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The big question which has arisen with the growth of ICT is how to incorporate this new technology into existing curriculum. The authors relate how they established a viable cooperation and transfer of knowledge between subjects Biology and ICT in their school in Slovenia. The result was that their students produced more than 150 biological Web pages, covering topics like evolution, genetics, human anatomy, birds and mammals. During the implementation of this program, the authors relate that they can achieve desirable outcomes only through cooperation between the teachers of IT and biology. The first underlying reason is that the IT teacher cannot be an expert in every discipline, so she cannot recognize if web pages produced by the students contains data from corrupted sources, is trivial, or even wrong. Without cooperation, students would produce technically correct Web pages but with questionable content. As such, the authors suggest that work must be carefully balanced between teachers, so students are taught things about computer and they get to put their knowledge into practice in other subjects.

Descriptors: [Foreign Countries](#), [Cooperation](#), [Teacher Collaboration](#), [Interprofessional Relationship](#), [Biology](#), [Computer Uses in Education](#), [Information Technology](#), [Interdisciplinary Approach](#)

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**RELATIONSHIPS IN TEAMWORK - BETWEEN COOPERATION AND PARASITISM**

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**ABSTRACT**

There is a large set of relationships between organisms in communities, ranging from parasitism to co-operation. Authors compare relations in teamwork using analogy from Nature. When working together on web-based projects they observed, you can only get to the final product by co-operating: every partner needs to know his/her place.

**KEYWORDS:** co-operative learning, improving classroom teaching, interdisciplinary projects, pedagogical issues, teaching strategies

## INTRODUCTION

A Swiss army knife is a great thing, everything that you need is in your pocket: knife, scissors, screw-driver, can opener, and many other tools. However we are sure that you would not be happy if your hairdresser tried to cut your hair with it, and a kitchen knife serves better for chopping vegetables. What's the difference? A kitchen knife and hairstylists' scissors are tailored for only one single purpose, and no sane person would ever use a knife for hairdressing or scissors for chopping carrots.

The big question has arisen with the growth of ICT of how to incorporate this new technology into existing curriculums. In reality there are two possible ways. Some would prefer to see ICT as a tool in every single subject, whilst others would prefer it as a distinctive subject. In the first case we could see a teacher of, for example, biology, using it as a multipurpose tool with one extra function. In the second case the students would be taught by a teacher who is expert in computers so we could see her, by analogy, as a specialized tool.

At the grammar-schools (K9 - K12) in Slovenia, ICT is more or less concentrated in one subject (Information Technology) and the use of computer outside this subject is rare.

Crosscurricular themes and connections between subjects was one of the highest priorities of Slovene school reform (Marentič - Požarnik 1997, Svetlik 1997). Five years later we can observe that, in reality, subjects are still like isolated fortified islands where teachers defend their territories against intruders from other fields. The authors of this article were aware of this situation, so they tried to establish viable co-operation and transfer of the knowledge between subjects - biology and ICT at their school (Šorgo and Logar 1999). The result was

that their students produced about 150 biological web pages, covered topics like evolution, genetics, human anatomy, birds and mammals in the last four years, with plans for more.

In a situation where two teachers work with the same students on the same project we must add to the traditional teacher – student relationship, a teacher – teacher relationship. From former experiences we know that a lot of great projects were never finished or results were below expectations, because something went wrong in this relation.

After our second year we made analysis of our co-operation. The question was: is co-operation between two teachers always something positive for them?

To find the answer to this question we used an ecological analogy. From ecology we know that, in nature, in every relation between two individuals or species in a community one or other partner can benefit from this relation, or can have a loss, or neither benefit nor lose (Odum 1971, Tarman 1992).

## **METHODOLOGY**

The methodology was simple. We rewrite from the ecological textbooks (Odum 1971, Tarman 1992) all cited the relations between species in a community into a spreadsheet. Everyone of us was forced to find his/hers analogy from school life to the biological realm. Where there were two possibilities, like in parasitism where one of the partners could be host or parasite, everybody wrote both possibilities. After this first step we discussed outcomes. In this way we were able to compare different views, one from the point of view of IT teacher and the other

from the point of view the science teacher. In the analysis of possible relations we had taken a teacher from each subject as a member of a different species in the relation.

## **RELATIONSHIPS**

### **Predation and parasitism**

Both relations have in common that one of the partners benefits and the other has losses. The differences are: i) predation is the short term and parasitism the long term process; ii) in predation the prey is instantly dead. The examples from nature are well known: foxes and buzzards are predators and mice are prey. There is no doubt that predator benefits and prey loses. Parasitism is a long-term process, so a dog as a host can have fleas or a tapeworm, both feeding from its body fluids for its whole life.

Fortunately we can recognize only parasitism in a school. We can observe that some teachers live at a cost to others. We can recognize two types of parasitism between teachers. In the first case, one of the teachers can be a parasite on several others, like a mosquito sucking blood from a herd of animals. A drop of blood here, a drop there, and in the end it is fed. The damage to every single host animal is minor unless there are too many parasites. Smart teachers can be a parasite for years and nobody would even recognize a parasite, because the loss for single host teacher is small. We must not mix parasitism with co-operation, when teachers help each other. The other kind is one by one parasitism, like a tapeworm in a small intestine. In this case one of the teachers is as parasite towards the other teacher. In some cases the relation can last for decades.

When working on a computer based project an IT teacher can use other teacher(s) as a corrector(s) for her projects without even mentioning him as a co-worker. Other teachers can be a valuable source of information and her students can be regular visitors to other teacher(s). In this case an other teacher(s) lose his/her time without benefits.

On the contrary, others can be a parasite on the IT teacher. It is common that the whole pedagogical staff ask for help with computers, during IT teacher's free time.

### **Competition**

In nature, competition is one of the commonest relationsh. We can observe competition within and between species. Organisms from different species can compete for food, nesting grounds, etc... Within species they can compete for everything as between species plus mating partners. In competition both partners lose because they must share a resource. In the absence of others, a whole resource could belong just to one species.

We will discuss only the competition between teachers teaching different subjects. In our practice we observed competition between teachers for the best students. The reason is that with them a teacher can finish his project and get credits for a reasonable amount of work in a reasonable time. Every teacher knows how those angels are rare who understand maths, can sing or play an instrument, can write an essay, understand computers and are unable to say 'no' to the teacher who would like to involve them in their project. There are other students too, but nobody will compete for them.

The other competition is for limited amounts of money to buy 'goodies' like computers, microscopes, books, etc. We can be sure that every single teacher is able to spend a whole school budget single handed. The problem with IT teachers is that they are able to spend a school budget not for a year but for a decade. Everyone who has exchanged more than three sentences with them, knows all about lamentations concerning processor speed and insufficient memory.

### **Amensalism**

In this case one of the partners has no benefit or loss but the other partner loses. In nature we can observe that some blue green bacteria excretes poisons into the water. The result is dead fish without any good reason. The other case is moulds secreting antibiotics which kill bacteria. It is unclear if the moulds benefited, but the bacteria lost for sure.

Commonly we can observe similar situations at schools but normally not in teachers but in students. It is called vandalism, students damage things without any sane reason.

Amensalism between teachers is when one teacher tries to inhibit the work of the others, without any particular reason.

### **Neutralism**

It is a relation where there is no direct relation between species. It does not mean that they are not connected in some indirect way or through some other species. In the forest, for example, there is no direct connection between bears and tits but they breathe the same air, etc.

At our school (and we believe that at other schools this is probably equal) this is the commonest relation of all. Teachers live on their own small planets, like persons in Saint - Exupery's Little Prince. The most important connection is indirect through their students.

All teamwork between teachers is excluded by definition, even if they alone make great projects.

### **Commensalism**

One of the partners benefits, the other neither benefits nor loses. So a bird can nest in a tree (benefit) without either visible damage or a plus for the tree. Our houses and apartments are full of tiny animals eating our dandruff or scraps of food.

The relation can go in both directions. A science teacher can use knowledge of students gained at IT lessons. Students are able to prepare their reports using word-processors or spreadsheets or even produce instructional materials for him. In contrast IT teacher can use knowledge about proposals in writing a project. For sure, all of us have benefited from teachers who taught us to write or calculate.

### **Protocooperation and mutualism**

Both partners benefit. The difference is that mutualism obligates both partners and protocooperation does not. The textbook example for mutualism is cooperation between termites and microbes in their intestine. The great African herds are an example of



protocooperation. In such herd there are animals with good sight, the others have excellent smell or hearing. A panic run is a signal for every other animal that something is wrong.

In a school both teachers must find their interest in cooperation and see the benefits for them. It is too optimistic to say that benefit must be totally equal, which would be ideal. At least benefit must be in correlation with the work invested in the project. To reach this ideal, teachers must find time for a long talk with totally open cards. In our case the IT teacher is totally competent for technical work details. She has her set of tasks which must be reached by students. Students must be able to choose background, find appropriate fonts, set links, incorporate pictures, make their animation, etc... The science teacher must care only about the quality of a text. It is not for him to teach students about computer graphics, but it is not for her to say whether the picture is appropriate or not. The end product - in our case a web page - has a value for both partners, not forgetting the student. He /she gets, for his/ her work, credits in two subjects, IT and biology.

## **Conclusion**

In our efforts to maximize the benefits of ICT in the production of students' biological web-pages we have recognized that we can achieve desirable outcomes only through cooperation between the teachers of IT and biology. The first underlying reason is that the IT teacher can not be an expert in every discipline, so she can not recognize if web pages produced by the students contains data from corrupted sources, is trivial, or even wrong. Without cooperation, in this case, students would produce technically correct web pages but with questionable content. On the other hand a biology teacher who wants to incorporate ICT in his lessons and is not an expert in IT would produce technically poor pages with correct content. To reach the desired outcomes, the work must be carefully balanced between teachers, so students are

taught things about computers and software by a professional, and they get a chance to put their knowledge into practice in other subjects.

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