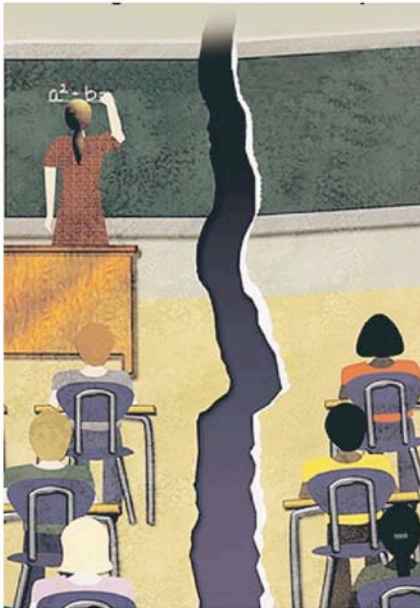


# The Environment and the Achievement Gap

Eberhard Architects LLC  
Cleveland, OH  
April, 2011

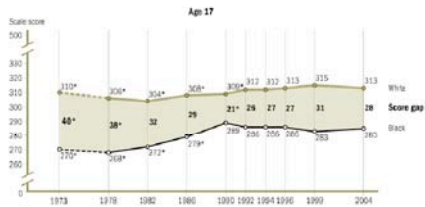


In less than two decades, the majority of Americans under 21 will be non-white, with the largest non-white groups being Hispanic and African-American. But the achievement gap between racial groups perseveres. According to The New York Times, only 12% of black fourth-grade boys were proficient on a national reading test, compared to 38% of whites.

The achievement gap is the persistent disparity in academic achievement between minority and disadvantaged students and their white counterparts.

Richard Nisbett is Theodore M. Newcomb Distinguished Professor of social psychology and co-director of the Culture and Cognition program at the University of Michigan at Ann Arbor. Nisbett's research interests are in social cognition, culture, social class, and aging. Nisbett, who received his Ph.D. from Columbia University, has stated that "the most relevant studies provide no evidence of the genetic superiority of either race but strong evidence for substantial environmental contributions to the IQ gap between blacks and whites."

For all of the money invested in the built environment, there has been precious little invested in hard research that identifies or validates linkages of environmental factors that contribute to performance in the classroom or workplace.



The last meaningful research initiative was from the Buffalo Occupational Safety and Testing Institute (BOSTI) which in 1985 published its attempt at a comprehensive study linking design with workplace performance. While the BOSTI study involved 10,000 individuals in 100 companies over six years and did identify fundamental benefits of those who worked in 'well-designed' offices compared to those who worked in 'poorly-designed' offices, the distinctions between the two were soft and ambiguous.



It is discouraging that even in the 2010 ASU architectural portfolio, which bills itself at "The Sourcebook of Award-Winning and Outstanding Educational Design," only five of the first 50 projects even reflect indirect lighting in classroom and media areas. Every year, the ASU portfolio reflects dozens and dozens of projects that look striking like facilities previously featured.

The Bill and Melinda Gates Foundation in late 2009 launched the Measures of Effective Teaching (MET) project to develop and test measures of teacher effectiveness to improve the quality of information to improve fair and reliable standards and achieve better student outcomes.



The MET initiative identifies different measures to attempt to focus in the various elements that inhibit or contribute to learning effectiveness. MET Measure 4 entails student perceptions of the classroom instructional environment. In Measure 5, the New Teacher Center's survey addresses the school environment, working conditions and instructional support.

Ronald Ferguson is a senior lecturer at the Harvard Graduate School of Education and the Kennedy School of Government, and has created the Tripod Project for School Improvement which the Gates Foundation has drawn into its MET initiative. Ferguson observes, "thirty or 40 years ago, there was a lot of publicity being

Middle: Math Achievement Scores Graph, 1973 - 2004; Whites (top) vs. Blacks (bottom)

Bottom: Vocational Guidance Services Training Center Computer Training Lab

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## The Environment and the Achievement Gap, cont'd

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given to people who argued that racial differences in intelligence were biologically anchored, and while there are still some people saying that we've made enough progress at equalizing racial differences ... not many people still make that argument." Ferguson believes that a significant racial achievement gap remains — though he believes it is bridgeable.

Ferguson, the founder of the Achievement Gap Initiative at Harvard and the creator of the Tripod Project for School Improvement, has spent over 30 years trying to ameliorate the economic and educational barriers faced by non-whites in America. Instead of basing his work on his own opinions, Ferguson has spent decades analyzing data and trying to apply his findings back into the nation's school systems.

Raised in a blue-collar community in Cleveland, Ohio, Ferguson considers himself lucky for his own educational experience. His school system was segregated, but he characterized it as stable, as he attended before mandatory desegregation was enforced, when students were bused to schools in other neighborhoods to right racial imbalances. "It was the kind of school where people were pretty optimistic about prospects for success," he said.

Ferguson majored in economics before earning a Ph.D. at M.I.T. After teaching for five years at Brandeis University, he was invited to apply for a faculty position at Harvard's Kennedy School of Government.

Ferguson had long been interested in economic development in low-income communities, but by the end of the 1980s, he was convinced that education was the nation's most important economic development issue. By the mid 1990s, he started studying the achievement gap, leading to the founding of the Tripod Project.

"A core aspect of what the Tripod Project does is to survey students and teachers about what they experience at the classroom level. Then we give that information back to schools to inform their improvement strategies," he said. After catching the attention of the dean of the Harvard Graduate School of Education, Ferguson was asked to head the university's initiative on the racial achievement gap, which involved founding the school's Achievement Gap Initiative.

The Bill and Melinda Gates Foundation recently relied on Tripod Project survey tools to measure students' classroom experiences for the M.E.T. project, in which Ferguson asks students to rate their teachers in seven different categories. Based on their responses, he puts together a survey to see if students' opinions on their teachers' effectiveness correlated with how much their standardized test scores improved from one year to the next. The results were that student responses to questions about teaching predicted how much they learned, demonstrating the need to constantly improve teaching.



Top: Training Room; Capitol Insurance Co.; Cleveland, OH





## The Environment and the Achievement Gap, cont'd

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"We need to focus a lot more effectively on making public schools places where teachers learn," he said. "The best schools are places where the teachers work on continually improving the quality of instruction. Weaker schools do not do this, and they blame the stagnant test scores on the students; at the stronger schools, the perspective is that we just haven't yet done what needs to be done for these students to improve." Training teachers to create environments more conducive to learning, Ferguson said, is an importance goal for his initiatives in the next five to 10 years.

One area where racial differences have become a touchy subject is the home environment. Ferguson said that talking about racial differences in parenting is a social taboo and an obstacle that he often faces. "People don't want to talk about it because they're afraid what is said will be misused," he said. "They're afraid that people will say it's their own fault, that members of low-achieving groups need to fix themselves. They're afraid that people will misuse information in bigoted ways. But if we can't have the conversation about things that we need to do differently, then we can't get around to actually doing them differently," he said.

### The Importance of the Gap

Andy Porter is the dean of the Penn Graduate School of Education and the George and Diane Weiss Professor of Education. He sees the Achievement Gap in socio-economic terms, not racial ones: "The typical contrast used to define the achievement gap is the black-white divide or increasingly the Hispanic-white. But the gap could be defined by socio-economic status, and it could be criterion-referenced or norm-referenced. Because people talk about the achievement gap in these various ways, we need to be precise about what we mean."

**When does the achievement gap begin?** The gap between whites and blacks is present before children experience any schooling. By the time children are three or four, it is already a standard deviation. Does the gap increase while students are in school? The surprising answer is no.

Researchers have found that the rate of growth in achievement among blacks is equal to that among whites during the academic year. In the summertime, both groups show a decrease, but that decrease is larger for blacks than for whites. So while the achievement gap doesn't increase while students are in school, it doesn't decrease either.

**Is the gap a function of test bias?** No matter how hard they have looked, researchers have been unable to find any evidence of test bias. A number of people have hypothesized that administering performance assessments rather than multiple choice achievement tests would show a smaller gap, but this is not the case. In fact, an achievement gap of one



Top: Cuyahoga Community College Metro Campus Technology Learning Center; Cleveland, OH  
Middle: Electronic Classroom, Vocational Guidance Services Training Center; Cleveland, OH  
Bottom: "Old School"





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standard deviation on multiple choice tests increases to 1.2 standard deviations with performance assessment. My hypothesis about this finding is that black children on average are not receiving the schooling they need to acquire the kind of knowledge needed to succeed in performance assessments. That is, there is differential distribution of opportunity to learn between black students and whites.

**How are definitions of comparison groups changing discussions of the gap?** In ten years, we won't be talking about the black-white achievement gap. Since the current Census allows respondents to report multiple ethnicities, we will have a much harder time in defining ethnic groups in the future. The achievement gap will still be there, and we will still worry about it. But we will likely be worrying about it in terms of socio-economic status.

### WHAT SOLUTIONS HAVE BEEN TRIED?

Since the 1960s, attempted solutions to this problem have fallen into four categories: preschool reforms, teacher reforms, instructional reforms, and standards-based reforms.

**Preschool Reforms.** Almost all of the research on preschool programs shows early gains in achievement, but that the early gains are not sustained. Moreover, the academic advantages of preschool programs are less likely to be sustained for children of color than for white children. The causes of this have not been determined though the findings have been replicated many times.

Preschool programs vary tremendously in quality. The Perry Pre-school evaluation famously found that particular program to be massively successful, with participating students half as likely to go into special ed, five times less likely to be incarcerated, four times more likely to earn \$2,000 or more monthly. But not all programs are good programs and white students are more likely to participate in preschools than their black peers and the schools they attend are more likely to be of high quality.

**Teacher Reforms.** Education research has finally caught up with common sense in its understanding of teacher quality. Now, researchers have documented teacher effectiveness in raising student achievement.

If a student has a good teacher every year, in the first grade, second grade, right up through the 12th grade, and that the good teacher has the effect of improving Johnny's performance one tenth of a standard deviation, at the end of the first year, Johnny may be a tenth of a standard deviation better off than he otherwise would have been. In second grade, he improves another tenth of a standard deviation. By the time Johnny graduates from high school, he is 1.2 standard deviations better than he would have been—a difference bigger than the achievement gap.

The assumption that the advantage from one year to the next does not deteriorate over the summer months is not certain. But even so, the impact of teacher quality is powerful, and virtually everyone in the education community is convinced that the best reform would be an effective teacher in every classroom.

Would it close the achievement gap? Probably not. For an education reform to solve the achievement gap, it must produce bigger gains for black students than for white students. But many education interventions actually exacerbate the gap, and the more effective they are in raising mean achievement, the more they widen the gap. So if every teacher in every American classroom were effective, then all students—black and white—would have an effective teacher and student achievement across the board would rise. Closing the gap means instituting reforms that improve black students' achievement at a higher rate than white students, which is tricky.

Research also confirms the effectiveness of other teacher reforms. In terms of teachers' expectations of students, almost all the research shows that if teachers expect more of their students, their students will achieve more. Interventions designed to improve teachers' expectations have shown modest effects.

Another intervention widely championed is the idea of black teachers teaching black students. Most results show that when black teachers teach black students, black students achieve more than when taught by white teachers. The policy implications are not straightforward. For example, schooling has many different goals—social and emotional ones, as well as achievement. Even if the achievement gap would decrease, is it wise to have black students learning only from black teachers?

**Instructional Reforms.** With a million instructional interventions out there, one example—Success for All, is a highly scripted intervention that can be implemented and replicated well. Rather than striving for excellence per se, Success for All focuses on raising the bottom level of achievement in classrooms. Many studies of this program find good effects—and greater effects, in fact, for black students than for white students. One could hypothesize that the intervention provides the opportunity to learn that black students tend to miss out on.



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Another example of a popular instructional reform is reduced class size, but the results are mixed. The best study of class size—the Tennessee STAR study—demonstrated that reducing class size to 15 or below, a fairly major reduction, can have a good-sized effect on achievement in year one. In years two, three, and four, that first effect was maintained, but there was no additional advantage.

Andy Potter says, “I can’t think of a more expensive education intervention than this one, and its effect size is disappointing. Moreover, as California’s experience demonstrates, bringing reduced class size to scale can be a perilous task. When that state decided to reduce class size massively, they had to hire new teachers—many of them unqualified—and haul in trailers for classes. For one of the most expensive educational interventions out there, the impact of reducing class size leaves something to be desired.”

Research on ability grouping and tracking delivers the counterintuitive news that it is enriched classes that tend to have positive effects on student achievement. Remedial classes, on the other hand, don’t have a negative impact but don’t provide much benefit either.

Following the release of *A Nation At Risk* in 1983, states increased requirements for high school graduation and have continued on that path ever since. Predictions were dire. People foresaw a big decline in high school graduation rates, which didn’t materialize.

Then, they were certain that enrollment in remedial courses would increase, and that didn’t materialize when students signed up for more college prep courses. Then, people predicted that teachers would dumb down those college prep courses—which also didn’t materialize: teachers continued to teach college prep courses as they always had.

And the effect on student achievement was huge. In one study, Potter looked at three contrasting ninth-grade mathematics curricula: Basic Math; Transition Math, which upgraded the curriculum but not to the level of college prep; and College Prep. Controlling for initial differences between students, the value added for student achievement was biggest for College Prep, followed by Transition Math. And then Basic Math was by far worst. Those findings represented a big success story for the idea that students benefit from being given an opportunity to learn at a higher level.

As for promotion and retention policies, the reviews are mixed. Because these policies are administered in so many different ways, evaluations of their effectiveness vary widely. The big hole in this research is that studies only compare kids who are retained versus kids who are promoted—they do not consider the changes to the system over time. Advocates of these policies argue that retaining students will be so painful to the system that it will be forced to improve.



Top/ Middle: Cuyahoga Community College Metro Campus Technology Learning Center; Cleveland, OH

Bottom: Student link their cell phones to the classroom display to vote/ test.





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**Standards-based Reforms.** The standards movement can claim some exciting accomplishments—most notably, putting student achievement on the map. Twenty years ago, discussions about achievement did not have the intensity or amplitude they do today.

Says Potter, "But standards-based reform has been with us for ten or 15 years—first at the state level and then in the form of No Child Left Behind—and it would seem that by now, we would be seeing improvements that we're just not seeing. But remember, too, that anything worth doing can be done poorly, and standards-based reform is no exception to that rule."

### Addressing Opportunity and the Gap

Schools are not the major cause of the achievement gap. Long before kids go to school, the gap is alive and well, and, during the academic year when kids are actually in the classroom, it tends not to increase. Any increases that do occur take place largely outside the context of schooling.

Still, it is the schools we turn to for a solution. But we do well to remember that we are asking schools to solve a problem not of their own making. For schools to solve the achievement gap, we will need much more aggressive interventions—interventions that address the critical issue of opportunities to learn—particularly the opportunities we do or do not provide to our most disadvantaged children.

The most promising reforms are alike in their attention to addressing the pervasive inequalities in opportunities to learn. Consider preschool. Done well, it shows some impressive effects, some lasting effects. But we need to make sure that the kids—all the kids—get this high-quality preschool. This is an opportunity to learn issue.

Consider teacher quality: the research shows that black students have less access to high-quality teachers than white students do and less access to good materials. This is an opportunity to learn issue.

Consider student course-taking patterns. The percentage of students taking college prep high school coursework is going way up for white students, for black students, and for Hispanic students. Over the last 20 years, the gap between black and white students in course-taking has dramatically reduced. This is an opportunity to learn issue—one where we have made real progress.

### New Alternatives:

The "Time To Know" initiative provides what is being described as a breakthrough solution for today's one-to-one computing classrooms. Teachers use the interactive comprehensive curriculum and the digital teaching platform to manage all classroom activities and deliver a personalized curriculum to every student.

TTK's solution constitutes a comprehensive digital curriculum integrated with robust teaching tools for lesson planning, instruction, assessment and reporting. It blends digital and traditional instructional activities offering flexible lesson plans for different teaching and learning styles. Time To Know claims to enhance student learning by providing engaging and adaptive content focused on exploration, inquiry-based learning, collaborative class discussions, multimedia activities, and games. Time To Know's classroom environment reinforces students' self-confidence, boosts learning motivation, and develops students' skills as team participants and self-directed learners.

Ongoing feedback during class enables the teacher to track each student's progress. It helps the teacher to address student needs at varying levels of proficiency by prescribing individually customized activities and appropriate homework. Time To Know's teaching platform enables students to learn at their own pace and according to their own proficiency levels, making the complex task of teaching students with differing needs a reality.

With its focus on problem-solving and skill-building, Time To Know develops higher-order thinking skills and prepares students for critical assessments without resorting to 'teaching to the test'. This holistic solution is deployed in wireless 1:1 classrooms and provided with a specially designed staff development program.

Teachers prepare students for high stakes tests without teaching to the test. Independent evaluations and scientifically based research have demonstrated positive, statistically significant results, including these findings from a two-year pilot program with 4th and 5th grade students:

- Improved teaching quality
- Better test scores across most measures

## The Environment and the Achievement Gap, cont'd

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- Deeper understanding of concepts
- Improved learning environment with fewer disruptions
- Increase in student confidence, motivation, and enjoyment of core subjects

### Results

According to studies conducted in 2009 and 2010, students using Time To Know demonstrated significant improvements in their achievement levels on standardized tests. Time To Know students were compared with control students from other schools which used traditional teaching methods and curriculum. Time To Know students exhibited successes across the board in Mathematics and English Language Arts.

A 2010 study by Rockman et al, an independent evaluation, research and consulting firm, evaluated the impact on 4th grade students' learning in public elementary schools in the Time To Know program in Texas during its first year of implementation. Students were measured on the Texas Assessment of Knowledge and Skills (TAKS) and math reasoning skills and compared to the results of a control group. The Time To Know students demonstrated substantial gains in Math and Reading/Language Arts in comparison to the control group.

In Math, the Time To Know students significantly outperformed the control students in TAKS results and also showed greater mathematics reasoning skills. Students in the Time To Know classes were shown to have spent more time on authentic tasks, problem-solving, and explaining their reasoning. Lower performing students made the greatest gains, considerably narrowing the achievement gap.

### Virtual Schools and the Achievement Gap

With poor students testing worse than wealthier students, and black kids scraping the bottom in math and reading while white kids score in the middle of the pack, one has to ask: Are these poor and minority students incapable of understanding the same material their wealthier, whiter friends study?

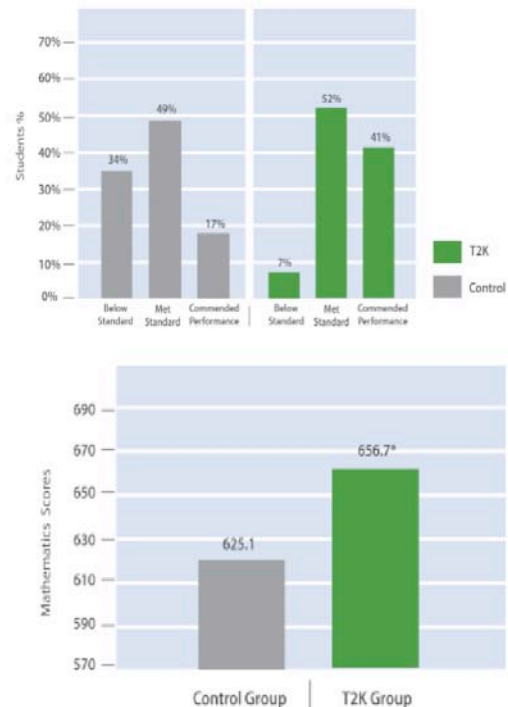
The popular Pixels and Policy blog analyzes the problem of environment, and how virtual schooling could put an end to the "Achievement Gap."

### The Cause? A Problem of Environment

Decades of research into public schools have confirmed that students in inner-city public schools fare, on average, much worse than students attending public schools in the suburbs.

The fact that the vast bulk of inner city students are also minority helps explain why black students traditionally fare worse on standardized tests.

Why?

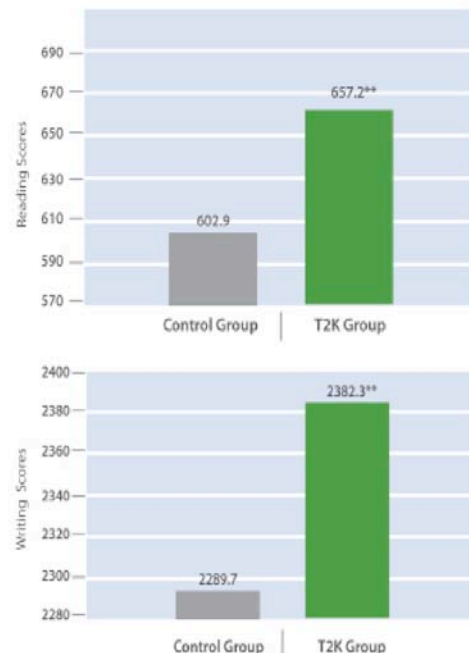


Top: Percentage of Students in each TAKS Category: Math: Control Students (left) vs. T2K (right) by Standard Levels

Above: TAKS 2010 Math Scores: Control Students (left) vs. T2K (right) by Average Scores

Below: TAKS 2010 Reading Scores: Control Students (left) vs. T2K (right) by Average Scores

Bottom: TAKS 2010 Writing Scores: Control Students (left) vs. T2K (right) by Average Scores





## The Environment and the Achievement Gap, cont'd

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There are no biological differences between a middle-class white student in upscale Shaker Heights, Ohio and a low-income black student down the hill in East Cleveland.

The achievement gap persists because the inner-city educational environment is fundamentally different than the suburbs, and it's not conducive to learning.

Inner-city schools suffer from all the symptoms of long-term neglect: Broken chalkboards, out-of-date textbooks, overcrowded hallways, apathetic teachers, and administrations crippled by politics and headline hunting. Student-on-student fights are common, creating distractions from which impressionable kids never really recover.

So how do administrators improve the environment - under tight budget restraints?

### Sitting in the Virtual Classroom

Environmental problems have plagued inner city schools for years - primarily because they lacked the funding and political resolve to meaningfully alter the environment. With virtual technology, this is no longer true - technology exists today capable of supporting a classroom environment, and innovation into the utility of virtual classrooms is ongoing.

Funding should not be used as a crutch for stalling the implementation of virtual worlds. As a nation, we spend nearly \$10,000 per student per school year - for teaching methods that lack effectiveness when large-scale studies of virtual education's feasibility could be carried out on an entire school for a fraction of the cost.

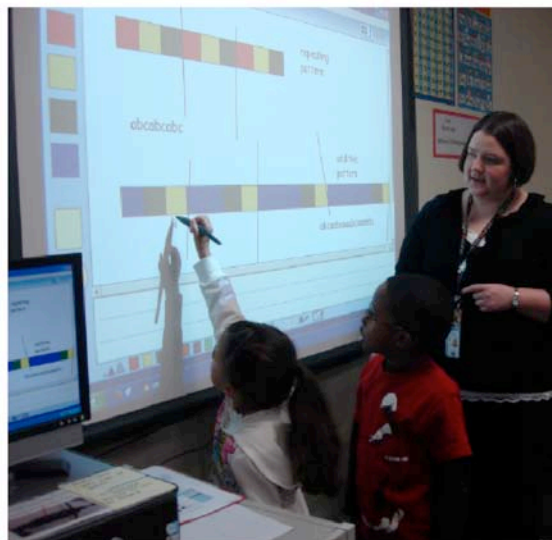
Virtual schooling also allows for closer tracking of performance. As the progressive education firm Synaptic Mash is proving, assignments given through computers can be tracked more effectively than paper assignments.

A virtual exam can adjust its questions to focus on problem areas for individual students instead of tired one-size-fits-all standardized examination. Virtual classrooms allow an individual instructor to adapt a lesson to every student's learning curve.

There is no certainty that sending inner-city students to virtual classrooms instead of the distraction-laden cells of dilapidated brick-and-mortar schools will make a difference.

But it's inexcusable that major pilot studies haven't been carried out given the cost-effectiveness of virtual education and the failure of previous progressive education techniques.

These students already understand the technology. They play with it every day after school. If ever there was a time to pilot virtual learning programs, it is now.





### Northern Kentucky Univ. Gets a Virtual Worlds Mecca

Northern Kentucky University is joining South Dakota State University and St. Paul College in Minnesota as a pioneer in the virtual world revolution.

According to an article in Scientific Computing, Northern Kentucky University is using a \$6 million grant to construct a \$30 million virtual world informatics center complete with the academic-sounding CAVE: computer assisted virtual environment.

According to Scientific Computing, NKU's new informatics center will set the standard for interdisciplinary research and development. The facility will feature a computer assisted virtual environment (CAVE) that will be available for businesses to use for product development. While several large corporations boast their own CAVEs for research and development, the CAVE located at NKU's Griffin Hall will be one of the only CAVEs available for public use.

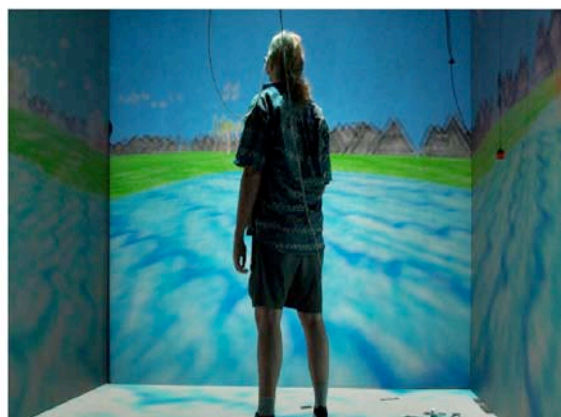
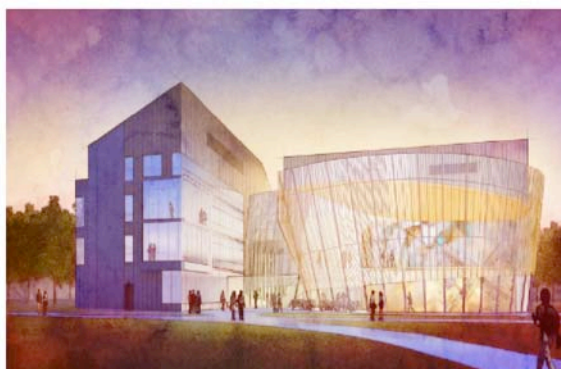
It also will boast a Digitorium that will be capable of running complex simulations in homeland security, computer and financial security, and other industries. The Digitorium can double as a network operations center (NOC) that will allow broad use by a variety of private and government sectors.

Not only does the new CAVE system move Northern Kentucky University to a leadership position in providing best-of-class technology to not only students and faculty, but engaging public and private operators also opens up new research and revenue streams. The same system that can rapid-prototype a new car engine can also run counter-terrorism simulators.

Students who gain expertise in developing programs and content in the CAVE will gain a unique set of skills even the Ivy League has trouble matching today. Educational technology leaders predict that the students who enroll in university virtual worlds programs will have a significant competitive advantage in the tech-heavy job market.

NKU informatics graduates will be well positioned to take companies to new heights in terms of technology and expertise. Robert Griffin, CEO of Griffin Industries, knows something about technology: He used it to improve animal waste disposal and biosecurity for farms, netting himself a fortune and the means to build the Informatics Center which opens later this year with his gift; "The company and the region are going to get the benefit out of this too. That's exciting."

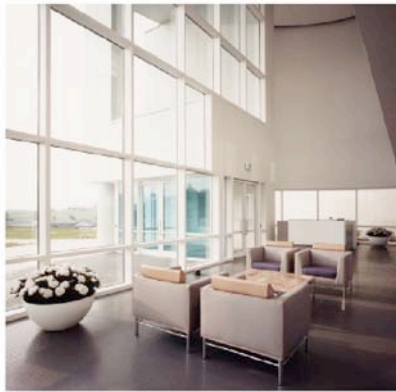
The ability to experiment freely in a state-of-the-art virtual worlds facility should lead to striking innovations and advancements in the field of virtual worlds, and in the economy as a whole. Young kids who viewed virtual worlds merely as a hobby before now have a shining Mecca and an academic goal.



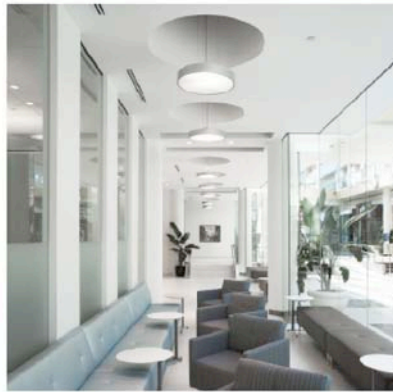


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American School & University Design  
Award



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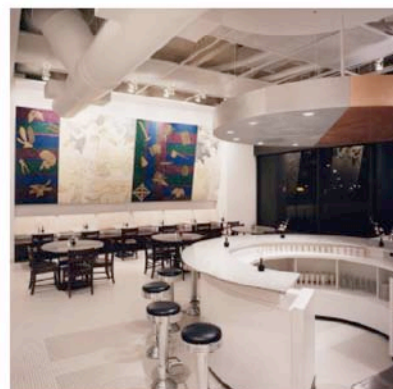
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