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ABSTRACT

Close collaboration between professional educators in the interests of students must be supported and maintained if an equitable environment is to be created in schools. This paper describes a novel approach to the preparation of science and special education teachers in constructing curricula for science classrooms that include students with disabilities. Clear communication, purposeful intention towards student learning, and focused advanced planning will serve not just the students with identified needs but all students. (Contains 11 references.) (WRM)

SCIENCE INCLUSION IN A CLIMATE OF REFORM (SICOR)

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We are each provided with different strengths and weaknesses, but when the instructional environment supports each students use of their strengths to work towards their maximum potential, we set the ground work for equitable conditions beyond school. Close collaboration between professional educators in the interests of students must be supported and maintained if an equitable environment is to be created in schools. Not only does the area of the inclusion of students with special needs offer a great potential for supporting equity, equity is mandated by the laws and regulations supporting special education.

Inclusion is a fact of life that many teachers in secondary schools are forced to deal with, often without in-depth knowledge or proper support. Yet teachers are held accountable in meeting the needs of all students, whether those needs are special or not. How teachers construct and interpret curriculum at the classroom level is informed by years of experience as students and teachers. Basic assumptions about how students learn and how curriculum is constructed and enacted must be examined in order to create opportunities for meaningful learning in all students.

The purpose of this paper is to describe a novel approach to preparation of science and special education teachers in the construction of curriculum for science classrooms including students with disabilities. The basic is inclusion is constructively accomplished by design and collaboration, rather than by attempting to modify existing curriculum or lessons. Specific objectives include: (a) describing the activities of the SICOR, (b) describing potential research trajectories with respect to the effectiveness of the SICOR, and (c) discussing implications of SICOR for science and special educators as they relate the dual processes of science education curriculum reform and inclusive special education service delivery.

Background

The inclusion of students with special needs in the regular classroom has clearly become part of the overall educational landscape. Despite the sincere interest of many teachers to address the educational needs of all of their students (Scruggs & Mastropieri, 1994), the current emphasis on inclusion remains a source of frustration, misunderstanding, and distrust by teachers, parents, and students. Many regular educators are ill-prepared or supported to accept the challenges of teaching students with special needs.

Most people associate the term "special needs" or "disabilities" with students with orthopedic disabilities such as paraplegia, movement restriction, or visual and/or auditory impairments. Yet these students make up less than 4% of the total disabled population in schools (U.S. Department of Education, 1996). The majority of the disabled population has some form of learning disability, developmental disability, or combination of conditions that are neither as evident nor as well understood as physical disabilities. Teachers are responsible and held accountable for seeing that students' special needs are being met in the classroom, whether they are fully aware of how to deal with such disabilities or not.

Inclusion, or its predecessor mainstreaming, came about as a direct result of the passage of Public Law 94-142 in 1975, which specified that all students were to receive a "free and appropriate public education" in the "least restrictive environment." This has been interpreted as putting students with special needs, to the extent possible, in classrooms with non-disabled peers. The law further specified that each student have an Individualized Education Program (IEP). The IEP is to specify goals and objectives as well as spelling out specific modifications and accommodations that the school must make. This law was strengthened and reinterpreted in Public Law 101-476 or the Individuals with Disabilities Education Act (IDEA) of 1990 and 1997 (Epps, Neville, & Ormsby, 1997).

Science Education and Inclusion

Science education is in a unique position to serve the needs of students with special needs in that accommodations can easily be made part of the normal variation in instructional modes.

Hands-on learning, cooperative groups, dialogue and discussion, and authentic assessment, which figure prominently in current thinking on effective science teaching (Champagne, Newell, & Goodnough, 1996; Gabel, 1995), are also opportunities for accommodating students with special needs (Mastropieri & Scruggs, 1996).

The proposed collaboration between the science teacher and the special education teacher, however, places an increased demand on the already limited time of teachers in general. In fact, many of the workshops and guidebooks offered to teachers on classroom modifications become "just one more thing", and without a cogent plan and a sense of shared need, science teachers and special education teachers will not provide appropriate services to their special needs students.

In order for science teachers to facilitate the learning of their students with special needs, Scruggs and Mastropieri (1994) suggest seven items that support an inclusion plan:

1) <u>Administrative Support</u> - school administrators should demonstrate strong support for inclusion.
2) <u>Special Education Support</u> - direct assistance by special education teachers and staff should be evident.
3) <u>Accepting Classroom Atmosphere</u> - student diversity is clearly appreciated and recognized.
4) <u>Peer Assistance</u> - using nondisabled students as aides to students with disabilities.
5) <u>Appropriate Curriculum</u> - curriculum that does not exclude students by their special needs, i.e. text-dependent curriculum mismatched with dyslexic students.
6) <u>Effective Teaching Skills</u> - teachers possess a broad repetiore of instructional approaches.
7) <u>Disability-Specific Teaching Skills</u> - teachers adapt their instructional approaches to the needs of their students.

Furthermore, effective collaboration requires intrinsic motivation, commitment, and valued knowledge base between both participants in the partnership (Finson, 1998).

The SICOR Project

Science Inclusion in a Climate of Reform (SICOR) is a project that was developed at West Virginia University in response to the need to facilitate the collaboration of science and special educators in North-Central West Virginia. The objectives of SICOR are for teachers to:

1) acquire knowledge, skills, attitudes and practices related to co-teaching in science and special education;
2) develop methods for planning and implementing instruction in science with regard to specific science content areas, Coordinated and Thematic Science (CATS) and th
3) develop methods for utilizing West Virginia Science Instructional Goals and Objectives (IGOs) and Individual Education Plans (IEPs) of students with disabiliti

SICOR was piloted in 1997 with a group of 12 elementary and middle school science and special education teachers. Their task as part of the workshop phase was to generate CATS instructional module components that included specific accommodations for students with disabilities, as described in several case studies of special needs students. The original project met its initial goals, but faced difficulty in that many of the discussions and lesson frameworks developed by the participants were in the abstract and often divergent with respect to their actual instructional needs.

During the summer of 1998, another group of 14 science and special education teachers were recruited to participate in a two week workshop that built upon the previous year's work. Consistent with the CATS program, teachers received instruction around a central theme, in this case "Earth and Space." Science content and activities were built around the four major science content areas (Earth Science, Physics, Chemistry, and Life Science). After participating in specific science learning activities, teams of science and special educators scanned the state science framework for grade-level specific objectives. Once the objectives were identified, they were grouped by investigative questions. The teams then began the development of Learning Cycle Lesson plans that included the content of the workshop modules suitably modified to the teams' grade levels.

Simultaneously, each team referred a specific "case" student with special needs in considering the accommodations needed in instruction. The cases, which were generated by the teams, consisted of a rich description of the student, identifying disabilities and history. The case also specified general accommodations that were needed as well as a prototypical IEP. In each phase of the Learning Cycle lesson plan, the teams inserted specific accommodations that met the needs of the case student. At the completion of the workshop, the teams defined their action plans for the Fall of 1998 in their classrooms and for their participation in the West Virginia Council of Exceptional Children (WVCEC) and West Virginia Science Teachers Association (WVSTA).

Much of the previous work that has been developed with respect to science inclusion has been divergent, in that experts have provided science teachers with specific and useful strategies to use with students that have particular special needs or disabilities. The science teacher and the special education teacher work largely separately and independently, with the science teacher translating science curriculum into instruction and the special education teacher interpreting the IEP. SICOR differs from previous work in that it is convergent, such that the student's IEP and the state curriculum are considered concurrently in the development of the lesson. As a result, the science and special educators become teammates in a common cause. They have a shared context for co-planning and co-teaching as the circumstances allow. Furthermore, it is anticipated that teams of teachers will be able to leverage more administrative support for co-planning and co-teaching than individual teachers alone (Koballa & Pyle, 1995). The work that has been generated by the 1998 SICOR teams thus far indicates that inclusion can become anticipated and often times seamless in terms of implementation in the class. This presentation will share examples of their work.

Assuming one knew that a particular student had special needs and an IEP, a means of serving that student's needs would be in designing lessons and assessments for inclusion from the start rather than attempting to devise modifications later (Pugach & Warger, 1996; Pyle &

Butera, 1997). In designing instruction for inclusion, a teacher should start by concentrating on the strengths identified in a student's IEP. A well prepared IEP should contain both the strengths and deficits of a student. By working with the strengths, teachers can attempt to generalize learning into other areas. The IEP document is the tool that serves to focus the selection of instructional approaches as much as the curriculum determines the content to be addressed. Bear in mind, IDEA specifies that both parents and regular educators participate in the development of the IEP, so teachers should ask parents for information to best help their child get the most from what the school has to offer. Principals can support inclusion by facilitating teachers attending IEP meetings and providing the resources necessary to carry out both the science curriculum and the IEP.

During the Fall of 1998, several SICOR participants were able to participate in team presentations at the WVCEC and WVSTA meetings. A novel format was adopted such that each member of the SICOR team adopted a role as one of the case students, acting out to the best of their abilities the various behaviors and limitations of their student. They performed their role without the prior knowledge of the remainder of the audience, who assumed that the SICOR participants were at the session for the same reasons as they were.The representations in the cases were authentic in that they represented students that the participants had had direct personal experience with. Furthermore, the guidelines suggested by Epps (1997?) that simulations involve debriefing, descriptions of limitations, and adequate time devoted to the simulation were used as a regular part of the simulation. Session attendees were provided with the overall framework of the activity, descriptions of the representation of the case students modeled, and a direct application of the collaborative model applied in the SICOR program. Both sessions were well received by the audience, with session evaluations averaging approximately 4.8 on a 5 point scale. Evaluation of the impact of SICOR on the students of past participants will continue throughout 1999.

Potential for Research

Because of the controversial nature of inclusion in any classroom setting, careful evaluation of any project's effectiveness is required. Furthermore, dissemination of effective program elements is of critical importance. A primary audience for such research is science teacher educators who wish to best prepare prospective teachers. Other audiences are parents, school board officials, and clinical diagnosticians, all of whom generally have limited information about inclusion but have primary decision-making responsibilities.

One line of research that would be particularly important to define would be the effects of interventions such as SICOR on special needs students' progress towards both IEP and academic goals. Data such as these are readily quantifiable, but their equivalence is an issue of concern. In particular, IEP goals are by their very nature idiosyncratic and cannot generally be norm-referenced. On the other hand, many special needs students are exempted from the normal standardized testing procedures, as the nature of some of the tests are in direct contradiction with IEP-stated modifications and accommodations, such as additional test time, tests read aloud, etc. The highest legal authority in such cases is the IEP. In addition, sensitivity by many special needs students' parents might preclude the direct use of data gathered from these students. Thus, both methodologic and ethical obstacles exist for quantitative research. These obstacles do, of course, exist for qualitative approaches as well. Interviewing or observing a special needs student, without a deep familiarity with the exact nature of the student's disability produces a threat to the validity of studies employing such an approach.

That is not to say, however, the picture is bleak for research on science inclusion. The unique nature of the science classroom and the activities that can occur within make it fertile ground for understanding how all students can learn, as certain science related tasks fit very well into individual students' strengths, whether they are disabled or not. Anecdotal evidence suggests that inclusion increases a classes' or small group's cohesiveness, as students without special needs "look out for" the student with special needs. They can, in fact, become quite defensive. The capacity for a teacher to take advantage of such cohesiveness in instruction would seem to increase the chances of meeting academic and IEP goals. The framework for doing this, however, is only in its infancy.

The future of inclusion is not at all certain. It will depend upon the willingness of all parties to adopt a student-centered approach. This approach, however, cannot always be guaranteed. Some possible futures include:

- Polarization: Between teachers and administration;
  Between parents and school systems;
  Between parents of "regular" students and parents of students with special needs;
- Stagnation: Teachers burdened with additional demands on limited time;
  Parents confused about disabilities, regulations, and documentation;
  Administrations overwhelmed by and increasing caseload;
- Maturation: Science and special educators comfortable with learner-centered collabor
  Science planning, instruction, and assessment that meets the needs of <u>all</u> students;
  Teachers receiving support for co-planing and co-teaching.

Given sincere work by all parties, maturation is possible, but it will not be easy or quick in coming. Projects such as SICOR offer a mechanism for teachers to make the appropriate choices from professional expertise and not external coercion.

Conclusions

Inclusion of students in the regular classroom is a fact of life now for many teachers, but it need not be feared, both in terms of one's own teaching as well as the impact of inclusion on students without special needs. Rather than being cast to one's own devices, structures such as the IEP and curriculum are the primary tools at a teacher's disposal. On the next level, the support of the special education staff and the student's parents are also available, but only to the extent that there is open communication and a common language and mind set. Special educators are generally not well versed in science, just as many teachers (and most parents!) are not well versed in the complexities of their child's special needs as well or the services associated with the education of students with special needs. Clear communication, purposeful intention towards student learning, and focused advanced planning will serve well not just the students with identified needs, but all students.

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