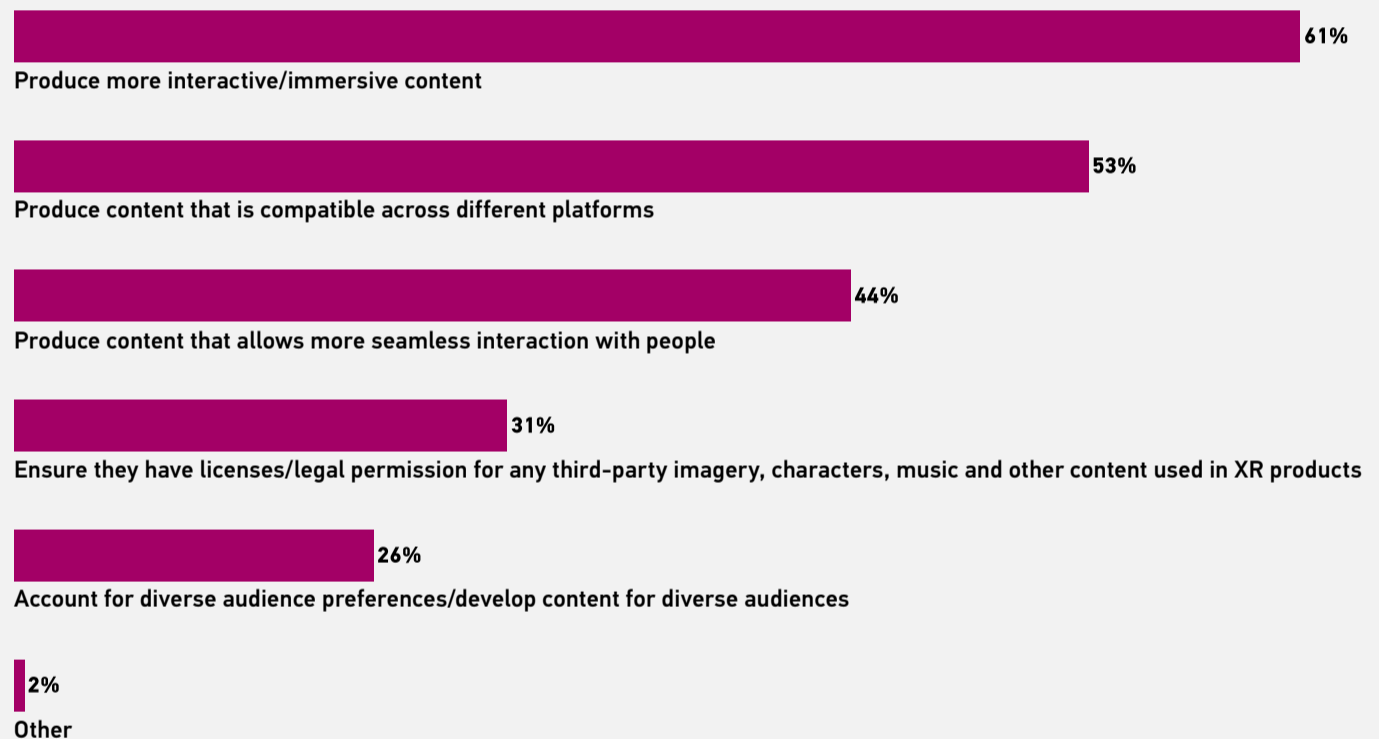
[RETURN TO PAGE 7: THINKING FROM MINORITY- AND FEMALE-OWNED COMPANIES](#)



ADDITIONAL FINDINGS

61%
of respondents
think content
developers should
produce more
interactive and
immersive content.

In which of the following ways, if any, can existing immersive technology content be improved across industries by content developers? Please finish this sentence with any statements that you believe are true:
Content developers should _____. (Select all that apply)



[RETURN TO PAGE 6: HOW CAN IMMERSIVE CONTENT IMPROVE?](#)

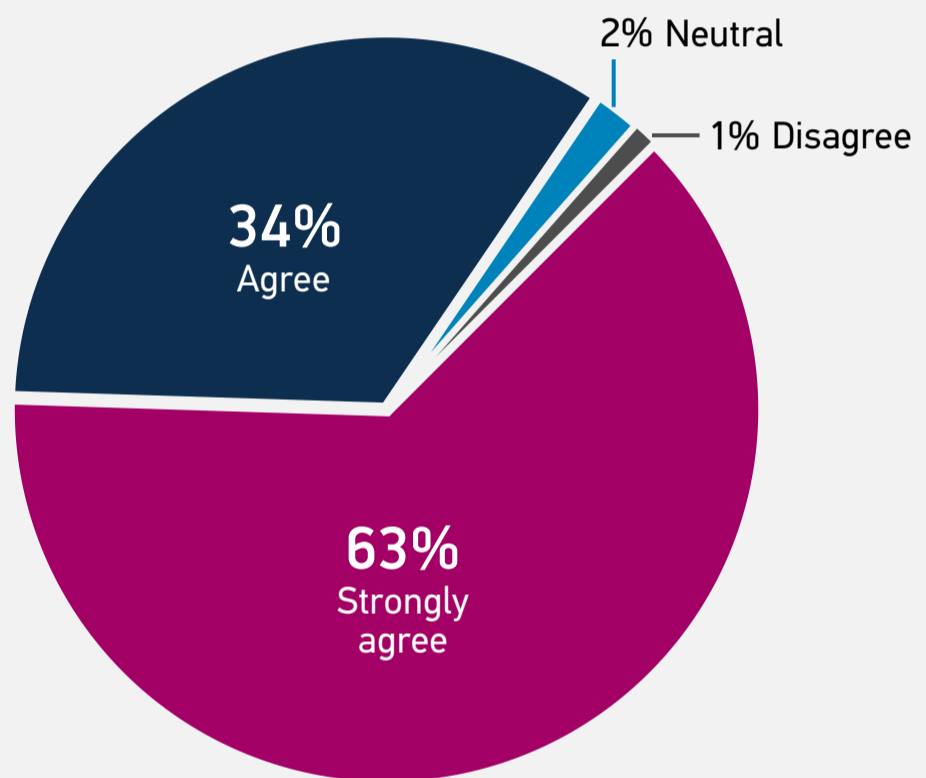


ADDITIONAL FINDINGS

63%

of respondents strongly agree that immersive technology will contribute to significant advancements in education over the next five years.

To what extent do you agree with this statement: Immersive technology will contribute to significant advancements in education over the next five years. (Select one option)



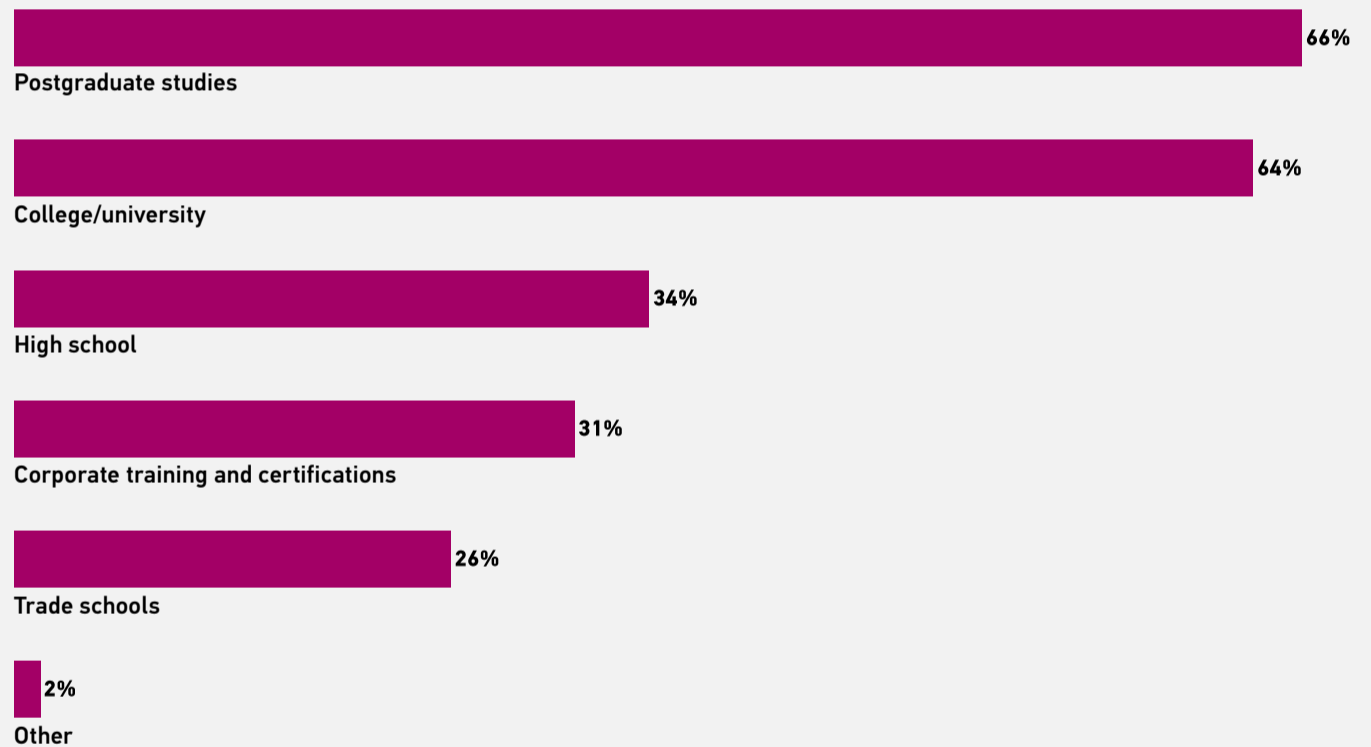
[RETURN TO PAGE 11: SPOTLIGHT: EDUCATION](#)



ADDITIONAL FINDINGS

66%
of respondents
think postgraduate
studies will
benefit most from
advancements
in AR and VR
technologies.

Which age groups/types of education will benefit most from these advancements? This includes the use of AR and VR technologies for adults, in terms of job training or academic applications, and experiences such as virtual field trips. (Select all that apply)



[RETURN TO PAGE 11: SPOTLIGHT: EDUCATION](#)

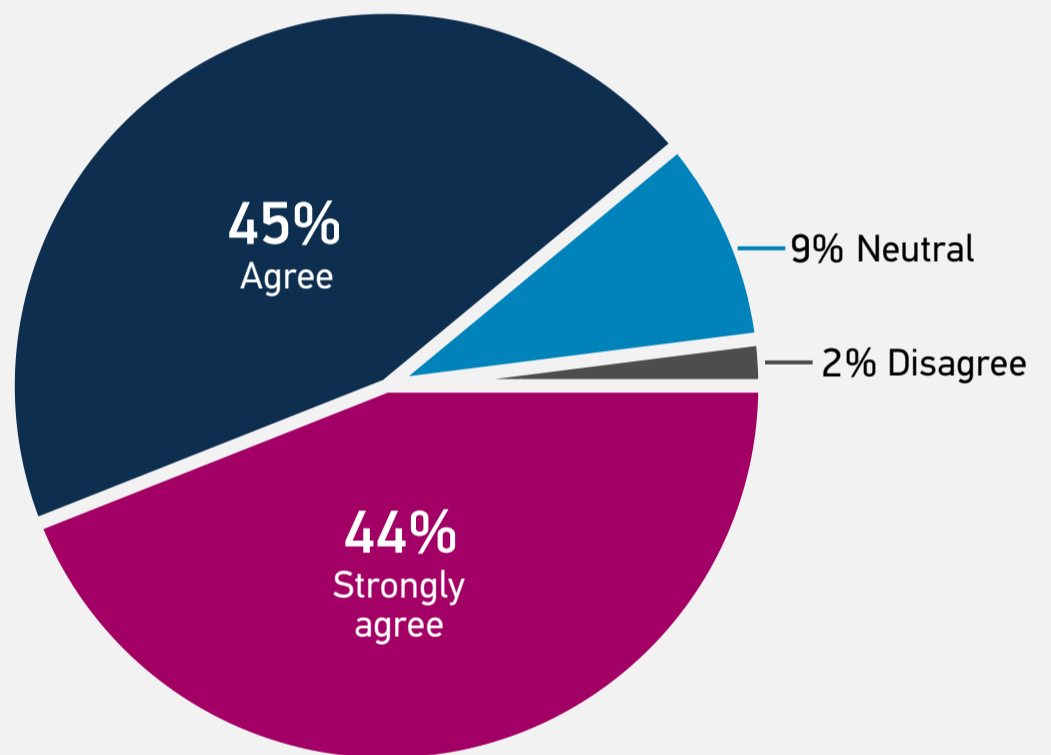


ADDITIONAL FINDINGS

“As the power of AR interactivity for branding, advertising and, increasingly, purchasing, becomes more widely understood, I think we’ll see an XR retail boom.”

— Top officer, network equipment manufacturer

To what extent do you agree with this statement: Retail and fashion represent a great opportunity for immersive technology. (Select one option)



[RETURN TO PAGE 12: SPOTLIGHT: FASHION AND RETAIL](#)

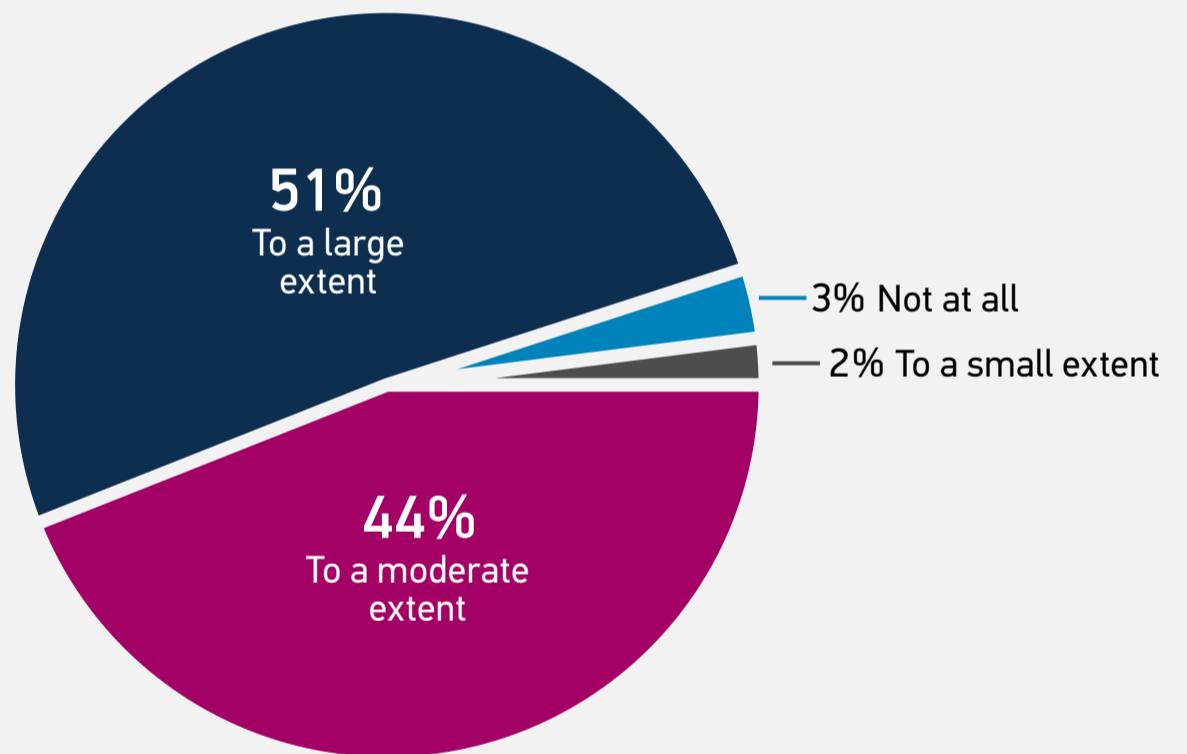


ADDITIONAL FINDINGS

“Job training not only saves money but also solves problems caused by the global pandemic while increasing employee competency.”

— Founder, XR design consultancy

In the next 12 months, to what extent does your organization plan to increase spending on immersive technology solutions for better remote collaborations and training? (Select one option)



[RETURN TO PAGE 4: STRONG OPTIMISM ABOUT IMMERSIVE TECHNOLOGY](#)

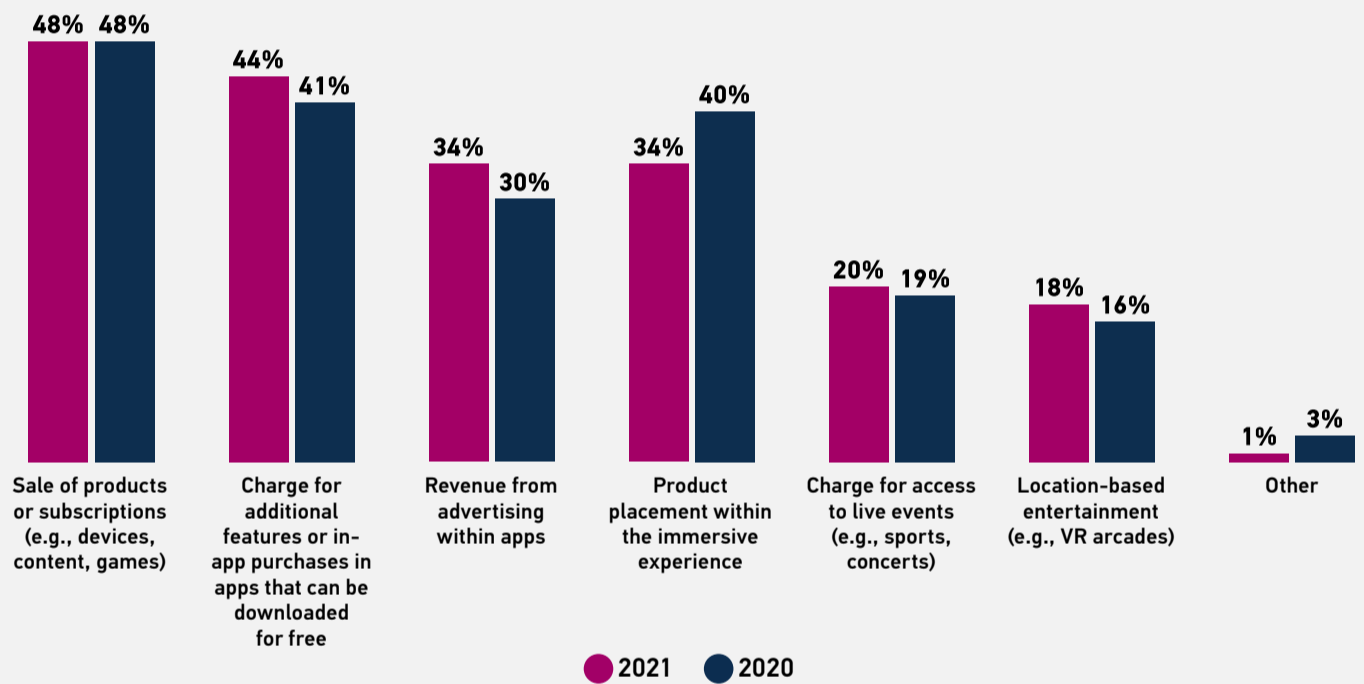


ADDITIONAL FINDINGS

“Sales of products and in-app purchases are going to reign supreme with the growing consumer market that has been helped by COVID-19 quarantine restrictions.”

— Founder, XR design consultancy

In which of the following ways do you plan to diversify monetization strategies for immersive technology after the pandemic? (Select all that apply)

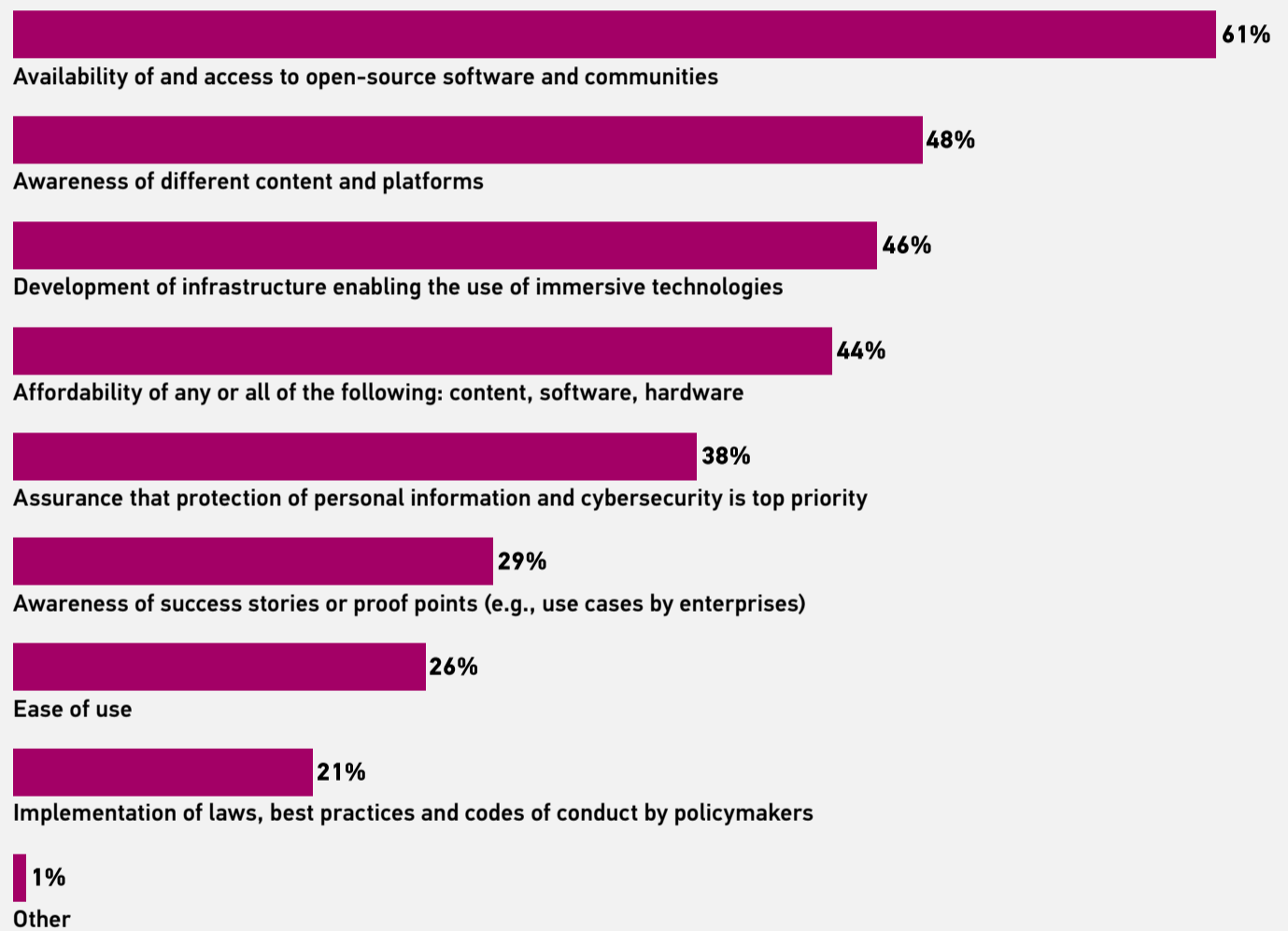


ADDITIONAL FINDINGS

“Open source is vital so that small companies can flourish along with the big ones.”

— Top officer, network equipment manufacturer

Which factors are key in increasing the adoption of immersive technology by consumers? (Select all that apply)



[RETURN TO PAGE 5: THE ROAD TO MASS ADOPTION](#)

[RETURN TO PAGE 8: GOVERNMENT OVERSIGHT INSIGHTS](#)



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