

# The Value of a Visit: Does Visiting a Science Center Motivate Students to Study More Science?

By Sue Cavell and Harry White



**Children play with a “Loop the Loop” at Techniqest in Wales. The center, now nearly 24 years old, conducted an investigation to determine its impact on student visitors.** *Photo courtesy Techniqest Marketing Department*

subjects each year. Using both sources, we undertook an investigation to see whether there was any correlation between the number of visits a school in Cardiff made to Techniqest and the percentage of students taking science, technology, engineering, and math (STEM) subjects at AS Level (i.e., in Year 12 at age 17).

First, some background. Science as a single subject is compulsory in Wales until Year 11. After that, students choose their optional subjects. The number of students opting for science subjects is an indication of their motivation toward science and, if we compare schools that have visited Techniqest with those that have not, we would hope to find a positive effect. In fact, data from both the preliminary investigation and deeper statistical analysis seems to show that the greater the number of visits to Techniqest, the greater the percentage of students taking science at AS Level.

## It's not that simple

Of course, undertaking this investigation was not as simple as it might have first appeared. The government does not publish the actual enrollment numbers in each class, so we took the number of students taking the General Certifi-

cate of Secondary Education (GCSE) mathematics exam in Year 11, which is compulsory for all, as the baseline for the percentage. By the time those students entered Year 12 and chose their optional subjects, the enrollment numbers may have changed slightly. Also, some U.K. secondary schools have all ages from 12 (Year 7) to 18 (Year 13) in the same school, while other schools feed into a separate “sixth form college” for Years 12 and 13. In order to more accurately compare the data, we combined the “feeder” schools and their sixth form college into one big “super” school. This does not take into account other movements between schools, however.

The study focuses primarily on state secondary schools in Cardiff. Religious schools and schools that teach in the medium of Welsh have been largely excluded from the data because they draw their students from all over Cardiff rather than from the area in the immediate neighborhood of the secondary school. Because the school system underwent reforms in 2003 and 2007, we used a window of consistent data between 2003 and 2006. Three science subjects (physics, chemistry, and biology) were selected for the first analysis.

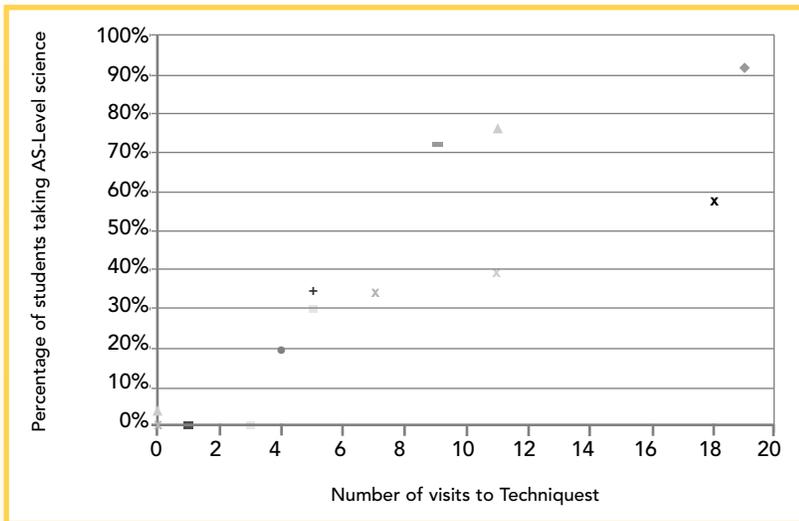
## A positive trend

Figure 1 shows the total percentage of students enrolled at AS Level for the three selected subjects at each of the different comprehensive or high schools in Cardiff between 2003 and 2006. A total of 18 schools, six of which are combined as a “super” school, are represented.

These results appeared to show that an

**W**ith Techniqest in Cardiff, Wales, approaching its 24th birthday, it is legitimate to ask what effect it has had on its visitors, and, in particular, on students. Of course, like all science centers, we have plenty of anecdotal evidence, but ideally, we need solid numbers to impress the policy makers.

Thanks to the foresight of our founder, John Beetlestone, we have 23 years of data that help us answer that question. It was his idea to keep records of the schools, classes, and numbers of educational visitors since Techniqest's inception in 1986. In addition, we now have eight years' worth of government data on the number of students taking science



**Figure 1: Graph of the percentage of students enrolled in AS-Level physics, chemistry, and biology, combined against the number of school visits to Techniqwest in the period 2003–2006, inclusive.**

increase in the number of school visits to Techniqwest corresponds to an increase in the percentage of students taking science at AS level. However, a more detailed and deeper statistical analysis was needed to confirm this trend.

Independent consultants from the Applied Statistics and Quantitative Modelling (ASQM) Consultancy Unit, Department of Mathematics and Statistics, the University of the West of England, were retained to undertake this analysis. All STEM subjects were included in this analysis rather than just physics, chemistry, and biology. The deeper statistical analysis confirmed the initial positive trends observed in the prelimi-

nary investigation. Total enrollments in STEM subjects did increase with an increasing number of school visits.

Figure 2 also shows data from 18 schools in Cardiff. This graph does not combine the “feeder” schools and their sixth form colleges as in Figure 1. Those schools with a percentage of zero are those without a sixth form; those with very high percentages are those who take additional students into the sixth form.

### Recommendations

While the deeper statistical analysis confirmed the initial positive trends observed in the preliminary investigation,

it highlighted a number of anomalies with the data, as described above, and raised further questions that require investigation. There are also, of course, all sorts of potential biases in this data, such as socioeconomic status of a school’s surrounding community or the positive influence of a good teacher.

A more reliable way to confirm the observed correlation between the number of times a school visits Techniqwest and the level of enrollments in STEM subjects at AS Level would be to undertake a longitudinal case control study and track the progress of individual students from the commencement of secondary school through to AS Level. This would be a major study over a number of years, and require considerable funding. Tracking individuals would also enable the researchers



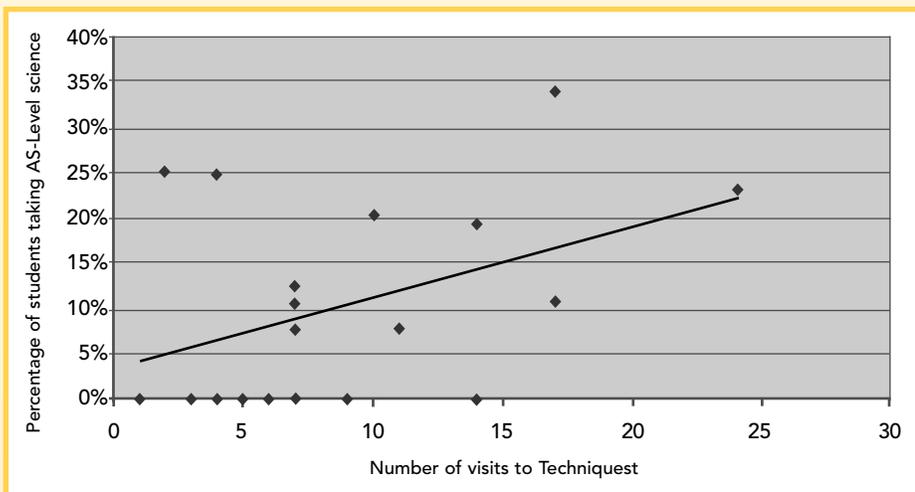
**Students enjoy the ground floor exhibition at Techniqwest in Wales. The science center examined data to see whether schools that visited Techniqwest saw higher percentages of students enroll in STEM subjects.**

*Photo courtesy Techniqwest Marketing Department*

to determine whether the students visited Techniqwest in primary and/or secondary school, or with their families, and how many times.

Clearly there are flaws in our investigation and ways in which the data could be refined. There may be other applicable data sources that we have not yet located. But the underlying trend indicates that we have a positive effect. ■

*Sue Cavell is head of research and evaluation, and Harry White is a science center consultant at Techniqwest, Cardiff, Wales, United Kingdom. The authors welcome comments or questions about their study at [suec@techniqwest.org](mailto:suec@techniqwest.org) or [harry@techniqwest.org](mailto:harry@techniqwest.org).*



**Figure 2: Scatterplot of the percentage of students enrolled in all STEM subjects at AS Level combined against the number of school visits to Techniqwest in the period 2003–2006, inclusive.**