

# Lessons Learned during a District Level Professional Development Effort for Improving Science Instruction

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## **Abstract**

As new standards for science teaching and assessment emerged during the last decade, the need for enabling teachers to accomplish the vision embodied in these standards also became apparent. More importantly, the insufficiency of traditional 'one-stop' workshops to accomplish what was demanded by the new standards became all too clear. As a result, new approaches to professional development and new programs of professional development began to be conceived and implemented. This paper presents the lessons learned during the development and implementation of one such program in the USA. The lessons described here have implications for the redesign of professional development and successful implementation of new professional development programs that are aimed at reforming school science instruction in order to meet new standards.

**Key Words:** Professional Development, In-service Science Teacher Education

## **Introduction**

Recent efforts to improve school science education place significant emphasis on teachers' professional development that goes beyond one-stop workshops. For example, the National Science Education Standards (NSES) developed in the USA (National Research Council, 1996) devote a complete section to professional development standards. When considered in the light of these standards, traditional forms of professional development activities (such as one-stop workshops sporadically scattered during the academic year) fall short as being inadequate, inappropriate, and out of step with current research about teacher learning (Fullan, 1995). Several efforts at improving professional development are underway in order to achieve the vision of the NSES. One such effort that has

gained international recognition is the Iowa Chautauqua Program (ICP) developed at the University of Iowa Science Education Center. The ICP offers a professional development model for science teachers that achieves the vision of NSES using the Science-Technology-Society (STS) (NSTA, 1992-93) approach to the teaching and learning of science. In 1993, the ICP was recognized by the US Department of Education as a model of professional development worthy of nationwide dissemination. With funding from the Department of Education during the following years, we shared the model with several district, state, and regional educational agencies, and helped initiate new professional development programs emulating the ICP.

Collier County Public Schools in Collier County, Florida, USA, emulated the ICP to develop the Collier Chautauqua Program (CCP) that offered district-wide, voluntary professional development opportunities to K-8 teachers for enhancing science instruction. Since CCP was the first ever attempt of Collier County school district to develop and conduct district-wide professional development that went beyond the traditional approaches, we learned many lessons regarding how to make such professional development effective. While these lessons themselves may not necessarily appear to be new, considering them in the context of development and implementation of a new program can provide fresh insights to those involved in redesigning professional development so as to meet new standards.

## **What is the Iowa Chautauqua Model**

The Iowa Chautauqua model (Figure 1) is substantially different from traditional forms of professional development. It involves teachers in a three-week summer workshop and engages them through an entire academic year, expecting from

them a commitment to practice in their classrooms the instructional approaches promoted by the program, and evaluate their effectiveness in the context of their own teaching situations. These evaluations become the focus of discussions during the academic year series of workshops for the purposes of refinement and improvement of instructional approaches to better

match one's teaching situation. The ICP promotes constructivist approaches to the teaching and learning of science within the context of real-life experiences. The primary feature of these approaches is to engage students in science through issues, concerns, questions, and problems of current local or personal relevance (Dass, 1996).

### **CHAUTAUQUA LEADERSHIP CONFERENCE**

#### **LEAD TEACHERS MEET TO:**

Plan Summer and Academic Year Workshops  
Enhance Instructional Strategies and Leadership Skills  
Refine Assessment Strategies

### **THREE-WEEK SUMMER WORKSHOPS**

**3-4 LEAD TEACHERS + UNIVERSITY STAFF + SCIENTISTS WORK WITH  
TEACHERS IN LOCAL/REGIONAL WORKSHOP SETTINGS**

Teachers are introduced to constructivist instruction in a Science-Technology-Society (STS) context.  
Teachers:

Participate in activities and field experiences that integrate concepts and principles from all major disciplines of school science.

Make connections between science, technology, and society in the context of real-life experiences.

Use local questions, problems, and issues to provide an organizing context for science instruction

Create a 5-day teaching module.

### **5-DAY CLASSROOM TEACHING TRIAL**

Teachers involved in summer workshops teach and assess a 5-day module using constructivist principles in an STS context

### **ACADEMIC YEAR WORKSHOP SERIES**

**3-4 LEAD TEACHERS + UNIVERSITY STAFF + SCIENTISTS WORK  
WITH SUMMER TEACHERS + NEW TEACHERS**

#### **Fall Short Course: 20 hour Instructional Block**

Defining techniques for developing teaching modules and assessing their effectiveness; selecting a tentative topic; practicing specific assessment tools in multiple domains of science

#### **Interim Project: Three to Six month Interim Project**

Developing a constructivist instructional module for a minimum of twenty days of instruction; developing a variety of authentic assessment strategies; administering pre-tests in multiple domains of science; teaching the module; communicating with regional staff, lead teachers, and central program staff.

#### **Spring Short Course: 20 hour Instructional Block**

Discussing assessment results; analyzing experiences related to teaching the module; planning next steps for expanding constructivist and STS approaches; planning for professional leadership in local reform efforts.

*Figure 1: The Iowa Chautauqua Model*



## **The Collier Chautauqua Program (CCP): An Emulation of the ICP**

Initial planning for CCP started in Spring 1994 with primary leadership provided by the district science coordinator of Collier County Public Schools. During the first year of implementation (starting in Summer 1995), the program focused on professional development of elementary and middle grades teachers. Because of this focus, teachers who taught several subject areas became involved. Therefore the program fostered an integrative approach to teaching and learning using the content of science. The activities of the CCP span a full academic year and include the following:

1. Summer Leadership Institute: A four-day institute for lead teachers designed to prepare them for leadership roles for the summer and academic year series of workshops.
2. Summer Training Institute: A three-week institute for participating teachers during which they experience new instructional strategies as students and develop short teaching modules using these (constructivist) approaches for use in their own classrooms.
3. Academic Year Series of Workshops: Three-day workshops during Fall and Spring semesters to evaluate teaching trials of the modules designed during the summer institute, make plans for more modules and refine the existing ones from the summer institute, and develop appropriate assessment schemes.
4. Interim Communication: Monthly meetings, electronic communication, and site-based meetings to continually share information, assess progress, and provide support and encouragement to peers.
5. Interim Teaching Projects: Teaching trials of modules developed during the summer institute and incorporation of new teaching strategies into the entire curriculum.

### **A Snapshot of Collier County School District**

Collier County Public Schools is a large, county-wide school district with 32 schools serving approximately 28,500 students. It is growing at the rate of one new school every year. Several

schools serve large proportions of immigrant students from low economic and limited English proficiency backgrounds. The schools are involved in site-based management, and each school has been developing its own 'school improvement plan'.

When CCP was developed and implemented, teacher contracts ran August-June for a total of 196 working days including four in-service days. Teachers were expected to work 7.5 hours each day. Each elementary school teacher worked with one class all day, interacting with approximately 25 students. Middle school teachers had an average of five teaching periods a day, interacting with approximately 140 students during the day. Many teachers in Collier County took other part-time jobs to make ends meet as well as teaching in the county's summer school program to supplement their income.

The CCP, directed by the district science coordinator, was the first comprehensive program in the county involving teachers during the summer as well as the academic year. It was also the first non-mandatory program of professional development implemented in Collier County. Thus, teachers participated in the program on a voluntary basis, which means they sacrificed other better paying job options during the summer in order to participate in the CCP. During the first year of implementation, 24 teachers from seven elementary and four middle schools participated in the program.

### **What did We Learn?**

Through a formal evaluation process that involved individual interviews of teachers and administrators, focus groups, teacher journals, and observations of classroom teaching and program workshops, we gleaned several issues influencing district-wide implementation of the ICP model in Collier County. We describe the main issues here in the form of lessons that may be useful in redesigning professional development programs or initiating new ones.

#### **Lesson 1: Do everything you can to develop a collaborative vision for change.**

In a district as large as Collier County (32 schools and 28,500 students), communicating and work-

ing with as many stakeholders as possible to develop a shared vision was critical for successfully implementing a program that is substantially different from the usual. This responsibility was initially undertaken by the district science coordinator. However, other administrators and lead teachers shared an equal concern for this responsibility. They realized that "to organize a county-wide effort is difficult" and that "it has to be a group effort, one cannot make it happen by oneself." Most participants realized that a broad-based support by district administrators, building administrators, teachers, as well as parents is "crucial for an effective program." Several teachers concurred that "as teachers struggle to make changes, they should not feel left out on a limb and unsupported." In order to develop a broad-based support, communication toward developing a shared vision is a critical first step.

The district science coordinator worked hard to communicate and involve a variety of stakeholders. He surveyed the district needs and connected them to the goals for professional development. He subsequently interacted with school board members, district administrators, building principals, and school faculties to share the needs, goals and the emerging vision. The lead teachers shared their work in the program with other teachers in their building and presented classroom activities to parents during parent teacher conferences and parents' nights. Several participants suggested ideas for further enhancing communication and involvement of others. These ideas include the use of district's cable television channel to share the vision with the local community, increased interaction between participating teachers and other teachers in their buildings, increased involvement of the participating teachers in their site-based school improvement plans, and use of their newly designed Whittaker Center for Science, Mathematics, and Technology as a vehicle for communicating the vision to the community via the center's advisory board.

In speaking with various participants and administrators, we felt that there was an underlying concern that sufficient partnership and ownership of the vision by all stakeholders had not happened. One administrator expressed a desire for "more of an ownership taken on by the whole district."

There was a sense among informants of the need to realize that "participation in a program should not be to satisfy someone else but to change the course of things." To this effect, "teachers have to become stakeholders and be committed to the success of the program." Forming a strong partnership between teachers, administrators, school boards, and parents is critical if the 'course of things' is to be changed. As one administrator put it, "If it is to get integrated into schools as a tool for the kind of school improvement they want to make, then more people need to understand."

According to Fullan (1993), educational innovations (such as the constructivist approach or the Chautauqua model) are tools for reform, useful only within the context of a vision for change shared by all stakeholders. The importance of collaboration in developing a shared vision and influencing lasting change cannot be over emphasized (Lambert, 1984). Fullan suggests that a combination of low degree of bureaucracy and high degree of interaction provides the best environment for district-school collaborations. Ideally, a triangle-shaped system involving teachers, principals, and district administrators in dynamic interactions would be best for developing a shared vision, yet it is difficult to develop such a system in large school districts such as Collier County. Even though the district science coordinator tried his best, developing an efficient system of interactions between the district and schools in Collier County has been a challenge, primarily due to its large size.

## **Lesson 2: Make sure all program activities model instructional approaches promoted by the program.**

If professional development activities are expected to 'change the course of things', it is imperative that teachers apply and practice in their classes what they learn during professional development activities (Sparks, 1983). The expectation to practice is one of the key elements of the Iowa Chautauqua model. Collier County teachers were positive about this expectation. However, for teachers to implement pedagogical approaches such as constructivism in their classrooms, they need to develop an understanding of the same through program activities. All program activities



should model the desired approaches and explicit attention should be drawn to the modeling. In the absence of appropriate modeling, teachers either do not develop proper understanding of the approaches or get mixed messages about program commitment to using these approaches.

The constructivist approaches promoted by the program were new to most participants. The first summer workshop generated some confusion among participants regarding just what these approaches meant. This is because the first summer program included a number of sessions and presentations that were conducted in non-constructivist ways. Teachers' confusion and misunderstanding were evident in their presentations of the trials of the teaching modules as well as information they provided during interviews.

### **Lesson 3: Ensure systemic support to teachers for implementing instructional innovations.**

Support to teachers emerged as a critical factor in influencing successful application of new approaches in Collier County classrooms. Support to teachers is important at several levels: Peer support; support from building administrators; and support from the district. Our analysis revealed that development of an extensive support system requires equal commitment on the part of all involved in bringing about the desired changes. Support from school and district administrators enhances teacher growth (Fielding & Schalock, 1985).

Several teachers participating in the CCP did not receive as much support from their building principals as they needed, perhaps because the principals may have had a different vision or agenda of change than that promoted by the Chautauqua model. With respect to support at the district level, some teachers reported receiving mixed signals regarding district's commitment to the program. For instance, some participants of the CCP were also required to participate in a curriculum-writing project, the philosophy behind which was contrary to the spirit and approach of the Chautauqua model. There were also some ambiguities about financial support for the CCP. Teachers felt that the district did not demonstrate commitment to the program in a holistic way. A

holistic commitment may be reflected by increased collaboration between district and school administrators toward increasing the "capacity of teachers to work by changing the contexts in which they work" (Fullan, 1993). Traditional assessment practices, dynamics of grade-level team work, and constraints imposed by rigid curricular structures are some key components of the context of teachers' work in Collier County, which had a negative influence on their efforts to implement the constructivist approaches in their classrooms. Holistic commitment addressing changes in these components can help alleviate several concerns expressed by teachers. Alleviation of these concerns may in turn increase the capacity of teachers to better implement the desired pedagogical approaches in their classrooms.

In Collier County, providing ongoing support to participating teachers, particularly those who were the lone participants from their schools, has been a challenge. Follow-up workshops during the fall and spring as well as monthly get-togethers were certainly helpful and, in some cases, even critical in preventing attrition within the CCP. Follow-up support has been found critical in ensuring behavioral change leading to increased classroom implementation of the desired pedagogical approaches by teachers (Guskey, 1995). To their credit, the district science coordinator and lead teachers in CCP have been actively engaged in devising better systems of support to improve program implementation. Some of these include special grants for teachers to access various resources; developing a 'buddy' system so teachers can share their questions, concerns, and insights with someone who is using similar modules at the same grade level; and greater communication between the district science coordinator and CCP teachers.

### **Lesson 4: Develop a readiness for change.**

A critical aspect of success in learning is the readiness (developmental, intellectual, and behavioral) to learn. Successful implementation of a professional development program, therefore, depends upon the extent to which individual teachers and district as a whole are ready to adopt

and implement the instructional approaches promoted by the program. If the program meets the teachers where they are (intellectually and in terms of teaching practice) and addresses their specific professional development needs, its implementation is more likely to be successful. The Collier County School District demonstrated readiness to adopt the Iowa Chautauqua model. This was clearly indicated by the district science coordinator's comments regarding district goals for professional development. With regard to teacher readiness, many participants were already using some facets of constructivism and were, therefore, somewhat ready to adopt this pedagogy, even though most of them indicated an ignorance of the term 'constructivism'. They welcomed the ICP model because it offered a broader, more comprehensive perspective of constructivist teaching and learning and enhanced teachers in applying constructivist principles more fully to their work.

While readiness regarding acceptance of the features of the model helped initiate the program in Collier County and drew teachers to participate, classroom implementation success was limited by the fact that there was insufficient readiness to make critical changes in various contexts of teachers' work. Readiness in terms of acceptance of the model and willingness to make necessary changes are both equally significant for successful implementation of any comprehensive program of professional development. This readiness can be achieved by collaboratively developing a shared vision for change and critically examining the theoretical and philosophical underpinnings of the professional development model or program to be adopted (in terms of its match with local goals and needs and the changes that may be necessary in the context of teachers' work in order to fully implement the program).

#### **Lesson 5: Work toward collaborative leadership.**

Initial leadership for implementing the Iowa Chautauqua model in Collier County was provided by the district science coordinator. With the help of a few teachers highly committed to improving science teaching and learning, the pro-

gram was pilot tested before being implemented. Positive results of the pilot test and leadership of the science coordinator served as primary stimulants for implementation. Subsequent sharing of leadership roles by teachers involved in the pilot test and others from the first year group served to lay grounds for program implementation during the second year. Our evaluation indicates that strong leadership provided by key individuals, such as the district science coordinator, is imperative to initial implementation of a new professional development effort.

However, we also realized that successful long-term implementation requires a sharing of leadership roles by teachers. One of the key elements of the Chautauqua model is to develop leadership among teachers. Teachers of the first year group began sharing leadership roles by the end of the fall workshop and were instrumental in setting up plans for the second year. Sharing of leadership roles enhances ownership of the program by teachers. Thus, they are more involved in designing program activities that are relevant to them. In other words, teachers begin to take charge of their own learning. The ownership and charge taken by teachers is critical for reforming professional development, so that it becomes an integral part of their professional lives rather than an extra activity added to their already busy schedules (Renyi, 1996). According to Lieberman and Miller (1986), both 'top-down' (leadership of key individuals such as the district science coordinator) and 'bottom-up' (involvement of participating teachers in leadership and decision-making roles) approaches are equally significant in improving program effectiveness. The charge taken by teachers of the first year group in the conduct of the CCP is well illustrated by modifications they initiated in their own program, which continued into the second year program. Some of these modifications include redesigning aspects of the budget to provide more resources specific to particular grade levels, changing the workshop structure to provide training sessions according to specific needs of the grade level teams, and allowing more time in the workshop schedule to digest the information and use it in developing the teaching modules.



## Conclusion: Let's Face the Challenge

Systemic reform of science teaching through professional development of science teachers demands collaborative teamwork involving teachers, school administrators, and district administrators. Reform of instruction in the classroom demands reform in several other areas as indicated above. These are imperative for increasing teacher 'capacity to work', which in turn leads to better implementation of the desired changes in classroom instruction. Redesigning professional development from 'one-stop' workshops to comprehensive programs, such as the ICP and CCP, is an intricately complex undertaking, which needs to be carefully thought out. The CCP example points to the fact that fundamental reform at the classroom level is intimately connected to reform of professional development at broader levels—in this case, the district level. Concerns expressed by teachers (regarding implementation of constructivist pedagogical approaches through teaching modules they designed) were directly related to broader issues of program implementation at the district level. Let us pay closer attention and more than 'lip service' to these intricacies in redesigning professional development.

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## References

- Dass, P. M. (1996). Professional development: The Iowa Chautauqua Model. *Science Education International*, 7(1), 18-21.
- Fielding, G., & Schalock, H. (1985). *Promoting the professional development of teachers and administrators*. Columbus, OH: ERIC Clearinghouse on Educational Management. (ERIC Document Reproduction Service No. EA 017 747).
- Fullan, M. G. (1995). The limits and the potential of professional development. In T. R. Guskey & M. Huberman (Eds.), *Professional development in education: New paradigms and practices*, pp. 253-267. New York: Teachers College Press.
- Fullan, M. G. (1993). *Change forces: Probing the depths of educational reform*. London, New York: Falmer Press.
- Guskey, T. R. (1995). Professional development in education: In search of the optimal mix. In T. R. Guskey & M. Huberman (Eds.), *Professional development in education: New paradigms and practices*, pp. 114-131. New York, NY: Teachers College Press.
- Lambert, L. (1984). *How adults learn: An interview study of leading researchers, policy makers, and staff developers*. Paper presented at the American Educational Research Association Annual Meeting, New Orleans, LA.
- Lieberman, A., & Miller, L. (1986). School improvement: Themes and variations. In A. Lieberman (Ed.), *Rethinking school improvement: Research, craft, and concept*. New York: Teachers College Press.
- National Research Council. (1996). *National science education standards*. Washington, DC: National Academy Press.
- National Science Teachers Association. (1992-93). *National science teachers association handbook*. Washington, DC: Author.
- Renyi, J. (Ed.). (1996). *Teachers take charge of their learning: Transforming professional development for student success*. Washington, DC: National Foundation for the Improvement of Education.
- Sparks, G. M. (1983). Synthesis of research on staff development for effective teaching. *Educational Leadership*, 41(3), 65-72.