VISION 95: A teacher improvement program gets bigger and better

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Abstract

This is an updated report of the VISION (Vision of Industry and Schools In Ongoing Networks) project based in Howard County, Indiana. The program, which aims to improve mathematical and science skills of K-12 teachers, combines the efforts of local industry, academia, and the county schools. The teachers perform hands-on exercises at participating industries and receive related instruction on technical and curricular matters from the two local universities. The teachers receive a stipend and three graduate credits in education for completing the program.

Improvements were made in the 1995 VISION project based upon lessons learned from the 1994 pilot. These included increased instruction time from faculty members of Purdue and Indiana Universities, especially in the areas of statistical control, quality management, biology, and physics. A second change provided the teachers more time to both reflect upon the industry experience and prepare the required instructional module. VISION 95 attracted more teachers, more industry partners and received funding from an Eisenhower grant.

The major goals of the program continue to be increased teacher knowledge of technical careers and assisting teachers in preparing their students for technical education and careers. For Purdue and Indiana Universities, the goal of participation in the project is to attract higher quality students into the areas of math, science, engineering and technology through increased teacher awareness. Future goals include finding additional funding sources and expansion of the program beyond Howard County.

Background

The pilot VISION project, championed by Glenn Grundmann of Delco Electronics, was held in the summer of 1994 [1,3,4]. It was a very intense three week experience. After a day of orientation and a day of technical instruction from Purdue University faculty, the local school teachers were placed in three separate, three day experiences in industry. Additional sessions on learning styles and curriculum development were presented by Indiana University Kokomo faculty. The teachers also received instruction on the preparation of a drop-in module. This lesson was to be used in the curriculum of the home school district. The second offering of the project, entitled VISION 95, addressed some of the problems encountered in the pilot.

Changes in VISION 95

The pilot VISION project was funded completely by Delco Electronics as state funding was denied. VISION 95, however, did receive a $36k Eisenhower grant. In addition, the business partners took on a share of the cost of the project and a donation was made by the local section of the American Society for Quality Control (ASQC). This alleviated some of the funding concerns that were present in the pilot 1994 project.

VISION 95 gained three new industry hosts over the earlier program, bringing the total number of hosts to nine. The steering committee was increased in size to reflect this increase in industry partners. The number of applicants accepted for the project also increased from nine in 1994 to thirteen in 1995. They included science, mathematics, and business teachers from grades four through twelve.

The greatest concern from the participants in the original VISION project was the overwhelming amount of material that the teachers covered during the three weeks. The industry experiences were packed with activity from 7:30 a.m. to 4:30 p.m. The teachers felt that time was needed to process some of what they had done in the activity. In VISION 95, the participants had at least an hour each day to discuss the activity with the other teachers. If needed, industry hosts were available during that time for consultation.

Another complaint of the initial VISION participants was that the required drop-in lesson plan required more preparation time than allotted. In the initial project, the lessons were presented at the conclusion of the three weeks to local media as well as school and state officials. VISION 95 participants were given the opportunity to develop and test their lessons before presenting the results. By testing them, they could evaluate the lesson's effectiveness and recommend changes for others wishing to use the exercise.

Schedule

The 1995 VISION project schedule was similar to the pilot project. The first day was devoted to orientation, and included a Myers-Briggs personality profile of the participants as well as many of the industry and university hosts. The second day was spent at the university. The teachers practiced some hands-on exercises in science and engineering related to the industry experience. In one exercise, the teachers built a digital counter on a breadboard to emphasize the importance of the binary number system in computers. University faculty also introduced the teachers to several quality issues that had not been introduced in 1994. These included Total Quality Management (TQM) and Statistical Process Control (SPC).

The teachers then had three days of activity with an industry host followed by one day of curriculum development. The participants then changed hosts and had a different three day activity, followed by a single day of lesson development. The final week had a third industry activity and two days devoted to curriculum development.

Several half day presentations were held during the fall semester of 1995. Some of these were limited to the VISION Task Force members, while others were media events focused on recruiting community support for continuation of the project. The final program, held in early December, featured presentation of several of the lessons developed.

Table 1 - Project Schedule

Instructional Schedule - Weeks 1, 2 and 3				
Monday	Tuesday	Wednesday	Thursday	Friday
Orientation Curriculum	Dig. Elect. Lab Curriculum Chemistry Biology.	Industry Activity (Groups of 2 or 3 at different locations)		
Work / Curriculum Day	Industry Activity (Groups of 2 or 3 at different locations)			Work / Curriculum Day
Industry Activity (Groups of 2 or 3 at different locations)			Work / Curriculum Day	Work / Curriculum Day

Industry Partners

The following is a list of the participating industries. Those marked with an asterisk(*****) participated in the pilot VISION project.

- **Chrysler*** - The teachers were involved in statistical process control and statistical problem solving in the Casting, Machining and Transmission Assembly Plant.
- **Coca-Cola Bottling Company** - Teachers were introduced to production and quality control at Coca-Cola. In addition, they looked at the various planning functions, including delivery scheduling.
- **Delco Electronics, Audio Systems (Automotive)* -** Electrical and mechanical engineering, assembly and test areas were included in the teacher's experiences. Problems posed were in the areas of printed circuit board manufacturing and assembly.
- **DuPont Photomasks* -** DuPont manufactures photomasks used in semiconductor processing. The experience included work inside a clean room in the areas of etch processing, mask inspection and repair, statistical process control and ISO-9002 management.
- **Electronic Data Systems (EDS)* -** EDS provides computer support to Delco Electronics at this location. The teacher's experiences included quality analysis and CAD/CAM in the area of automotive air control systems.
- **Howard Community Hospital** - Activities included emergency service procedures, oncology, and medical careers.
- **Public Service Indiana (PSI)*** - PSI is the regional electric power utility serving most of central Indiana. Activities at PSI included visiting a coal fired generation facility and an electricity distribution center. Also discussed were energy efficiency and residential wiring.
- **St. Joseph Hospital* -** Teachers were introduced to Nuclear Medicine. Topics included ultrasound and Magnetic Resonance Imaging (MRI).
- **Society Bank** - The participants were involved in account classification, loan processing, and financial planning activities.

Curriculum Developed

Teachers brought back ideas from these industry experiences and incorporated them into a lesson for their students. These lessons were presented at an open meeting in December 1995, to a wide range of industry, university, school and media attendees.

The lesson developed by Bob Goodrick, an earth science teacher at Eastern High School, was a unit on radiation, conduction, and convection. The unit was fifteen class periods, and began with the basics of heat transfer. Afterwards, the teams used automobile sound systems donated by Delco Electronics to study the problems of power and heat dissipation in the radios. Students measured power consumption when operating the cassette player, CD player, and radio of the sound system. In one experiment, they compared the power consumption of different styles of music (Rock, Rap, Classical, Country, New Age and Blues).

A lesson prepared by Larry Taylor, a mathematics teacher at Taylor Middle School, studied scientific notation and different base systems in a sixth grade classroom. Mr. Taylor used exponential notation as a lead into base systems where the students learned to use binary, octal and hexadecimal systems. As an application of the binary system a mechanical gear selector studied at Chrysler was shown to the class. It used electrical contacts and a binary count to determine the gear selection in an automatic transmission.

BethAnn Heuermann of Lafayette Park School in Kokomo used her experience at PSI Energy to educate her fifth graders on electricity. Ms. Heuermann integrated language arts and social studies, as well as mathematics and science in her lesson. She included writing exercises and geography by having the students study the state maps of power generating networks. In the mathematics portion of her lesson, students calculated kilowatt-hour usage and monthly charges based upon meter readings.

Another teacher used her experiences with color matching (important to Delco in matching interior parts) and photomask preparation at Dupont Photomasks in a lesson on silk-screening.

Results

As expected, the second offering of the VISION project ran much more smoothly than the first. The teachers were more relaxed on the final day of the three week experience. By trimming some of the technical material, the teachers had a better focus on the subject rather than being overwhelmed. The lessons that the teachers presented also were more complete because of the additional preparation time.

Participation in VISION has created an integrated network in the community which previously did not exist. Often teachers from the same school building did not work with each other, much less teachers from other school corporations. They now have a support group which spans beyond the boundaries of their classroom and school building. The relationships developed with persons in industry and academia give them a tie to the real world, and a place to go for answers. Finally, their experience in industry lends realism to their own class lessons.

The benefits of VISION are not limited to the teachers involved. By taking on the mentoring role, the industrial participants gain a renewed pride in their work. All of the industry representatives on the planning committee reported that their employees enjoyed working with the teachers and found satisfaction in contributing to a more relevant education. The networking has also shown benefits for the university participants. Industry contacts made through the program are extremely helpful for arranging tours, gathering information, and even arranging summer employment. The links between pre- and post-secondary teachers

have also been fruitful. A question about a typing timer following the digital counter laboratory resulted in a (college) freshmen design project. In this case, two high school teachers played the role of "customer" in making the design specifications.

Without performing a longitudinal study assessing the results of this program, is difficult. However, several of the teachers involved have performed pre- and post-testing of the students with positive results.

Future Plans

We feel the project is well developed after this second successful year. The primary concern is continuing to fund VISION. It is anticipated that the Eisenhower grant obtained for VISION 95 will not be renewed since it was previously funded. Current plans are to solicit funds from businesses who do not wish to be hosts. At present, the plan is not to expand to school corporations outside the county until all the local needs are met. This geographical limitation may exclude the project from other government funding sources.

References

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5. *Hands-On Science for Grades K-5: An Industry, School, University Collaboration*, Nancy Streim, Jane Horwitz, Teresa Pica, Jacob Abel and Carlo Parravano, 1995 Frontiers in Education Conference

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