TITLE

Students creating science learning resources

VISION (ASPIRATION AND AIMS)

- Students support one another as they learn difficult concepts in science
- Students collaboratively create exhibits that can be used teach the difficult concepts learned
- Exhibits are used to teach younger children or those in future years

BACKGROUND MOTIVATION STATEMENT

Science teachers find that some topics in the curriculum are hard for students to grasp and it can be a struggle to keep students interested in the subject. Each year, a teacher is introduced to a new group of children and must deal with the challenge of understanding if the new students have already grasped the pre-requisites for the most challenging topics or how each student best learns. The challenge therefore is to devise learning experiences that support this understanding and also stimulate students' curiosity and interest in science.

NARRATIVE

As a science teacher in a transition year, I try to get students interested in topics by asking them to teach each other and the younger year groups.

First, I administer a formative assessment that covers both the pre-requisite curriculum and this year's curriculum. Then, I form small groups of students mixing those who show they know certain concepts well with others who do not. Each group is tasked with creating a multimedia interactive science museum "exhibit" to teach a concept from the curriculum.

I point the students to textbook and online resources (eg resources from the Learning Resource Exchange - lre.eun.org) that are related to the concept. They learn as a group, and those who already showed proficiency can help their peers. I give them sample problems and worksheets that they can use to check that everyone in the group understands the concept sufficiently.

The group picks one or two of the methods they have used to learn and that have worked well for them and creates their own "virtual science museum exhibit". The students have quite a bit of freedom over how to construct their exhibit: it might be a poster, a physical or virtual simulation, a video recording of a lecture, a rap song, or a puppet play. There are few limits to their creativity! Each group creates a few sample problems to accompany their exhibit.

At a timely and appropriate point in the school year, all the students in my class present their exhibits to children from an earlier grade (possibly at a feeder primary school). Beforehand, I assess their work for accuracy and completeness and offer suggestions for improvements. I also usually encourage groups to involve an external expert (eg a curator from the science museum or a professor from the university). Later in the year I use the problem sets each group created in year-end subject reviews before final exams. Finally, the exhibits are uploaded to the iTEC learning resource exchange. Next year I will use them to help enliven and enrich my lessons, making science accessible in ways that were proven effective by students the year before.

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TREND/S

A growing MST (Mathematics, Science and Technology) skills gap

Although predictions of actual human resource requirements for the next 5-10 years are difficult, many employers in Europe believe that the potential demand for MST (Mathematics, Science and Technology) skills is likely to increase.

Enhanced professional development

There is a trend of increased emphasis on teacher professional development, in which the use of technology plays an important part. For example, technology is used to create collaborative platforms and communities of practice to bring life to the "hard to teach" and "hard to understand" areas of the curriculum, like MST (Mathematics, Science and Technology), thus engaging students with such crucial subjects.

The challenges of fostering MST (Mathematics, Science and Technology): tackling lack of interest

There is currently a great emphasis on MST skills, but teachers face challenges when supporting such skills in the classroom. There is a lack of interest from students (particularly girls) in MST subjects and jobs compared to other disciplines and professions.

KEY CONCEPTS

Engagement, scientific exploration, using formative assessment to optimise student collaboration, resource development and reuse, peer tutoring

ENVIRONMENT

- traditional classroom is the place where most of the activity happens
- computer labs where students can record and compose their learning resources
- Learning Resource Exchange is the space where the learning resources are shared
- another school as a potential venue for presentation of science exhibits

PEOPLE & ROLES

- teacher in a traditional role as the person who assesses student performance and organizes students and directs them to appropriate learning resources
- students in traditional roles as individual learners and peer collaborators
- students in innovative roles as peer tutors within small groups and composers of learning resources for other students
- external experts as advisors providing feedback on learning resources created by students

INTERACTIONS (INCL. PEDAGOGIES)

- teacher organizes students into small groups
- teacher directs groups to appropriate resources
- teacher assesses student comprehension and exhibits
- students interact in their small groups to support each others' learning
- students collaborate to compose their science exhibit
- external experts advise students on their presentations
- teachers and students use exhibits as learning resources

ACTIVITIES

- formative assessment
- organizing students into optimized groups
- directing students to learning resources
- learning from each other
- assessing student comprehension
- creating learning resources
- seeking expert advice
- end-of-module diagnosis and consolidation
- collaborating between schools

RESOURCES (INCL. TECHNOLOGIES)

- formative assessments mapped to the curriculum to provide an analysis on a per-student basis
- Learning Resource Exchange
- video/audio recording equipment for recording science exhibits
- multimedia authoring tools e.g., video editing, podcasts, presentations
- physical materials and resources for creating simulations and exhibits
- virtual simulation environments e.g., Sodaplay, Algorix