Biology in the 21st Century

Using Interactive Technology to support students with disabilities in a general education classroom
Description

Biology in the 21st Century will provide students with disabilities access to a 3D whiteboard and supporting software. The technology will be used to pre-teach and re-teach biology concepts for students needing additional exposure to master the targeted biology concept. The technology can be used to create an interactive hands-on learning experience for students who may not master lessons within a traditional classroom.
Statement of need

Biology in the 21st Century is a project designed to increase the number of special education students who master Arizona state biology standards and obtain passing grades within general education biology classes. Biology in the 21st Century is also designed to increase student interest and motivation in the sciences.

Special education students at the general education biology class, but no specific special education courses exist for the teaching of biology. Special education students are included within the general education biology class with the support of accommodations and modifications, but these are not always enough support for students to find success. In one specific section of biology of the 9 special education students only 3 are currently passing without modifications to their grades. The trend is similar in all biology classes. Traditionally special education students have had their course, test, or classroom work grades modified to allow them to pass the course and meet graduation requirements. This does not need to be the case.

Biology in the 21st Century would provide pre-teaching and re-teaching opportunities to special education students so that they could learn the biology concepts at a level comparable to general education peers. Not only would Biology in the 21st Century provide pre-teaching and re-teaching opportunities, but it would also provide a different learning modality. Biology in the 21st Century would provide hands on interactive learning opportunities for students. According to T. Farwell’s article on visual, auditory, and kinesthetic learning styles 20% of student learning by hearing, 30-40% learn by reading or seeing while taking notes, the remaining 40-50% must learn by interacting
with the material. These statistics are based on general learners and do not specifically relate to the 15-20% of school age children who have specific learning disabilities. The need for hands on learning experiences are even higher for this population of student. Biology in the 21st Century is designed to provide the much needed hands on learning experiences for the students who most need it.

Biology in the 21st Century will specifically provide students access to an interactive white board with 3D imaging software. SPR would provide the interactive white board and other needed hardware to support this project. This technology will allow students to interact with biology concepts being presented in their general education classroom. Access to the technology will be provided in addition to their general education class to extend their access to the biology concepts and provide additional learning opportunities.

It is a high needs district that has taken reductions in annual budgets each year for the past four years due to state and local budget reductions. It is a title one school with more than 75% of our student population living in low income areas. The majority of students come from the city of which had an annual family income below $20,000 in 2011 as reported by the mayor's office. The special education population has an even higher percentage of economically disadvantaged students with more than 75% qualifying for free and reduced lunch.
Project description and timeline

Timeline:

Biology in the 21st Century would be a yearlong project that would be repeated in future years if successful. The project would begin in August of the 2012 school year.

Components:

- Co-teaching between the general education and special education teacher within the general education biology class
- Common planning time for the general education and special education teacher
- Pre-teaching/re-teaching time for special education students with the special education teacher
- Access to interactive technology for special education students

Biology in the 21st Century is one part of a larger project designed to increase the success of special education students within the general education biology classroom. The special education teacher began implementing co-teaching within the general education biology classroom during the 2011-2012 school year to allow for re-teaching of course concepts during students’ special education study skills class. The intent was for the special education teacher to support special education students during the general education class, but the teaching team found that the real impact came during the special education students study skills class when they could ask for re-teaching of concepts they had not mastered during the general education class. The special education teacher having witnessed the lesson and having copies of classroom materials was prepared to
meet students’ needs. The model of co-teaching has allowed special education students to pass the general education biology class with the accommodations and modifications stated in their individual education plans.

Biology in the 21st Century would take this model one step further by providing the special education teacher and special education students access to technology that would allow for interactive re-teaching using interactive software that is directly aligned with state and national biology standards. One example of an activity that could be improved using this resource would be the teaching of mitosis (cell reproduction). Within the classroom students viewed videos and read text describing mitosis. Using the technology students could actually model mitosis using the interactive white board by pulling apart the cell with their hands. The interactive white board would also allow students to label parts of the cell or even phases of mitosis while the student modeled the process.

Another activity students could use the interactive white board for during this same lesson would be to pause video viewed in the classroom and label still frames from the video making the video which is visual learning into kinetic learning. The 3D hardware available with the interactive white board would allow students to create and view cells as three dimensional creations making the concepts come alive.

... will be investing in improvement of the co-teaching model so that the special education and general education teacher have common planning time which would allow the special education teacher to know the vocabulary and concepts students would be presented in upcoming lessons allow for pre-teach vocabulary and concepts to the special education students providing them the additional
exposure they need to be successful. This is being done in response to effective teaching practices for special education students which has found that providing typical vocabulary lists is ineffective for special education students who need real world applications for these words before mastering them.

provides special education students opportunities during their school day to access the special education teacher for re-teaching of concepts as well as direct teaching of study skills. With the changes in the co-teaching model this time could also be used for pre-teaching of upcoming vocabulary and concepts. Providing pre-teaching in a special education setting allows students to feel more comfortable with the language and concepts within the general education classroom which increases students motivation within the class 2010 article on pre-teaching at risk students specifically looked at the impact of pre-teaching special education students included in a general education science class. The article found that pre-teaching increase student academic success as well s student attitudes towards the subject matter. Specifically students reported they felt more prepared to answer questions in class and were more willing to respond during class and group discussions. Biology in the 21st Century would allow students to be active participants within their general education biology class.
Goals:

- Decrease student failure rate in the general education biology class by 20%
- Increase student motivation in the sciences
- Increase student performance on state science test (AIMS Science) by 10%
- Increase student knowledge of scientific concepts and how it applies to their daily lives
- Increase opportunities for hands on learning during the students school day by 20%

Biology in the 21st Century is a project designed to meet the needs of special education students. The project will target the heart of the problem by increasing student motivation and reduce student anxiety within the general education classroom. The project will increase student learning with byproducts of increased state test scores and decreased failure rates. Providing students with interactive learning opportunities designed to meet their specific learning styles and leaning needs has worked in previous projects I have created. The ESS English program is one example of including more interactive learning opportunities. Within this program student success rate increase with students self reporting an increase in self confidence and academic motivation. There were also 3 students who moved from a special education setting to a general education setting based on their increased skills and motivation to maintain high grades. Students have reported that not only do perform better within these programs but it increased their
overall outlook and motivation towards school. The more programs in place to meet the
needs of special education learners the less drop outs and late graduates the school will see.
Student impact

Biology in the 21st Century is designed to impact the special education students in the general education biology class. The predicted number of special education students within the general education biology curriculum for the 2012 school year is roughly 30-45. These students will be provided direct access to the hands on interactive pre-teaching and re-teaching during their school day and after school hours through pre-determined tutoring times. There is also a possibility for using the interactive hands on technology for the entire biology class. The interactive white board would be contained in a resource classroom, but there is nothing to prevent the general education teacher from using the resource classroom for part of the school day to provide instruction to the whole class using the technology. It is also possible for the special education teacher to switch rooms with other teachers for one or more periods on a given day to allow others to utilize the technology. The interactive white board would have to be installed into the resource classroom which reduces the amount of use other teachers and students would have, but with proper scheduling it is possible to impact a great number of the 2,000+ students on campus. Less than 10% of 1 students do not take biology and are assigned to functional life skill classes or advanced placement sciences other than biology based on specific career path interests. The general education and special education teacher would be co-teaching at least one section of biology and could easily plan to provide access to the estimated 180 biology students during the 2012-2013 school year. With careful planning and interest on the part of other teachers all sections of biology taught by any teacher could be offered some benefit through tutoring and re-teaching times during the school day.
In the future if Casa Grande Union High School continues to develop its co-teaching practice there is a chance that they could employ the universally designed instruction model which would allow all students to participate in pre-teaching and re-teaching as determined my pre and post unit testing. This would ensure that all 180 estimated students had access to the technology as determined by specific needs. Currently, general education students have access to re-teaching with the special education teacher during after school tutoring hours.

Biology is typically a sophomore science class so the majority of students impacted by this project would be 10th grade students. There are a few students who are in 11th or 12th grade that because of scheduling conflicts take biology in their high school career. There are also approximately 10-15% of students who do not pass biology and must re-take the class after their sophomore year in order to gain needed graduation credit.

Biology in the 21st Century will have an impact beyond the few students assigned to the resource pre-teaching and re-teaching session. The teacher coordinating the Biology in the 21st Century project will work to involve family members of the at risk students to create school family connections and school community connections. The Biology in the 21st Century coordinator will also provide profession development to staff at well as staff within the to expand the use of interactive white boards for pre-teaching and re-teaching and to expand the use of pre-teaching and re-teaching within the science content area.

Biology in the 21st Century will also have a family and community component. There will be at least two family nights to showcase the use of the interactive white board as an
educational tool. The teacher coordinating Biology in the 21st Century will host at least one parent night per semester to demonstrate the use of the interactive white board and provide time for students and families to utilize the white board together. Other hands on projects will also be demonstrated on these nights allowing parents the opportunity to have practical hands on experience with the tools their child is using to master biology concepts. During the 2011 school year a make it take it night (a night in which parents were offered the chance to make educational material to take home and use) was done for literature and parents who attended this family night reported that they felt more comfortable asking their child about their class work as well as providing support. Family nights for Biology in the 21st Century will have the same goals.

Biology in the 21st Century will also have a staff professional development component. The Biology in the 21st Century coordinator will host at least one staff development session to demonstrate the use of the interactive white board in providing pre-teaching and re-teaching opportunities for students. There are currently 7 classrooms that have interactive white boards and two more being set up for the 2012 school year. Teachers within these rooms may be able to implement similar lessons within their rooms to provide pre-teaching or re-teaching to at risk students. Professional development will also be provided to other science content teachers to expand the practice of pre-teaching and re-teaching within science classes.
Innovation

Using interactive smart boards to teach biology is not a new concept. Using interactive white boards to provide targeted pre-teaching and re-teaching based on assessment data to at risk students is a new concept. Since the number of students this project targets is smaller than the typical classroom project, students will gain even more hands on time with the technology. The way the inactive white board will be used will be different than in the traditional classroom. The smaller number of students will allow the white board to be used as a center for small group instruction or even one to one review for a specific student for a specific topic. This is not something that can be easily achieved in a large classroom. The impact of the technology on individual learners will be much greater. Targeting individual learners with individual needs will also ensure that the technology is being used to help students master specific biology concepts rather than becoming just another classroom tool for the teachers benefit.

Biology in the 21st Century also provides some flexibility in using the technology for the general biology lessons where modeling processes on an interactive white board is far better than traditional models. One particular example from our current biology course would be when we have students model mitosis (cell reproduction) using sheets of paper. The entire class would have benefited from seeing the process done on an interactive white board that would allow the teacher to move pieces around prior to doing their own modeling. The modeling was not possible given our current resources and so the co-teachers spent time modeling the process individually to more than half the class so that students understood the purpose of the lab.
Budget

The money being request for Biology in the 21st Century will provide for new technology to be installed into the resource classroom. Only the physical technology items are being requested through this grant.

SRP will provide labor and materials for the installation of the equipment, training for both co-teachers, software for the equipment as well as ongoing software updates, and maintenance of the equipment.

will also continue the co-teaching model within the biology class to allow for the implementation of the project. SRP will provide a onetime contribution while will provide ongoing funding and support for the implementation of this project.

Interactive white board with 3D imaging capabilities $2,250
Installation of interactive white board by certified tech $1,000
Document Camera $1,000
3D Reality Cube $50

Total $4,300
District covered Expenses

Interactive White Board Software $500.00

Installation of and updates of white board software $200.00

Maintenance of technology and software (labor yearly) $100.00

Training of co-teachers on how to implement the technology $500.00

Co-teaching and planning expenses dependent on number of co-teaching hours and salary of teachers. This year the expense amount for 1/5 of a full time teacher contract is estimated at $10,000

Estimated total $11,300.00
Evaluation process

Biology in the 21st Century will be evaluated given a number of indicators.

1) Decreased number of failing students

The most significant indicator will be end of quarter student grades. We will be comparing 2012 quarter grades to 2011 quarter grades and will be looking for a decrease in the number of students failing. We will monitor both general education students and special education students, but will be looking for a significant decrease in failing grades within the special education population.

2) Increased state test scores

The majority of students in the biology class are sophomores and will take the Arizona State Science tests (AIMS Science) during the spring. We will compare 2011 school AIMS Science scores with 2012 AIMS Science scores for all students and also the sub category of special education students.

This data will not be available until the beginning of the 2013 school year and will not be reportable on the one year review of the project.

3) Increased student motivation

Motivation on the part of special education students in the general education biology classroom will be measured in two ways.
First, motivation will be monitored by the number of missing assignments students have within the class. Increased motivation in the classroom typically positively impacts student work completion. Data will be collected each quarter on the number of assignments students have missed during the school year while using the project. The number of missing assignments should decrease. We will also compare the number of missing assignments for special education students to the class average number of missing assignments.

Secondly, motivation will be measured by student surveys. Pre and post surveys are a common tool in the special education setting to allow students to anonymously rate and report their level of motivation and comfort.

4) Student mastery of biology concepts

Mastery of the biology concepts will be measured for all students through the development and implementation of pre and post unit testing. This testing will also be used to further understand what concepts individual students may need re-teaching on.
References

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