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Les hauts et les bas de la biologie
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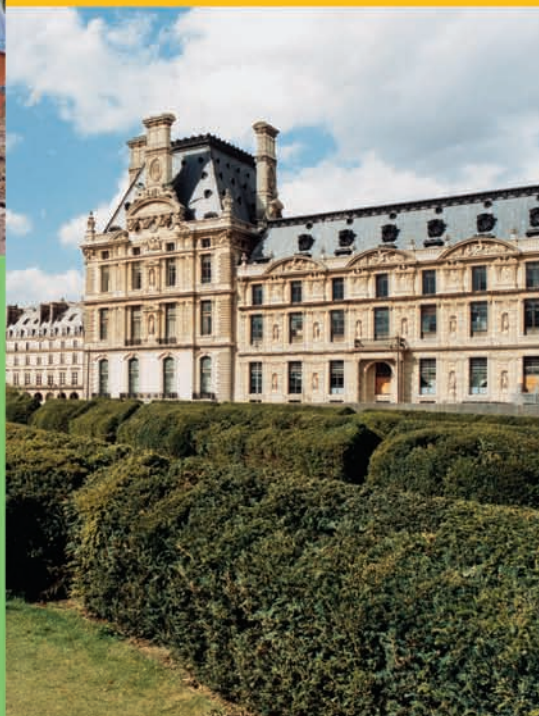
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10/21

FEATURES

**The Highs and Lows
of High School Space Biology** 10
— *Lesley Roberts and Richard Wassersug, PhD*

**Les hauts et les bas de la biologie
spatiale à l'école secondaire** 21
— *Lesley Roberts and Richard Wassersug, PhD*

**13th Annual
Technology Supplement** 24
— *Laurel Rhind and Krista Glen*

COLUMNS

Futures/Le Futur 7/8
Cutting our culture adrift/
Arrêter la dérive de notre culture
— *Richard Worzel*

Web Stuff 20
Notable Sites for Teachers
— *Marjan Glavac*



24



13

DEPARTMENTS

CURRICULA 13

Library of Parliament: People and Parliament
Bibliothèque du Parlement : Le public et le Parlement

Ad Index 29

What do a snake, an aircraft and a group of high school students all have in common? Science, of course!

If this sounds like an unlikely combination to you and your students, then you can learn from scientist Richard Wassersug and student Lesley Roberts. In this issue, we feature their article, *The Highs and Lows of High School Space Biology*, which includes a rundown of their fascinating parabolic flight experiment and how you can conduct a similar project in your classroom – even if you're on a tight budget.

The authors' key message? Plan early! Now that spring is here, it's a perfect time to begin planning your lesson plans for next year. This is a great way to involve your students in their own learning outcomes by encouraging them to look forward to not only the summer, but to the upcoming academic year as well.

What goes hand-in-hand with science? If your answer is "technology," then turn to our *13th Annual Technology Supplement*. This is a listing of products, websites and services – all technologically enhanced and advanced – that we believe will help you in the classroom.

Speaking of help in the classroom, flip to our CURRICULA section. From the Library of Parliament, this issue's lesson plan includes information about the Canadian government and democracy. With the recent headlines about our federal government – scandals, inquiries and a shake-up in the House of Commons – we have no doubt your students are questioning how and why the Canadian government works the way it does.

Finally, be sure to read our Futures, Computers and Web Stuff columns for more fantastic classroom ideas.

- Krista Glen

Next Issue: International Teaching, Health and Nutrition, Futures, CURRICULA, Web Stuff and more!

Qu'est-ce qu'un serpent, un avion et un groupe d'élèves du secondaire ont en commun? La science naturellement!

Si cette association vous semble farfelue à vos élèves et à vous, peut-être pourriez-vous apprendre directement au contact du scientifique Richard Wassersug et de l'élève Lesley Roberts. Dans le présent numéro, nous reprenons leur article, Les hauts et les bas de la biologie spatiale à l'école secondaire, qui inclut une courte description de leur fascinante expérience de vol sur une trajectoire parabolique et vous livre le mode d'emploi pour réaliser un projet similaire dans votre classe – même avec un budget serré.

Le message clé des auteurs? Planifier sans tarder! Maintenant que le printemps est là, c'est le moment opportun pour commencer à penser aux plans de cours de l'année prochaine. C'est une façon formidable de faire participer vos élèves à leur propre expérience d'apprentissage en les encourageant à anticiper non seulement l'été, mais la prochaine année scolaire également.

Qu'est-ce qui va main dans la main avec la science? Si votre réponse est la technologie, tournez vous alors vers notre 13^e supplément technologique annuel. Vous y trouverez une liste des produits, des sites Web et des services – tous enrichis par la technologie et de pointe – qui, à notre avis, devraient vous aider dans vos cours.

En parlant d'aide en salle de classe, rendez-vous à notre section CURRICULA. À partir de la Bibliothèque du Parlement, le plan de cours de ce numéro comprend des renseignements sur le gouvernement canadien et la démocratie. Avec les gros titres des journaux sur notre gouvernement fédéral – scandales, commission d'enquête et chambardement à la Chambre des communes – nul doute que vos élèves s'interrogent sur les raisons qui font que le gouvernement canadien fonctionne comme il le fait.

Enfin, n'oubliez pas de lire nos sections Le futur, Computers et Web Stuff où vous trouverez d'autres idées fantastiques pour vos cours.

- Krista Glen

TEACH

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Richard Worzel

cutting our culture adrift



Technology has started something dramatic and fundamental, but we have no idea where it's going to lead us. It's as if the foundations of our culture have been lifted off their bedrock, leaving us adrift, much like homes pulled from their bases by last year's Hurricane Katrina. This technological change is having profound effects in the classroom for both teachers and students.

Many factors have caused this. For convenience let me identify the Apple iPod, and the tiny drop that triggered its flood: downloading and viewing video. Viewing video on a handheld device has two immediate, and important, consequences. First, it means that consumers can buy video directly from producers instead of going through an intermediary. Second, it means that consumers can view what they want, when they want, where they want (although the iPod already allowed this effect with audio).

When consumers can buy television shows directly from the producer – for example, purchasing *Desperate Housewives* from ABC – the need for television stations or channels, whether broadcast or conveyed by cable or satellite, is eliminated. The CTV network, for instance, profits by buying American programming from American producers, transmitting it to Canadian viewers, and charging premium prices to advertisers who want to reach those viewers. Now viewers can go directly to program producers and purchase only what they want to watch. If this becomes popular enough, CTV will lose its relevance and may go out of business. The same applies to all cable stations and other broadcasters, except for those who originate enough of their own programming that they wouldn't care. If this happens, then the media we use to share experiences may shrivel.

Next, notice the medium of transmission: the Internet. If the Internet delivers all of your entertainment to every part of your house, then you can access any signal provider (say, a video producer) to download a program any time you want. And if you can download it to a portable device, you can access the information whenever and wherever you want.

When that happens, what events will we share

in common? Thirty-five years ago there were two television networks in Canada and three in the US. Viewers may have chosen which network they wanted to watch, but the choice was limited. The result? We shared common experiences: we listened to the same news, watched the same events and shared our culture together. Now, running things through the Internet, we only share electronic experiences with people who have similar tastes. Contrary to Marshall McLuhan's description, we don't have one "global village," but a proliferation of global villages, each defined by the interests, prejudices and desires of the individual.

We can see a parallel between television and the US political system. Due to the proliferation of networks and channels of communications, people can get their news filtered through organizations that reflect their interests, preferences, prejudices and opinions, whether that is from the religious right or the liberal, humanist left. This has polarized the divide in American political discussion – the right listens to people who say the "lefties" are out to destroy their fundamental values: family, freedom and the right to bear arms. The left listens to commentators telling them that the "righties" are trying to undermine essential human liberties and create an authoritarian theocracy. It creates an innate sense of hostility and entitlement, and reinforces the conviction that your principles are the only correct ones. It makes dialog or discussion difficult. Customization of information sources isolates people, eliminates common ground and creates hostility.

Now look at the ability to experience what you want, when and where you want. Cultural anthropologists already talk about people (most frequently kids and young adults) walking around in their own "iPod spaces," cut off from, and ignoring, the people around them.

We can't blame all this on the iPod. The device is merely the logical and superbly engineered result of many technological developments that allow us to

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• Continued on page 9

Richard Worzel



arrêter la dérive de notre culture

La technologie a mis en branle un processus spectaculaire qui ressemble à une lame de fond et nous emporte vers une destination inconnue. C'est comme si les fondements de notre culture avaient rompu leurs amarres et commencé à dériver, un peu à l'image de ces maisons arrachées de leurs fondations par le passage de l'ouragan Katrina l'an dernier. Ce changement technologique a des répercussions profondes sur l'école, tant au niveau des enseignants que des élèves.

De nombreux facteurs sont à l'origine du phénomène. Pour schématiser, permettez-moi de pointer du doigt le iPod d'Apple, et la goutte qui a fait déborder le vase : le téléchargement des images vidéo. Regarder des vidéos sur un petit appareil qui tient dans le creux de la main a deux conséquences

immédiates et non anodines. D'abord, cela signifie que les consommateurs peuvent acheter les vidéos directement aux producteurs au lieu de passer par un intermédiaire. Deuxièmement, cela signifie que les consommateurs peuvent regarder ce qu'ils veulent, quand ils veulent et où ils veulent (même si le iPod procurait déjà ces avantages avec le matériel audio).

Lorsque les consommateurs peuvent acheter les spectacles télévisuels directement au producteur – par exemple, *Desperate Housewives* au réseau ABC – la nécessité des stations ou des chaînes de télévision, que les signaux soient transmis par voie hertzienne, câblodistribution ou satellite, est éliminée. Le réseau CTV, par exemple, tire parti de l'achat de programmes américains auprès des producteurs américains, qu'il transmet aux spectateurs canadiens, et il facture le gros prix aux annonceurs qui veulent atteindre ce public. Désormais, les spectateurs peuvent s'adresser directement aux producteurs de programmes et acheter uniquement ce qu'ils veulent regarder. Si cette façon de faire gagne suffisamment de terrain, CTV deviendra inutile et n'aura plus qu'à déposer le bilan. C'est le sort qui guette également les câblodistributeurs et les autres

télédiffuseurs, sauf ceux qui fabriquent suffisamment de programmes pour ne pas se préoccuper du risque. Si cela se produit, les médias qui nous transmettent l'information pourraient bien périr.

Enfin, notez bien le mode de transmission : Internet. Si Internet est à l'origine de tous vos loisirs dans chaque secteur de votre maison, vous pourrez alors avoir accès à un émetteur de signaux quelconque (disons un producteur vidéo) pour télécharger un programme à l'heure qui vous convient. Et si vous pouvez le télécharger vers un dispositif portable, vous aurez accès à l'information à l'heure qui vous convient et où que vous soyez.

Lorsque cela se produira, quels événements partagerons-nous avec les autres ? Il y a trente-cinq ans, il y avait deux réseaux de télévision au Canada et trois aux États-Unis. Les téléspectateurs pouvaient choisir leur réseau, mais le choix était limité. Résultat ? Nous avions des expériences communes : nous écoutions les mêmes nouvelles, nous regardions les mêmes événements et partagions la même culture. Maintenant, en téléchargeant par Internet, nous ne partageons les expériences électroniques qu'avec les gens qui ont les mêmes goûts que nous. Contrairement à ce que disait Marshall McLuhan, il n'y a pas de « village global », mais une prolifération de villages globaux, chacun défini par des centres d'intérêt, des préjugés et des désirs individuels.

Nous pouvons faire un parallèle entre la télévision et le système politique américain. En raison de la prolifération de réseaux et de chaînes de communication, les gens peuvent accéder à l'actualité filtrée par des organisations qui reflètent leurs intérêts, leurs préférences, leurs préjugés et leurs opinions, qu'il s'agisse de la droite religieuse ou de la gauche libérale et humaniste. Cette situation a polarisé le discours politique américain – la droite écoute les gens qui disent que les « gauchistes » s'efforcent de détruire leurs valeurs fondamentales : la famille, la liberté et le droit de porter une arme. La gauche écoute ses commentateurs lui dire que les « ultra-conservateurs » essaient de saper les libertés fondamentales et de créer une théocratie

Contrairement à ce que disait Marshall McLuhan, il n'y a pas de « village global », mais une prolifération de villages globaux, chacun défini par des centres d'intérêt, des préjugés et des désirs individuels.

autoritaire. Cette situation crée un sentiment inné d'hostilité et une mentalité d'ayant droit qui renforce les clivages et la conviction que nos principes sont les seuls à être valables. Elle rend le dialogue ou la discussion difficiles. La personnalisation des sources d'information isole les gens, élimine les terrains d'entente et crée l'hostilité.

Maintenant, réfléchissons à la capacité de faire ce que nous voulons, quand nous voulons et où nous voulons. Les anthropologues de la culture évoquent déjà ces personnages (le plus souvent des enfants et des jeunes adultes) qui cheminent à travers leur propre « espace iPod » coupés du monde qui les entoure et l'ignorant.

Et l'on ne saurait rejeter tout le blâme sur le iPod. Cette petite machine est l'aboutissement logique et superbement achevé de nombreux progrès technologiques qui nous permettent de façonner notre vie et nos expériences en fonction de nos goûts. Ce faisant, les progrès technologiques nous isolent les uns des autres et sapent les fondements de la culture qui nous nourrit.

Quelles sont les conséquences à l'école et qu'est-ce que cela implique pour les enseignants? Nous sommes à même de constater quotidiennement comment les parents et les élèves deviennent de plus en plus égocentriques et hostiles à la critique constructive. Ils ont l'impression que tout leur est dû et sont moins enclins à coopérer à l'enseignement et à l'apprentissage. Et les technologies émergentes ne feront qu'empirer les choses. En apprenant à nous isoler depuis notre

tout jeune âge et en apprenant que nous pouvons – et par conséquent que nous devrions – avoir ce que nous voulons, quand et où nous le voulons, nous détruisons peut-être la motivation qui fait que les jeunes esprits sont intéressés à participer à leur propre éducation.

Mais le cours des choses n'est pas inéluctable. Les enseignants peuvent enregistrer leurs cours sur vidéo en même temps qu'ils les donnent, les télécharger dans le site Web de l'école et donner ainsi aux élèves la possibilité de revoir la matière à leur rythme – mettant ainsi la technologie au service de l'apprentissage. Il est possible pour les parents et les élèves de comprendre ce qui se produit et de travailler à contrecarrer les forces de la division et de l'isolement. Et il est possible de détourner ces changements à l'avantage de la collectivité, de la pensée et de la prospective. Mais la voie de la facilité et de la séduction conduit au précipice. Pour faire échec à ce danger, il faut du travail et la volonté de faire en sorte que l'éducation tire les gens vers le haut. Malheureusement, ce travail n'est pas aussi facile, aussi drôle et aussi populaire que le divertissement source de plaisir sans effort.

Richard Worzel est le futurologue le plus célèbre du Canada. Il parle devant plus de 20 000 personnes du monde des affaires chaque année, et il donne des conférences bénévolement dans les écoles secondaires. Vous pouvez communiquer avec lui à futurist@futuresearch.com.

• Continued from page 7

tailor our lives and experiences to suit our tastes. In so doing, these tech developments isolate us from each other and erode the foundations of the culture that sustains us.

So what are the effects in schools and the implications for teachers? We're seeing how parents and students are becoming more self-centered and hostile to constructive criticism. They're developing a sense of entitlement and becoming less willing to cooperate in teaching and learning. The emerging technologies will only make matters worse. By learning to isolate ourselves from a very early age, and by learning that we can – indeed, should – have what we want, when and where we want it, we may be destroying the urge that makes young minds interested in participating in their own education.

It doesn't have to be this way. It's possible for teachers to videotape their lessons as they give them, upload them to a school website, and provide students the opportunity to review work at a pace they prefer – to harness the technology in a way that benefits learning. It's possible for parents and students to comprehend what's happening and work to counter the forces of division and isolation. And it's possible to co-opt these changes for mutual benefit with creativity, thought and by being proactive. But the easy, seductive road leads downward. To counter this, it will take work and a willingness to make sure education comes out on top. Unfortunately work is not as easy, as much fun or as popular as being spoiled by entertainment.

Richard Worzel is Canada's leading futurist. He speaks to over 20,000 business people each year, and volunteers his time to speak to high school students for free. You can reach him at futurist@futuresearch.com.

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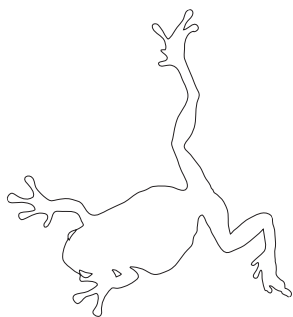


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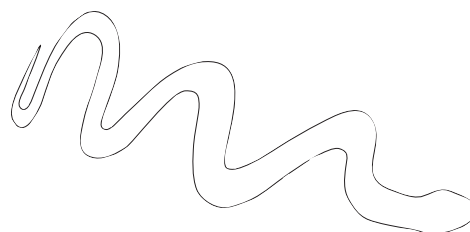
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THE HIGHS AND LOWS OF HIGH SCHOOL SPACE BIOLOGY

By Lesley Roberts and Richard Wassersug, PhD



This is the story of a scientist, a group of high school students and an unusual, but highly successful, research collaboration. Below is a description of the events that took place – and how you can conduct a similar experiment in your classroom – according to Lesley Roberts, one of the students, and Richard Wassersug, the scientist.

It all started with a remarkable offer from the Canadian Space Agency (CSA) to Richard in the summer of 2003. The CSA wanted to know if he would like to do a parabolic flight experiment of his own design, at no cost to himself.

Parabolic flight experiments are performed on jet aircraft that accelerate upward, subsequently arching over. For some 20 seconds everything onboard the airplane experiences weightlessness – also called freefall or microgravity – just like on the orbiting Space Shuttle. Although 20 seconds is not long compared to orbital flight, it is long enough to observe the reflexive responses of animals to microgravity, a topic that Richard has investigated in the past, and the reason why he quickly accepted the CSA's offer – he could watch the reactions of animals that had never before experienced weightlessness in such an environment.

Access to aircraft, especially one that can safely fly parabolic trajectories, is limited and expensive. The CSA was willing to cover all expenses associated with the experiment, including the use of a National Research Council (NRC) aircraft specially modified for parabolic flight. But the CSA had a condition attached to their

invitation: they wanted the project to be a learning experience for a group of high school students. Richard had the choice of research project and high school.

The CSA wanted to create a program that would encourage high school students to pursue scientific careers, especially in space science research. Richard's project would be test run for such a program.

Next to Nova Scotia's Dalhousie University campus, where Richard works, sits Armbrac Academy, a top-ranking independent school. Its proximity to Richard's campus made it an obvious choice for the scientist/high school collaboration. Armbrac was pleased to participate and held a writing contest to determine the six 11th- and 12th-grade students who would be part of Richard's team. Lesley Roberts was one of them.

In October 2003, the project members began holding team meetings to plan the experiment. The aircraft was scheduled to be in Halifax for two days late in March 2004, leaving six months to complete the following tasks:

- 1) design the experiment;
- 2) get the paperwork approved by Dalhousie University and the NRC to import and study live animals;
- 3) acquire or construct necessary equipment;
- 4) round up the required animals;
- 5) test the equipment.

Above: photo courtesy of the CSA.

Above: The student/scientist team with officials from the CSA and NRC, standing in front of the aircraft used for the parabolic flight experiment.

Richard decided to focus on the behaviour of exotic amphibians and reptiles based on limited data from frogs, lizards and one snake observed previously on parabolic flights performed in Japan and the USA. He wanted to know if animals that live underground (fossorial species) would react differently to microgravity than closely related taxa that live either above ground or in trees. Richard reasoned that fossorial species, which rarely surface, might never experience natural falling and may not be adapted to freefalling. He hypothesized that tree-dwelling (arboreal) taxa may be well adapted to microgravity simply because they occasionally fall when jumping from one surface to another, or when being chased by predators or competitors.

By begging, borrowing and, in a few cases, buying, the group managed to amass a menagerie of over 50 specimens from 23 species of exotic amphibians and reptiles. By March, fossorial limbless amphibians (caecilians), limbless lizards (amphisbaenian), ground dwelling skinks (limbed and limbless species), ground and tree-dwelling geckos, and snakes were on-hand. Several of these species are rare in captivity and required permits to enter Canada.

“Creating a team environment fostered motivation within the group and helped to maintain a strong work ethic. It also created a support network for the students.”

In order to document their behaviour in microgravity, cages were designed and built with dedicated lighting so that 20 animals at a time could be individually videotaped on the aircraft. In order to save money, the students bid for video cameras on eBay. The gambit worked with 22 cameras obtained and several thousand dollars saved. The NRC helped build racks to hold the containers and cameras in the aircraft.

Highly fossorial amphibians and reptiles showed relatively limited movement in freefall. Most limbed reptiles that were non-arboreal showed wild rolling and thrashing movements in weightlessness. In contrast, both arboreal and non-arboreal geckos showed well-controlled “skydiving” postures during the parabolas. (No animals were harmed during or at the end of the experiment.)

As a result of the study, more species of amphibians and reptiles have now been observed in microgravity than any other vertebrate class. And, thanks to this experiment, the patterns of behaviour exhibited by these organisms in weightlessness can be predicted on the basis of their normal ecology and taxonomic relationships.

Over the summer of 2004 the group penned the results, which were published in the journal *Zoology*, with each student credited as co-author.

While much was learned about the responses of amphibians and reptiles to microgravity, many lessons about conducting scientific research with a group of high school students were also learned. The students completed an in-depth, but anonymous, survey of their experience. That feedback was used to identify potential pitfalls



PHOTO: R. Wassersug

Richard Wassersug and Lesley Roberts with one of their experiment subjects.

in programs that involve high school students in original scientific research.

First, it is important to keep in mind the different goals of the collaborators. In this particular study, these goals ranged immensely. The CSA wanted to test and promote a program that would give high school students a chance to participate in real research. The scientist wanted to learn how a group of previously untested animals would react to their new environment. The motivations and goals of the students, however, were more widespread. They ranged from a desire to gain experience in the scientific world to the practical reasoning that participation in such a project would better one's resume.

For teachers interested in conducting a similar experiment, the motivations and goals of the students are important to keep in mind, as they help drive any project. If the students were not reminded of the project's end goal and their own personal goals, their work ethic tended to falter.

Creating a team environment fostered motivation within the group and helped to maintain a strong work ethic. It also created a support network for the students, which was helpful for venting (when necessary) and for encouraging each other through difficult tasks.

The group discovered that a team of six is a productive size for a project with only one mentor. One obstacle that was encountered, however, was the uneven sharing of tasks. It was sometimes difficult to distribute the workload equally, especially when students were working on very different aspects of the project.

While competition within the group was agreed to be one of the more positive aspects of the project by the students, all felt that having the project culminate in a competitive setting, such as a science fair, was the wrong approach. As one student says, “Having a competitive aspect often shifts the focus to the competition and away from the science. So if the goal is introducing real science, I think competition is unnecessary in the traditional science fair way, though some sort of symposium or arena for presentation might be useful.”

Communication is essential to maintaining motivation in students and to ensure projects run smoothly. Not only was good communication necessary between the students and the scientist in this project,

but also between the scientist and their high school teachers. Richard admits that as a university-level professor, he had little understanding of what knowledge the high school students had and how comfortable they were using it.

When presented with the questionnaire, one of the main complaints the students voiced was that the scientist was sometimes overbearing, and at times failed to adequately explain requests or concepts. This was not a conscious lack of explanation, but rather Richard sometimes assumed that the students understood the concepts he was referring to, when in actuality they did not. Such misunderstandings could have been circumvented if there had been more communication between the high school teachers and the scientist.

The mentor also needs to be made aware of the students' workload and their upcoming stresses, notably, exams. For example, Richard was unaware of the exam period. When he attempted to move the project forward during that time period, he was frustrated by the experiment's slow progress.

The next lesson learned (which could have prevented the above-mentioned time conflicts) was to start the project earlier. The funding for the project, via a government grant, was not in place until the beginning of January 2004, even though the project began earlier because of the limited length of the school year and the preset dates for the flight.

As well, the students participating in the project were not selected until the beginning of the school year in which the project needed to be completed. A more time-efficient method of selection would be to choose the participating students at the end of the school year preceding the project. The planning could then take place over the summer.

Adequate financial support was a necessary factor in the success of the project (thank you, CSA!). Without funds in place, one can only plan, but not execute, research. Funding must be in place early in order to purchase materials for the project. Have all funds in place before beginning any project that involves students, if the project has a realistic hope of being accomplished within a single school year.

Everyone agrees that the project was a success. It's rare that any scientific research goes from the "idea" stage to publication in less than two years. Perhaps our group was lucky. Given our success, we would like to see the CSA program offered to other scientists and high schools in Canada (unfortunately we have been told that the CSA does not currently have the funds to make this an ongoing program).

There is no reason why similar alliances between scientists and high schools couldn't be established elsewhere, focusing on research that need not require large government contracts nor access to extremely expensive equipment (such as a jet plane) to succeed. **T**

LESSONS LEARNED

1. START EARLY.

Unforeseen problems are the most common reasons why experiments fail. In order to avoid producing disenchanted students who will shy away from future research due to early failures, start the project as early as possible. Give plenty of time to deal with the unexpected. Consider having intermittent discussions with the students about the problems that might arise as one begins each new step. Encourage them to think ahead.

2. HAVE ALL MONEY IN PLACE AT THE START.

Budget out all imaginable costs, but still have a strategy in place for what will happen should the funds run out. Inadequate funding is another major reason why research fails.

3. KNOW THE GOALS—BOTH THE SCIENTIST'S AND THE STUDENTS'.

It is perfectly reasonable that students will have short term and more immediately self-serving goals for participating in research – such as a belief that it will help them get into college. This will affect their work schedule. For example, if getting into college is a greater motivation than collecting data, students might give completing college applications higher priority than data collection. Both sides need to know and accept the differences in motivation.

4. ACCEPT THE FACT THAT SOME STUDENTS WORK BEST NEAR DEADLINES.

Often the best students are the ones who do their homework the night before it is due. Such students, who have been successful in their academic career thus far, cannot be expected to change their work habits despite the open-endedness of the research project. The only way to avoid a crisis in timing is to make sure the students have many small subprojects along the way, each with clear and tight deadlines.

5. STUDENT INVOLVEMENT SHOULD CONTINUE RIGHT TO PUBLICATION.

Students graduate and move on. However, to fully understand how science works – that it's much more than just data collecting – students should ideally have a chance to work on the manuscript production and submission, following the research through to publication. Students should be kept informed of the entire process, even if they are not actively involved in manuscript production.

Curricula

Reproducible Insert

LIBRARY OF PARLIAMENT: *People and Parliament*

Duration: 1-3 Class Periods

(Not including additional activities)

Grade Level: 6-12



INTRODUCTION

The process by which Canada is governed is a complex and exciting one. Each day in the pages of the daily newspapers one can read updated reports of the issues, personalities and processes of Parliament.

It is important that students become informed, interested, critical and conscientious Canadian citizens. To become involved, students must understand how the system works and how they can interact with their government and elected representatives. This resource, developed by the Library of Parliament, will help them. Due to limited space, the materials published in this issue represent only a small fraction of the Library of Parliament's resource, *People and Parliament*. For more great classroom activities and ideas, please visit www.parl.gc.ca/information/about/education/people-parliament/pp-e.asp.

People and Parliament provides an opportunity for students to examine the processes of Parliament as they are happening. The activities presented in this resource are suitable for use with newspaper, broadcast media and on-line news sources.

We would like to hear from you. Please contact us at info@teachmag.com and let us know how you used this resource in your classroom.

LEARNING OUTCOMES

Students will:

- learn basic information about how Parliament functions
- learn about the dynamic nature of Parliament
- become aware of how they can get involved in the legislative process
- become thoughtful, critical newspaper readers
- learn about and assess the decision-making process in Canada from a non-partisan perspective

HOW TO USE THIS RESOURCE

Survey

Conduct a survey to determine the newspaper habits of the class and discuss the importance of following current events. For a sample survey, please visit www.parl.gc.ca/information/about/education/people-parliament/survey-e.asp.

Review

Before starting a unit on parliamentary democracy, it is important to review certain fundamental terms with the class. A student glossary is also provided for class reference, and can be found at www.parl.gc.ca/information/about/education/gloss-inter/index.asp?Language=E.

Review the features of your daily newspaper (print or on-line) and the various writing styles therein. The section The Daily Newspaper – Your Guide to What’s Inside provides a concise overview of this information, found at www.parl.gc.ca/information/about/education/people-parliament/newspaper1-e.asp.

CLASSROOM ACTIVITIES

Read over the list of classroom activities, found at www.parl.gc.ca/information/about/education/people-parliament/cards-e.asp. Decide which activities best fit the curriculum. They can be used as independent studies, by groups of students or as class activities.

The activities are designed to satisfy a variety of student learning styles and vary in length of time needed for completion. They have been designed to address:

- People who work in Parliament
- The parliamentary process
- How Parliament affects us
- How people become involved in Parliament
- Familiarity with newspaper format



All activities include information for the teacher, featuring:

- Objectives for the lesson
- Materials required
- Related links
- Notes to teachers outlining suggestions or any special preparation needed

The student-ready activity sheets are available in both .html and .PDF formats, found at www.parl.gc.ca/information/about/education/people-parliament/studentact-e.asp. All include:

- Background information for the activity
- Investigative questions for students
- A follow-up activity using the newspaper

Choose the activities that best match students’ interests or that reflect the events of the day. The best part about working with the daily newspaper is that it keeps the class current. Archived editions on the Web let students see how news stories evolve over time and how issues become prominent and then disappear. Class discussions and activities will be able to reflect that timeliness and will be more animated and exciting because of it.

Consider the Supplementary Activities as follow-up exercises. These exercises can be found at www.parl.gc.ca/information/about/education/people-parliament/suggest-e.asp.

Research

Visit the Links page, at www.parl.gc.ca/information/about/education/people-parliament/resources-e.asp, for additional sites that will help you with your background research and will help students learn more about Parliament and the media.

SUPPLEMENTARY ACTIVITIES

www.parl.gc.ca/information/about/education/people-parliament/suggest-e.asp

Ask the Experts

• Invite a Senator or an MP to visit your class

Students will learn about Canada's Parliament from the point of view of a parliamentarian. They may also gain insight into the reasons why people choose to run for political office.

Parliamentarians are usually willing to visit classrooms, but call well ahead to help ensure they can come at your chosen time.

- To find a Senator from your region, search the Senate directory.
- To find your local MP, search the House of Commons directory.

Materials required:

- Activity Sheet S1 – *An Interview with a Parliamentarian*
- Types of Newspaper Stories

• Invite a newspaper journalist who covers political stories.

Students will learn about the decisions journalists must make when reporting the news.

Materials required:

- Activity Sheet 2 – *An Interview with a Political Affairs Journalist*
- Types of Newspaper Stories

FOLLOW-UP ACTIVITIES

Assign students to write feature articles about the class visits. Read these together and ask the class to select one of the articles for submission to the school paper or local newspaper. To further explore the work of a parliamentarian with your class, see the resource Setting the Agenda.

What's Happening Out There?

- Discuss the day's headlines each day.
- Maintain a bulletin board of current events.

- Keep a clipping file of stories, political cartoons and editorials. Use them to generate classroom discussions. (Outdated stories and items demonstrate the unpredictability of politics.)
- Maintain subject files of people or specific roles in Parliament as they occur in the press. (They occur irregularly, but more often than you might think.)
- Assign students to follow a continuing news story and speculate on the outcome.

Add a Little Colour

For the duration of your unit on Parliament, seat your class to reflect the Senate Chamber or House of Commons Chamber, with government and opposition facing each other. (The teacher's desk could be the Speaker's chair. The government would be on the teacher's right and the opposition on the left.) To create a "mock Parliament," place an equal number of squares cut from five colours of paper – one colour for each "party" – in a hat. Have each student select a square. Add up the number of squares picked of each colour picked. Decide which colour's party will form the "government," which will be the "Official Opposition," etc. Discuss whether the drawing has produced a minority or a majority government.

Fundamental Terms

If you mean "Parliament," don't say "government." The words "government" and "Parliament" are often used interchangeably, although they are not equivalent terms. What is the difference?

Parliament

The term "Parliament" encompasses the legislative branch of government, and includes:

- The Sovereign (represented by the Governor General)
- All members of the Senate
- All members of the House of Commons

All legislation introduced by the government or by private members must be passed by a majority of the members of the House of Commons and the Senate and receive Royal Assent from the Governor General. Therefore, it is correct to say "Parliament has just passed a bill."

The term "Parliament" also refers to the period of time during which the institution of Parliament exercises its powers, which under the Constitution can be up to 5 years. These periods are consecutively numbered (for example, the 38th Parliament).

• Continued on page 4 of French Curricula

Curricula

Encart prêt à photographier

BIBLIOTHÈQUE DU PARLEMENT : Le public et le Parlement

Durée : D'une à trois heures

(Sans compter les activités supplémentaires affichées dans le site Web Le public et le Parlement)

Élèves de la 6^e à la 12^e année



INTRODUCTION

Le Canada est gouverné d'une manière à la fois complexe et fascinante. Chaque jour, les quotidiens du pays renseignent leurs lecteurs sur les délibérations, les personnalités et les pratiques du Parlement.

Il est important que les élèves deviennent des citoyens canadiens informés, intéressés, critiques et consciencieux. Pour acquérir cet intérêt, les élèves doivent d'abord comprendre les rouages du système parlementaire et savoir comment ils peuvent intervenir auprès de leur gouvernement et des représentants élus. Cette ressource les aidera. Faute d'espace, nous n'avons présenté dans ce numéro qu'une petite partie de la ressource « Bibliothèque du Parlement : Le public et le Parlement ». Pour obtenir des idées ou vous renseigner sur d'autres activités intéressantes à réaliser en classe, consultez le site www.parl.gc.ca/information/about/education/people-parliament/pp-f.asp?Language=F.

Le public et le Parlement donne aux élèves l'occasion d'examiner les activités du Parlement à mesure qu'elles se déroulent en se servant des quotidiens comme ressource première. Les activités se prêtent aussi à l'utilisation des médias électroniques et aux sources de nouvelles en ligne.

Nous aimerions obtenir vos commentaires. Veuillez communiquer avec nous à l'adresse info@teachmag.com et nous faire savoir comment vous avez utilisé cette ressource en classe.

RÉSULTATS DE L'APPRENTISSAGE

Les élèves :

- acquerront une connaissance de base du fonctionnement du Parlement;
- saisiront la nature dynamique du Parlement;
- verront comment ils peuvent participer au processus législatif;
- deviendront des lecteurs de journaux critiques et avisés.

Les activités permettront aux élèves de mieux connaître et évaluer le processus de décision au Canada dans une optique non partisane.

COMMENT UTILISER CETTE RESSOURCE

www.parl.gc.ca/information/about/education/people-parliament/how_to-f.asp/

Sondage

Faites un sondage (www.parl.gc.ca/information/about/education/people-parliament/survey-f.asp) sur les habitudes de lecture des journaux des élèves de votre classe et discutez de l'importance de suivre l'actualité.

Revue

Avant d'entreprendre une leçon sur la démocratie parlementaire, il est important de passer en revue certains termes de base. Un vocabulaire (www.parl.gc.ca/information/about/education/gloss-inter/index.asp?Language=F) à l'intention des élèves est également disponible comme référence.

Passez en revue les caractéristiques de votre quotidien (sur papier ou à l'ordinateur) et les différents styles de rédaction qu'on y trouve. La section intitulée « Le quotidien – ce qu'il contient » (www.parl.gc.ca/information/about/education/people-parliament/newspaper1-f.asp) brosse un tableau concis de cette information.

ACTIVITÉS EN SALLE DE CLASSE

Après avoir examiné la liste des activités en salle de classe (www.parl.gc.ca/information/about/education/people-parliament/cards-f.asp), choisissez celles qui conviennent le mieux à votre programme. Elles peuvent être exécutées individuellement, par petits groupes ou par toute la classe.

Les feuilles d'activité, qui ont été conçues pour convenir à divers modes d'apprentissage, sont de durée variable et traitent des sujets suivants :

- les personnes qui travaillent au Parlement;
- le processus parlementaire;
- l'influence du Parlement sur notre vie;
- les réactions et l'engagement des citoyens à l'égard du Parlement;
- la disposition du contenu d'un quotidien.

Toutes les activités comprennent des renseignements pour l'enseignant, en particulier :

- les objectifs de la leçon;
- le matériel requis;
- les liens connexes;
- une note à l'enseignant avec des suggestions ou des détails si une préparation spéciale est requise.

Les feuilles d'activité à l'intention des élèves (www.parl.gc.ca/information/about/education/people-parliament/studentact-f.asp) sont disponibles en formats html et PDF. Toutes les activités comprennent :

- les renseignements de base pour l'activité;
- des questions pour guider les élèves dans leurs recherches;
- une activité complémentaire faisant appel au journal.

Choisissez les activités qui conviennent le mieux aux intérêts des élèves ou qui concordent avec les événements de la journée. L'utilisation du journal pour ce genre d'activité permet à la classe de demeurer en contact avec l'actualité. Les numéros archivés dans Internet font voir comment les nouvelles évoluent, font la manchette puis disparaissent. Ce caractère d'actualité devrait rendre les discussions et les activités d'autant plus animées et intéressantes.

Considérez les Activités supplémentaires (www.parl.gc.ca/information/about/education/people-parliament/suggest-f.asp) comme des leçons de suivi.

Recherches

Visitez la page de liens (www.parl.gc.ca/information/about/education/people-parliament/resources-f.asp) qui contient des sites qui vous aideront dans vos recherches en plus d'aider les élèves à mieux connaître le Parlement et les médias.

ACTIVITÉS SUPPLÉMENTAIRES

(www.parl.gc.ca/information/about/education/people-parliament/suggest-f.asp?Language=F)

Demandez aux experts

- **Invitez un sénateur ou un député à venir dans votre classe**

Les élèves apprendront à connaître le Parlement canadien du point de vue des parlementaires. Ils seront à même de comprendre ce qui pousse certaines personnes à se porter candidats aux élections.

Habituellement, les parlementaires acceptent volontiers de rendre visite à des classes, mais il faut les inviter longtemps d'avance pour s'assurer qu'ils pourront venir au moment de votre choix.

Pour trouver un sénateur de votre région, consultez l'annuaire du Sénat (www.parl.gc.ca/common/senmemb/senate/isenator.asp?sortord=N&Language=F). Pour trouver votre député, consultez l'annuaire de la Chambre des communes (<http://webinfo.parl.gc.ca/membersofparliament/MainMPsCompleteList.aspx?TimePeriod=Current&Language=F>).

Matériel requis :

- Feuille d'activité S1 – Une entrevue avec un parlementaire (www.parl.gc.ca/information/about/education/people-parliament/studentact.asp?Language=F¶m=36)
- Genres d'articles (www.parl.gc.ca/information/about/education/people-parliament/newspaper5-f.asp)

- **Invitez un journaliste qui couvre la scène politique**

Les élèves apprendront que les journalistes doivent prendre des décisions lorsqu'ils préparent des reportages.

Matériel requis :

- Feuille d'activité S2 – Une entrevue avec un journaliste (www.parl.gc.ca/information/about/education/people-parliament/studentact.asp?Language=F¶m=37)
- Genres d'articles (www.parl.gc.ca/information/about/education/people-parliament/newspaper5-f.asp)

ACTIVITÉS COMPLÉMENTAIRES

Demandez aux élèves d'écrire des articles de fond au sujet des visites en classe. Lisez-les ensemble et invitez la classe à choisir un article à soumettre au journal de

l'école ou à un journal local. Pour effectuer avec votre classe une recherche approfondie sur le travail d'un parlementaire, référez-vous à *Établir l'horaire*.

Que se passe-t-il là-bas?

- Discutez quotidiennement des manchettes de la journée.
- Créez un babillard destiné aux événements de l'actualité.
- Constituez un dossier de coupures de presse, de caricatures politiques et d'éditoriaux. Utilisez ces éléments pour susciter la discussion en classe. (Au moyen d'informations parues dans de vieilles éditions, démontrez l'imprévisibilité de la politique.)
- Montez des dossiers sur des personnes qui travaillent au Parlement ou sur certains rôles parlementaires, au fur et à mesure que la presse en traite. (On n'en parle pas tous les jours, mais plus souvent que vous ne le croyez.)
- Confiez à des élèves le soin de suivre l'évolution d'une nouvelle et livrez-vous à des spéculations sur la suite des événements.

Mettez un peu de couleur

Pour la leçon sur le Parlement, disposez la classe comme s'il s'agissait du Sénat (www.parl.gc.ca/information/about/education/people-parliament/images/Sen%20map-fr.pdf) ou de la Chambre des communes (www.parl.gc.ca/information/about/education/people-parliament/images/HOC%20map-fr.pdf), le parti au pouvoir et l'Opposition se faisant face. (Le bureau de l'enseignant pourrait représenter le fauteuil du président. Les membres du gouvernement prendraient place à la droite de l'enseignant et les membres de l'Opposition à sa gauche.) Pour créer un « parlement modèle », placez dans un chapeau un nombre égal de morceaux de papier de couleurs différentes, une couleur pour chaque parti et demandez à tous les élèves de piger. Comptez les morceaux de papier d'une même couleur qui ont été pigés puis décidez quel parti formera le « gouvernement », l'Opposition officielle, etc. S'agit-il d'un gouvernement minoritaire ou majoritaire?

Le Module de simulation du Parlement (www.parl.gc.ca/information/about/education/empu/french/home_f.htm) présente un exercice de simulation plus complet.

Termes de base

Ne pas confondre Parlement et gouvernement (www.parl.gc.ca/information/about/education/people-parliament/basics-f.asp)

Les termes « gouvernement » et « Parlement » sont souvent employés de façon interchangeable, bien qu'ils ne soient pas équivalents. Quelle est la différence?

Le Parlement

Le terme « Parlement » veut dire l'organe législatif du gouvernement, et il est composé de : la souveraine (représentée par le gouverneur général); tous les membres du Sénat; tous les membres de la Chambre des communes.

Toutes les lois, qu'elles émanent du gouvernement ou d'un simple député, doivent être adoptées par une majorité de sénateurs et de députés et recevoir la sanction royale du gouverneur général. Donc, il est correct de dire : « Le Parlement vient d'adopter un projet de loi ».

La « législature » est la période de temps au cours de laquelle un Parlement exerce ses pouvoirs. En vertu de la Constitution, une législature ne peut durer plus de cinq ans. Ces périodes sont numérotées consécutivement (par exemple : 38^e législature).

Le gouvernement

Dans un sens large, le terme « gouvernement » veut dire l'autorité politique d'un État, qui se voit confier les pouvoirs exécutifs, législatifs et judiciaires. Dans ce sens, le terme « gouvernement » sert à désigner notre système de gouvernance. Par exemple, le régime canadien est à la fois une monarchie constitutionnelle et une démocratie parlementaire.

Le terme « gouvernement » est aussi utilisé pour faire référence à l'organe exécutif, composé du premier ministre et du Cabinet dont les membres ont été nommés officiellement par le gouverneur général pour administrer ou « gouverner » le pays.

Dans ce contexte, le « gouvernement » (organe exécutif) détermine les priorités et les politiques, veille à leur exécution et soumet des mesures législatives à l'approbation du Parlement.

Ce sens étroit englobe aussi les ministères qui participent à l'élaboration, à l'exécution et à l'administration des politiques officielles.

Gouvernement responsable

Le gouvernement (ici l'organe exécutif) est responsable devant l'organe législatif. Si le gouvernement présente une mesure législative qui est rejetée ou s'il est défait sur un vote de confiance à la Chambre des communes, il doit démissionner.

Pour d'autres sources de références, consultez *Les Canadiens et leur système de gouvernement* (www.parl.gc.ca/information/library/idb/forsey/index-f.asp) et le *Vocabulaire du Parlement* (www.parl.gc.ca/information/about/education/gloss-inter/index.asp?Language=F).

Pour des feuilles d'activité à l'intention des élèves et beaucoup plus, visitez www.parl.gc.ca/information/about/education/people-parliament/pp-f.asp?Language=F.

• Continued from page 3 of English Curricula

Government

In a broad sense, the term "government" refers to the political authority of the state, which includes executive, legislative and judicial powers. In this broad sense the term "government" can be used in reference to a system of governance. For example, Canada's system of government can be described as a constitutional monarchy and a parliamentary democracy.

The term "government" is also used to refer to the executive branch, essentially the Prime Minister and Cabinet, who have been formally appointed by the Governor General to administer or "govern" the country. In this context, the "government" (executive) determines priorities and policies, ensures their implementation, and presents government legislation to Parliament for approval.

This definition of government also includes federal departments, which assist in developing, implementing and administering government policy.

Responsible Government

The government (in this case the executive branch) must be accountable to the legislative branch. If it loses the confidence of the House of Commons, the government is expected to resign.

For student activity sheets and much more, please visit www.parl.gc.ca/information/about/education/people-parliament/pp-e.asp.



Marjan Glavac

notable sites for teachers

Math Forum

<http://mathforum.org>

Visit this website and be introduced to one of the longest running math resources on the Internet. Created by Drexel University, Math Forum is a hotspot for answers to tough math questions that students often ask their teachers.

If your students frequently stump you with mathematical queries that you don't always feel comfortable answering, visit the site's Ask Dr. Math feature. Click on the Classic Problems link in the Frequently Asked Questions (FAQ) section for cranium-busting conundrums like: "Which is more: a million dollars or a penny doubled everyday?" or "How large must a class be to make the probability of finding two people with the same birthday at least 50%?" Other questions include dividing by zero, order of operations and determining square roots without a calculator. Can't find the answer in the FAQs? You can also submit your own question to Dr. Math.

Discussion groups housing countless math questions, an Internet Newsletter, Math Tools, Problems of the Week, Teacher2Teacher (a resource for teachers and parents who have questions about teaching mathematics), Teacher Exchange (housing lesson plans for kindergarten to grade 12 and beyond; you can submit your own too), Workshops and an Internet Mathematics Library are all designed to support math instruction.

More support materials can be found in the sections Math Resources by Subject, Math Education and Key Issues in Math.

If you still can't find what you need, try the search engine. This practical tool not only searches the Math Forum site, it also sends your query to other search engines as well.

This simplistic site provides easy access to sometimes-elusive math resources. It's a great first place to bring your math questions and receive comprehensive answers.

Encyclopedia Mythica

www.pantheon.org

This award-winning Internet encyclopedia is an information depot for mythology, folklore and religion. No in-your-face graphics, annoying pop-ups or banners – a rarity for today's Internet users. That's why this is a great place for students – and teachers – to research legends of the past.

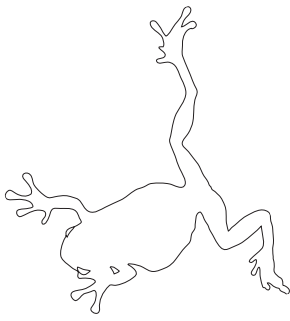
The mythology section is divided into six geographical regions: Africa, Americas, Asia, Europe, Middle East and Oceania. Each region is then broken down into clearly defined subdivisions. For example, the Americas section is divided into Aztec, Haitian, Inca, Mayan, and Native American mythology. In each section you can explore either the introduction page or go to articles (an alphabetical listing of short articles about people, places and things relating to the different mythologies).

The Folklore section shares general folklore, Arthurian legends, Greek heroic legend and folktales from many countries.

Check out the site's detailed offerings on Greek mythology. You'll find links to genealogy tables for Zeus' consorts and offspring, the Principal Gods and the Descendents of Prometheus. Click on the link to Greek heroic legend to find genealogy tables for the ancestors of Achilles, Perseus, Heracles, the family of Helen of Troy and the House of Troy.

With so much unreliable and commercially polluted information on the Internet, Encyclopedia Mythica is truly unique. The information found on this site is well written and researched by respected academic writers. Presented with clear, concise writing, students will find this a great first place to research mythology, folklore and religion. Teachers will find their jobs made just a little bit easier.

Marjan Glavac is author of The Busy Educator's Guide To The World Wide Web. He can be reached by e-mail at marjan@glavac.com or through his website www.glavac.com.



LES HAUTS ET LES BAS

DE LA BIOLOGIE SPATIALE À L'ÉCOLE SECONDAIRE



Par Lesley Roberts and Richard Wassersug, Ph.D.

Les héros de ce récit sont un scientifique et un groupe d'élèves de l'école secondaire. La trame : une collaboration peu ordinaire, mais extrêmement fructueuse, pour mener à bien un projet scientifique. Vous trouverez ci-après une description des événements qui se sont succédé – ainsi que la façon dont vous pouvez mener une expérience similaire dans votre classe – d'après Lesley Roberts, une des élèves, et Richard Wassersug, le scientifique.

Tout a commencé par une offre fort tentante de l'Agence spatiale canadienne (ASC) à Richard au cours de l'été 2003. L'ASC lui a demandé s'il aimerait faire une expérience de vol parabolique dont il concevrait personnellement les paramètres, sans qu'il ne lui en coûte rien. Les expériences de vol parabolique ont lieu à bord d'un avion à réaction que le pilote cabre en altitude avant d'accélérer et de couper les gaz pour injecter l'appareil dans une trajectoire parabolique.

Pendant 20 secondes, tout ce qui se trouve dans l'appareil fait l'expérience de l'apesanteur – ce qu'on appelle également chute libre ou microgravité – exactement comme lors de la mise en orbite d'une navette spatiale. Si ces 20 secondes représentent un court intervalle de temps par rapport à un vol orbital, ce temps est suffisamment long pour qu'on puisse observer les mouvements réflexes des animaux à la microgravité, sujet que Richard a exploré par le passé, et qui lui a fait accepter rapidement l'offre de l'ASC. Il y a vu la possibilité d'observer les réactions d'animaux qui n'avaient jamais auparavant fait l'expérience de l'apesanteur dans un tel environnement.

L'accès à un appareil, en particulier de ceux qui peuvent effectuer en toute sûreté des trajectoires paraboliques, est coûteux et difficile. L'ASC acceptait de prendre en charge tous les frais associés à l'expérience, y compris le coût d'utilisation d'un appareil du Conseil na-

tional de recherches (CNRC) spécialement modifié pour le vol parabolique. Mais l'ASC mettait une condition à cette invitation. L'Agence voulait que le projet constitue une expérience d'apprentissage pour un groupe d'élèves de l'école secondaire. Richard avait toute

latitude quant au projet de recherche et au choix de l'école.

L'objectif de l'ASC était de mettre sur pied un programme propre à inciter les élèves du secondaire à poursuivre une carrière scientifique, en particulier en recherche spatiale. Le projet de Richard allait être un test pour un tel programme.

L'Armbrae Academy est une école secondaire privée de très haut niveau située non loin du campus de l'Université Dalhousie, en Nouvelle-Écosse, où Richard travaille. Sa proximité par rapport au campus en a fait un choix évident pour la collaboration entre le scientifique et l'école. L'école fut enchantée de participer au projet et elle organisa un concours de rédaction pour déterminer quels seraient les six élèves de la 11^e et de la 12^e années appelés à faire partie de l'équipe de Richard. Lesley Roberts était du nombre.

En octobre 2003, les membres du projet commencèrent à se réunir en équipe pour planifier l'expérience. On prévoyait que l'appareil serait stationné à Halifax pendant deux jours à la fin de mars 2004, ce qui laissait six mois pour accomplir plusieurs tâches :

- 1) concevoir l'expérience;
- 2) préparer la documentation approuvée par l'Université Dalhousie et le CNRC pour importer et étudier des animaux vivants;
- 3) acheter ou construire le matériel nécessaire;

Photo : courtoisie de l'ASC

Ci-dessus : L'équipe de scientifiques et d'élèves ainsi que les responsables de l'ASC et du CNRC devant l'avion utilisé pour l'expérience de vol parabolique.

- 4) sélectionner les animaux requis;
- 5) mettre à l'essai le matériel.

Richard avait décidé d'observer le comportement d'amphibiens et de reptiles exotiques en raison de données limitées qu'il avait accumulées sur des grenouilles, des lézards et un serpent observés auparavant lors de vols paraboliques effectués au Japon et aux États-Unis. Il voulait savoir si face à la microgravité, les animaux qui vivent sous terre (espèces fousseuses) auraient des réactions différentes de celles d'espèces aériennes ou arboricoles apparentées. Selon l'hypothèse de Richard, les espèces fousseuses, qui émergent rarement à la surface, peuvent ne jamais avoir fait l'expérience d'une chute naturelle et ne pas être adaptées à la chute libre. Son hypothèse était que les espèces arboricoles peuvent être mieux adaptées à la microgravité, par le simple fait qu'elles tombent occasionnellement lorsqu'elles sautent d'un endroit à l'autre ou lorsqu'elles sont poursuivies par des prédateurs ou des rivaux.

En sollicitant, en empruntant et en achetant à l'occasion, le groupe réussit à se constituer une ménagerie de plus de 50 spécimens de 23 espèces d'amphibiens et de reptiles exotiques. En mars, les élèves avaient en leur possession des amphibiens fousseurs (caeciliens), des lézards sans pattes (amphisbènes), des scinques aériens (espèces avec et sans pattes), des geckos aériens ou arboricoles et des serpents. Plusieurs de ces espèces sont rares en captivité et leur importation au Canada nécessitait un permis.

De façon à documenter leur comportement en microgravité, nous avons conçu les cages et les avons équipées d'un éclairage spécial, de sorte que 20 individus en même temps puissent être enregistrés individuellement sur vidéo à bord de l'appareil. Pour ménager leurs fonds, les élèves ont magasiné leurs vidéocaméras aux enchères sur eBay. Ils ont réussi à se procurer ainsi 22 vidéocaméras et à économiser plusieurs milliers de dollars. Le CNRC les aida à acheter des bâts pour arrimer conteneurs et caméras embarqués.

On observa relativement peu de mouvements chez les amphibiens et les reptiles très fousseurs au cours de la chute libre, mais la plupart des reptiles avec pattes qui n'étaient pas arboricoles ont été agités de soubresauts et se sont débattus dans tous les sens en apesanteur. En revanche, tant les geckos arboricoles que les autres ont adopté des postures de nage aérienne bien maîtrisée au cours des paraboles (aucun animal n'a été blessé au cours de l'expérience et tous étaient indemnes à la fin).

L'étude a permis d'observer davantage d'espèces d'amphibiens et de reptiles que toute autre catégorie de vertébrés. Et, grâce à l'expérience, on sait maintenant que les types de comportement qu'adoptent ces organismes en apesanteur sont prévisibles à partir de leurs relations écologiques et taxonomiques.

Au cours de l'été 2004, deux groupes ont consigné par écrit les résultats, qui ont été publiés dans la revue *Zoology* avec le nom de chaque élève comme coauteur.

Si l'on a beaucoup appris des réactions des amphibiens et des

reptiles à la microgravité, on a aussi tiré de nombreuses leçons sur la conduite d'un projet de recherche scientifique avec un groupe d'élèves du secondaire. Les élèves ont fait une analyse approfondie, mais anonyme, de leur expérience. On s'est servi de leurs commentaires pour cerner les écueils et les erreurs à éviter dans le cadre de programmes faisant appel à la participation d'élèves du secondaire afin de mener à bien une recherche scientifique originale.

D'abord, il est important de ne pas perdre de vue les objectifs différents des collaborateurs. Dans cette étude, l'éventail des objectifs était considérable. L'ASC voulait mettre à l'essai et promouvoir un programme donnant à des élèves du secondaire la possibilité de participer à une véritable recherche. Le scientifique voulait savoir comment un groupe d'animaux qui n'avaient jamais été soumis à des expériences auparavant réagirait à son nouvel environnement. Les motivations et les objectifs des élèves, toutefois, étaient plus diversifiés encore. Ils allaient du désir d'acquérir de l'expérience dans le monde scientifique à l'idée pragmatique que la participation à un tel projet ferait bonne impression dans un curriculum vitae.

Ce que ne doivent pas oublier les enseignants désireux de mener une expérience similaire, c'est que les motivations et les objectifs des élèves sont importants puisqu'ils aident dans la conduite du projet. Si l'on n'avait pas rappelé

aux élèves la finalité du projet et leurs propres objectifs personnels, leur éthique du travail aurait peut-être faibli. La création d'un climat de travail en équipe a stimulé la motivation au sein du groupe et a aidé à conserver l'éthique du travail. Cette ambiance a également créé un réseau de soutien pour les élèves, qui leur a été utile pour décompresser (lorsque c'était nécessaire) et pour s'encourager mutuellement dans les tâches difficiles.

Le groupe a découvert qu'une équipe de six personnes est une taille qui donne de bons résultats dans le cadre d'un projet ne comportant qu'un seul mentor. Au nombre des obstacles, mentionnons toutefois le partage inégal des tâches. Il était parfois difficile de répartir la charge de travail de façon égale, en particulier lorsque les élèves travaillaient sur des aspects fort différents du projet.

Si les élèves ont convenu que l'esprit de compétition au sein du groupe était l'un des aspects les plus positifs du projet, tous ont estimé que c'était une erreur de mettre un point final au projet dans un cadre compétitif, comme une foire scientifique. Comme le déclare l'un d'entre eux, « le fait d'avoir un aspect compétitif déplace le centre d'intérêt au profit de la compétition et au détriment de la science. Par conséquent, si l'objectif est d'initier réellement à la science, je pense que la compétition, sous la forme d'une foire scientifique traditionnelle, est superflue, mais qu'un symposium ou un forum quelconque pour la présentation des résultats aurait pu être utile ».

La communication est essentielle pour soutenir la motivation des élèves et pour que les projets se déroulent harmonieusement. Et dans le projet dont nous venons de parler, non seulement une bonne communication entre les élèves et le scientifique était-elle nécessaire, mais



Photo : R. Wassersug

Richard Wassersug et Lesley Roberts avec l'un de leurs sujets d'expérience

également entre ce dernier et leurs enseignants. Richard reconnaît qu'en tant que professeur d'université, il ne savait pas vraiment quelles étaient les connaissances des élèves du secondaire et dans quelle mesure ils avaient de la facilité à les exploiter.

Dans le questionnaire, l'un des principaux reproches des élèves a été que le scientifique était parfois péremptoire et ne réussissait pas toujours à leur expliquer convenablement les demandes ou les concepts. Ce manque d'explication n'était pas délibéré mais plutôt attribuable au fait que, parfois, Richard supposait que les élèves comprenaient les notions auxquelles il se référait alors que ce n'était pas le cas. Ces malentendus auraient pu être évités par une meilleure communication entre les enseignants de l'école et le scientifique.

Le mentor doit également être mis au courant de la charge de travail des élèves et des tensions auxquelles ils seront soumis, notamment les examens. Or, Richard ne connaissait pas la date des examens et lorsqu'il essayait de faire avancer le projet au cours de cette période, il était agacé par la lenteur des progrès.

La deuxième leçon est qu'il aurait fallu commencer le projet plus tôt, ce qui aurait permis d'éviter tous les conflits d'horaire susmentionnés. Le financement du projet, par l'intermédiaire d'une subvention gouvernementale, n'a pas été en place avant le début de janvier 2004, même si le projet avait commencé plus tôt en raison de la durée limitée de l'année scolaire et des dates préétablies pour le vol.

De même, les participants au projet n'ont pas été choisis avant le début de l'année scolaire où le projet devait être mené à bien. Il aurait été plus efficace de choisir l'équipe à la fin de l'année scolaire précédant le projet. La planification aurait pu alors se faire au cours de l'été.

Un appui financier adéquat était indispensable au succès du projet (merci à l'Agence spatiale canadienne!). Tant qu'on n'a pas les fonds, on ne peut que planifier mais non mener à bien la recherche. Le financement doit être en place tôt afin de permettre les achats nécessaires pour le projet. Il faut donc disposer de tous les fonds requis avant de mettre en branle tout projet mené avec des élèves, si l'on veut avoir de bonnes chances de le réaliser en une seule année scolaire.

Cependant, tout le monde s'accorde pour dire que le projet a été un succès. Il est rare qu'un projet scientifique passe de l'étape de « l'idée » à l'étape de la publication en moins de deux ans. Peut-être que notre groupe a eu de la chance. Compte tenu de notre réussite, nous aimerions que le programme de l'ASC soit offert à d'autres scientifiques et écoles secondaires du Canada (malheureusement, on nous a dit qu'à l'heure actuelle, l'ASC ne disposait plus de fonds pour en faire un programme permanent).

Il n'y a aucune raison pour que des alliances similaires entre scientifiques et écoles secondaires ne puissent être créées ailleurs pour mettre sur pied des projets qui n'ont besoin ni d'importants contrats du gouvernement ni d'avoir accès à du matériel extrêmement coûteux pour réussir (comme un avion à réaction). **T**

LEÇONS APPRISSES

1. COMMENCER TÔT.

Des problèmes inattendus sont les raisons les plus courantes de l'échec des expériences. Pour éviter que les élèves soient déçus en raison d'échecs précoces propres à les dissuader par la suite de s'engager dans la recherche, il faut commencer le projet le plus tôt possible. Donnez-vous tout le temps voulu pour faire face aux imprévus. Envisagez de discuter de temps à autre avec les élèves des problèmes qui peuvent survenir et, ce, à chaque nouvelle étape.

2. ENCOURAGEZ-LES À PRÉVOIR POUR PRÉVENIR LES PROBLÈMES.

Arrangez-vous pour que tous les fonds soient en votre possession dès le début. Établissez votre budget en prévoyant tous les coûts imaginables, mais mettez également en place une stratégie pour faire face aux imprévus si vous manquez d'argent. Le manque de financement est une autre raison importante qui fait que des recherches tournent court.

3. DÉFINISSEZ LES OBJECTIFS : TANT CEUX DU SCIENTIFIQUE QUE CEUX DES ÉLÈVES.

Il est parfaitement raisonnable que les élèves aient des objectifs à court terme et plus immédiatement égoïstes pour participer à la recherche – comme le sentiment que cela les aidera à être admis dans un collège. Cet élément aura une incidence sur leur emploi du temps. Par exemple, si être accepté au collège est une plus grande motivation que recueillir des données, les élèves peuvent

accorder la priorité à remplir leur demande d'acceptation au collège plutôt qu'à la collecte de données. Les deux parties doivent connaître leurs divergences en ce qui a trait à la motivation et les accepter.

4. ACCEPTER LE FAIT QUE CERTAINS ÉLÈVES TRAVAILLENT MIEUX LORSQU'ILS SE RAPPROCHENT DES ÉCHÉANCES.

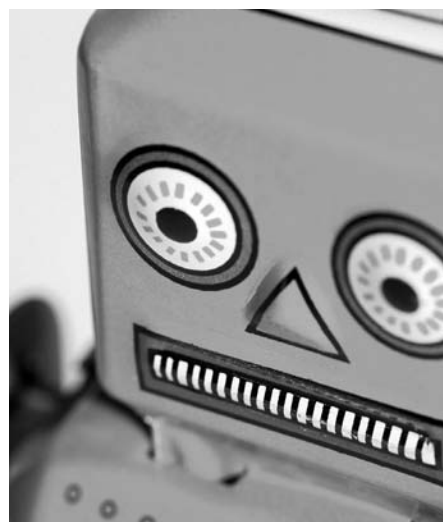
Souvent, les meilleurs élèves sont ceux qui font leurs devoirs la veille du jour où ils doivent les rendre. On ne peut pas s'attendre à ce que des élèves de ce genre, qui ont obtenu de bonnes notes dans leurs études jusqu'alors, changent leurs habitudes de travail même si le projet de recherche n'a pas véritablement de date limite. La seule façon d'éviter d'être à court de temps est de s'assurer que les élèves mènent à bien de nombreux sous-projets dans des délais serrés et avec des échéances bien définies.

5. LA PARTICIPATION DES ÉLÈVES DEVRAIT SE POURSUIVRE JUSQU'À LA PUBLICATION.

Les élèves obtiennent leur diplôme et vont de l'avant. Toutefois, si l'on veut qu'ils comprennent bien la démarche scientifique – c'est-à-dire quelque chose qui dépasse de beaucoup la simple collecte de données – ils doivent avoir idéalement la possibilité de travailler à la production et à la présentation du travail écrit, afin de mener à terme la recherche jusqu'à la publication. Même s'ils ne participent pas activement à la production de l'article scientifique, il convient de les tenir informés de tout le processus.

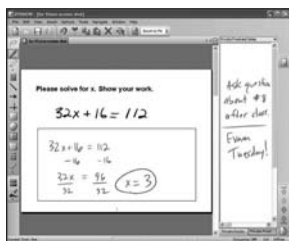
TECHNOLOGY SUPPLEMENT

Compiled by Krista Glen and Laurel Rhind



Welcome to *TEACH Magazine's* 13th Annual Technology Supplement. Over the years we have presented new products and services for you. We carefully provide narrative descriptions only – they do not qualify as critical reviews or endorsements. Make sure you inquire about educational discounts and pricing. Some products come with teacher's guides.

software



> DyKnow Vision

DyKnow Vision software works with interactive whiteboards and desktop, laptop and tablet PCs – notes the teacher creates on the whiteboard/tablet instantly appear on students' computers. Students can add their personal notes to the lesson on their computer, creating an electronic notebook. This allows students to focus their attention on the lesson being taught instead of copying notes the teacher writes on the board. DyKnow engages learners in class through collaboration and electronic note-delivery. Students can play back notes to review for exams. The software has additional capabilities that make learning more collaborative among professors and students. For more information, please visit <http://dyknow.com>.

The pricing for the DyKnow software follows two different models. The following are starting prices, but volume discounts drop the price significantly.

When purchasing per named user (where each student and teacher has an individual license and can take/teach multiple courses with the DyKnow software), price per user license begins at the num-

bers below and volume discounts dramatically drop the price. Prices, in US dollars, are as follows: DyKnow Vision 4.1: \$60, DyKnow Monitor: \$26, Bundled DyKnow Vision and Monitor: \$77.50.

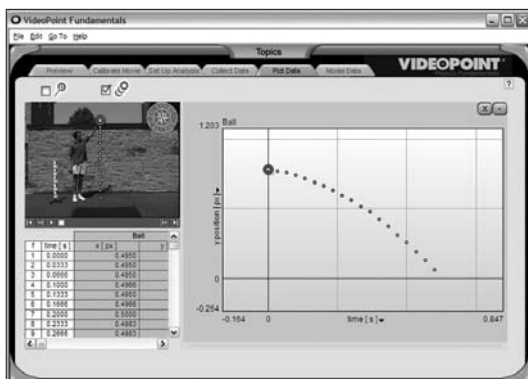
When purchasing concurrent licenses (designed for computer lab settings, where a license is granted to one computer and several different students and teachers can use the software on that computer), the price per license starts at the numbers below and volume discounts lower the price. Prices (USD): DyKnow Vision 4.1: \$240, DyKnow Monitor: \$104, Bundled DyKnow Vision and Monitor: \$310.

The above pricing applies to an annual subscription. DyKnow also offers perpetual pricing that gives users the right to use the software in perpetuity and they can purchase annual maintenance and support. For more information, please call 1-888-8DYKNOW.

To see a short video about the product, visit www.dyknow.com/video.htm. To download DyKnow for your use, visit [http://dyknow.com/download/\(2rdvgh45mzsgvt55bzzxiu45\)/Default.aspx](http://dyknow.com/download/(2rdvgh45mzsgvt55bzzxiu45)/Default.aspx).

VideoPoint: Physics Fundamentals

Connecting the dots between challenging physics concepts and the real world can be a daunting task for any teacher, but a new software program promises to change all that.



From Lenox Softworks, VideoPoint: Physics Fundamentals teaches students about basic physics concepts by analyzing real-life phenomena shot on digital video. Kids watch captured video to analyze motion and can view the mathematical equations that explain what they have seen. The “Eureka!” moment hits when students see the connection between concepts and action in the real world.

The software enables users to collect position and time data from QuickTime movie frames.



The data is then reviewed in graphical or tabular form. The VideoPoint: Physics Fundamentals web-site contains a Tips for Teachers section, and users also have access to the online Resource Library that houses extra movies for download, sample analyses and activities.

Pricing varies depending on the purchased package, but Windows users can expect to pay \$210 for a five-user pack, \$345 for a site license and \$105 for a Student Pack. Interested? Contact the distributor, Merlan Scientific, at 1-800-387-2474 or visit www.merlan.ca.

Visit www.vpfundamentals.com for more information.

web sources



Screenshot courtesy of the Great Unsolved Mysteries in Canadian History project.

> Great Unsolved Mysteries in Canadian History www.canadianmysteries.ca

Transform your students into amateur historians who can perform research and analysis through the lure of cold-case murder mysteries. *Great Unsolved Mysteries in Canadian History* is a bilingual website project that asks students to become critical thinkers and formulate their own conclusions about unsolved Canadian mysteries. Each mystery has a respective site that shares detailed background information and primary source materials for students to read and analyze. Included are court documents, newspaper articles, photos, letters and more. Each mystery offers instructor support through free, available-by-request Teachers' Guides. Lesson and unit plans, along with suggestions for how the guides can be used to meet Ministry curriculum requirements, are included.

With more to come, three mysteries are currently online: *Who Killed William Robinson?* (probing the murder of three black people in the British Colony of British Columbia in the 1860s); *We Do Not Know His Name: Klatsassin and the Chilcotin War* (which explores the deadliest attack by Aboriginal people on immigrants in Western Canada); and *Aurore! The Mystery of the Martyred Child* (which investigates the 1920 death of a 10-year-old girl in Quebec). And keep your eyes peeled: three new mysteries are set to go live in April 2006, along with a new portal (www.mysteryquests.ca) featuring web-quests relating to all the mysteries on *Great Unsolved Mysteries in Canadian History*. Interested in winning

a cool t-shirt? E-mail us at info@teachmag.com, mention the webquests, and you could win!

NGA Classroom

www.nga.gov/education/classroom

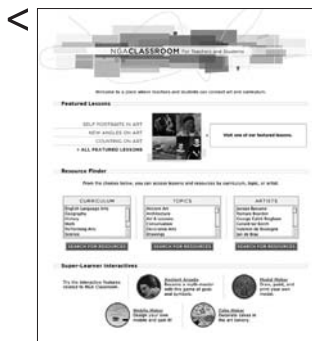
From the United States' National Gallery of Art (NGA) comes a fantastic site that will connect the world of art to your classroom curriculum. Easy to navigate, *NGA Classroom* offers a wealth of information for students and teachers, from lesson plans to artist biographies.

Users can look for resources three ways from the homepage: search by curriculum (such as geography, history or studio art), by topic (including ancient art, architecture and still life) or by artist (the list includes greats like Caravaggio, Matisse and Warhol).

Searching through the site you'll find valuable teaching tools and innovative lesson plans. Self Portraits in Art is a lesson plan that explores identity using self-portraits and creative writing. Counting on Art, created for kindergarten and elementary students, employs art to introduce and practice math concepts. You'll find lesson plan objectives, assessment guidelines, a glossary of terms, printable worksheets and more.

Kids will enjoy the Super-Learner Interactives section, which features interactive art-themed computer activities. Students can design a mobile and watch it in motion with Mobile Maker, or draw, paint and print their own medal using Medal Maker.

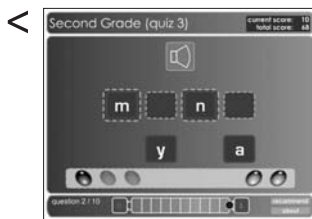
Students and teachers alike will enjoy combing through this extensive site that is both educational and a lot of fun.



Quiz-Tree.com

From Sierra Vista Software comes a series of sight word exercises found at Quiz-Tree.com. Sight words (often called the Dolch Word List) are some of the most frequently used words in the English language. Even though they number only about 200, sight words make up 50 to 70 per cent of general, non-technical reading material. Teaching sight words as early as possible is often considered a crucial part of elementary education.

The new online exercises at Quiz-Tree.com have been designed to help children master sight words. The exercises have been divided into groups, accord-



ing to grade: Pre-Primer, Primer, First Grade, Second Grade, and Third Grade. When the exercise starts, the student will hear one of the sight words. The student's task is to assemble, by using the mouse, the word from the letters provided. After the student provides the correct answer, the game will move on to the next word.

The Sight Words exercises can be accessed at www.quiz-tree.com/Sight-Words_main.html. The exercises are free to use and visitors do not need to sign up.

miscellaneous

All the Right Stuff

From popular music to the latest celebrity-designed fashions, youth are bombarded with images of what's hot and what's not. This kind of media overload can make even the savviest of kids "need" to sport jeans and sneakers with trendy labels. You can help your students wade through the media messages they receive with *All the Right Stuff*, a National Film Board of Canada (NFB) video that discusses media awareness among youths.

The movie follows Brendan, a typical teenager on a trip to the mall looking to spend his birthday cash. Students will learn that although teens typically work in low-paying jobs, their incomes are disposable and make them ideal targets for advertisers selling the latest trends.

Directed by Connie Littlefield, *All the Right Stuff*, priced at CAD \$49.95, is available from the NFB by calling 1-800-267-7710.



Photo: Mark Simkins
© 1997 National Film Board of Canada. All rights reserved.

Unotron's SpillSeal Keyboard

Ever had to replace a keyboard because Sally spilt her juice box all over its keys during your computer class? This kind of irritation (and the expense) can be avoided with Unotron's SpillSeal® washable computer keyboards. These innovative keyboards seal and protect against spills, and they can be easily washed and disinfected. Not only is this an effective answer to the inevitable student and teacher spills that occur at every school, it's also a great way to



help stop the spread of germs during the flu and cold season.

Unlike most standard keyboards, SpillSeal® keyboards can be washed under a faucet and sprayed with disinfectant, causing no harm to the individually sealed keys. Users can even immerse the keyboards in an antibacterial solution to ward off germs.

The corded SpillSeal® keyboard can be purchased online at www.tigerdirect.ca. The cost can be significantly reduced if the keyboards are purchased in bulk. For more information visit www.unotron.com.

Tandberg Visual Communications Tools

First period: visit the Smithsonian Institute. Second period: tour the Baseball Hall of Fame. After lunch: gym class – swimming with live sharks – in sunny Sarasota, Florida. Tomorrow: visit the bones of prehistoric dinosaurs, create your own music and define matter like a true scientist.

Wondering what makes these field trips possible on a budget limited both by money and time? By using Tandberg's virtual visual communications tools, you can take your class around the world and back all before the 3 o'clock bell rings – without ever leaving the classroom.

With Tandberg's advanced visual communication technologies, educators can extend their resources and provide their students with unique educational experiences that motivate and inspire. Through Tandberg's Connections Program, K-12 schools can receive free virtual field trips using Tandberg video equipment. As a Tandberg customer, schools have access to this program and the power to bring your students the latest cultural events, newest scientific discoveries and musical inspirations with the touch of a button.



Tandberg's free virtual field trips are offered, in real-time, on a monthly, first-come, first-serve basis to current customers. To register, visit www.tandberg.net/connections. Tandberg taps into over 300 content providers from universities, museums and other cultural centres. Existing Tandberg clients receive a list of 10 topics and can sign up for two of those topics free of charge. Any additional topic or session ranges anywhere from \$50 to \$300. Some content providers even offer their sessions for free. As an added bonus, teachers receive reference materials prior to their live session so students are well prepared for their lesson.

In order to connect to the program, all you need is adequate bandwidth (achievable with most Internet connections) and Tandberg visual communications equipment, including a large screen for viewing and a video conferencing system that starts at \$4000. Although the price tag might seem a little steep at first glance, Tandberg's equipment was designed with portability in mind, meaning a school can share an entire unit among all its classrooms, or better yet, a school board can purchase the equipment, sharing it among its schools. You'll find the technology saves you money on costly field trips and class materials.

If you're concerned by your inexperience in setting up telecommunications systems, Tandberg's got a solution for that too. Tandberg offers a four-step training session for those still uncomfortable with the idea of implementing the system. The program, called the Tandberg Teachers Training Teachers Program (T⁴), is designed by teachers for teachers and provides educators with the knowledge and skills necessary for successfully implementing a distance learning program. For more information about the T⁴ Program, please contact Durlene Johnson at 703-272-2153 or via e-mail at durlene.johnson@tandbergusa.com.

For more information about Tandberg's equipment and services, visit www.tandberg.net.

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Teacher's Guide to Physical Activity for Youth/Children

Inactivity remains a mounting health concern in this country, especially among Canada's youngest



Source: (Above) *Teacher's Guide to Physical Activity for Children 6-9 Years of Age*, Public Health Agency of Canada, 2002. (Below) *Teacher's Guide to Physical Activity for Youth 10-14 Years of Age*, Public Health Agency of Canada, 2002. Both reproduced with the permission of the Minister of Public Works and Government Services Canada, 2006.



> generation. The school arena is an ideal place to teach students about the importance of physical activity, and the Public Health Agency of Canada offers two teacher resources to help you do just that. *Teacher's Guide to Physical Activity for Children 6-9 Years of Age* and *Teacher's Guide to Physical Activity for Youth 10-14 Years of Age* are two free .PDFs available for download off the website www.phac-aspc.gc.ca/pau-uap/paguide/child_youth/resources.html. Developed for children aged six to nine and youths aged 10 to 14 respectively, these resources are meant to help you stimulate discussion about physical activity and encourage kids to get moving!

You'll find steps to help students try new behaviours and build better lifestyles that include exercise. Both guides share creative ideas that other teachers have used to bring physical activity into schools. You'll even learn that physical education can be taught beyond gym class: one English teacher created student awareness about the issue through physical activity-themed writing assignments.

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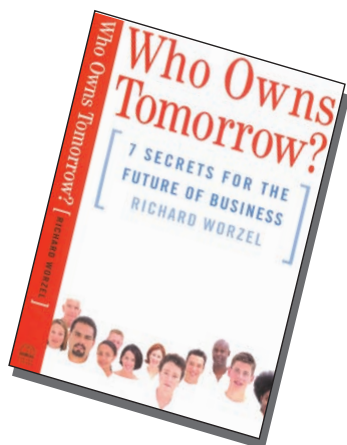
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Reader Response #	Advertiser	page#
1	CroLife Canada.....	Insert
2	EF Educational Tours.....	Insert, 3
3	John Deere	28
4	Learning Village.....	9
5	Media Awareness Network	29
6	Microsoft Canada.....	IFC, OBC
7	OTIP	IBC
8	POP! Magazine.....	30
9	Toshiba Canada	4
10	Richard Worzel.....	29
11	WWF	29

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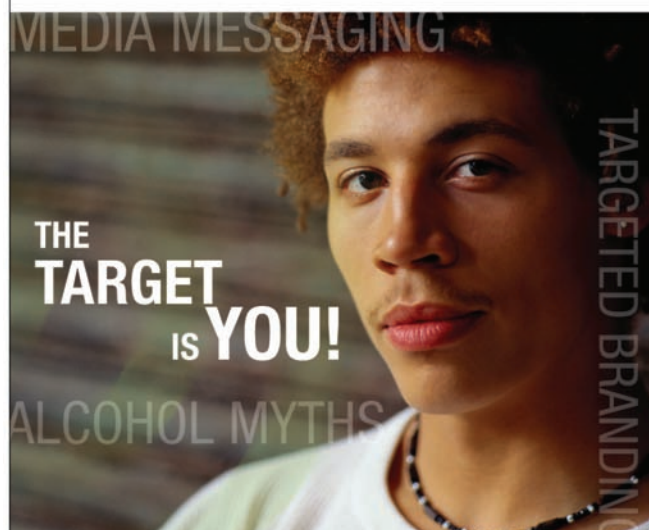


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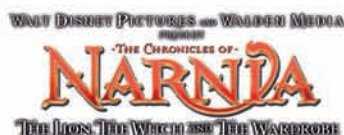
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