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Letter from the Director

The contributors to this issue of *Focus* challenge conventional thinking about teaching, learning, and assessment. Their work may also inspire colleagues to apply their disciplinary expertise to develop more creative learning experiences for our students.



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**DALHOUSIE UNIVERSITY**

*Inspiring Minds*

## Valuing Creativity in our Teaching and Learning



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Maxine Greene (1995) argues that our imaginations are the most important faculty we possess, yet many Western educational systems, including universities and colleges, do little to develop that fundamental creativity that “lies within each of us waiting to unfold” (Allen, 1995, p. xvi). In fact, many would claim that higher education dampens creativity rather than fosters it.

As educators, we are preparing students for life in a rapidly changing world. Our students will need to be creative in order to adapt to several careers in a lifetime, to be innovative, to see connections and to solve increasingly and as yet unknown problems. The time when academics could simply replicate the teaching methods that they experienced as students is quickly drawing to a close. Current students no longer require traditional, transmissive educational practices. Why should they? Information to “these Clickerati kids” (Caperton, 2005) is readily accessible from their home computers. These students have a new set of expectations.

Creativity is a capacity that is inherent to varying degrees in all of us. Unfortunately, it is an ability that seems to diminish with the number of years devoted to formal education. In recent years, however, creativity has been linked to technological innovation and economic prosperity. In fact, Sir Ken Robinson (2007) proposes that creativity is now as important in education as literacy. Consequently, institutions of higher education need to look closely at their educational objectives, teaching strategies and physical environments if they hope to graduate future leaders who can think increasingly outside the box.

But how do we go about cultivating creativity in an educational environment? How do we create places where creative individuals thrive? And what factors constitute barriers to creative behaviour? According to Simon and Hicks (2006),

Integrating creative styles of teaching and learning in our educational practices is not only timely, but is also necessary if all students are to be offered opportunities to explore their creativity and come to “know” without the pressures of formal modes of learning and assessment (p. 80).

In order to reconnect students with their creative potential and encourage different routes to learning, it is imperative that we welcome the active

participation of our students. We can do this by providing opportunities for inquiry-based learning, constructivism, project-based learning and collaborative learning. Our teaching approaches need to emphasize negotiation and collaboration in inquiry (Sawyer 2004) rather than imparting content knowledge.

Amabile's (1983) work on creativity and motivation has highlighted the importance of giving students, and hopefully faculty, as much free reign as possible in their creative endeavours. I recognize that there is an ongoing tension here between creativity and organization, but we must consider different approaches if we want our students to experience innovation and imaginative learning and teaching in their higher education studies. We must consider how different students learn and which strategies might promote that learning. Cornish (2007) argues that:

We need to design learning activities that are supported by instruction and modelling, that include a collaborative and problem-solving element, that are engaging and relevant, and that require both reflection and articulation of that reflection (p. 4).

We know that creativity and imagination flourish in environments that embrace diversity, collaboration and interdisciplinarity (Cutler, 2003, p. x). Since creative people gravitate to centres of creativity, we need to establish educational settings in our lecture theatres, classrooms and labs that are enhancing, harmonious and meaningful.

An environment that contributes positively to the development of creative potential should include: allowing adequate time for creative thinking; rewarding creative ideas, thoughts and products; encouraging risk-taking; allowing mistakes; imagining from various viewpoints; exploring the environment; questioning assumptions (Sternberg & Williams, 1996); identifying interests and problems; generating multiple hypotheses; focusing on broad ideas rather than narrow facts; and thinking about the thinking process itself (Starko, 1995).

Research has confirmed that creative individuals produce higher quality work when they are motivated by personal commitment rather than extrinsic rewards. Amabile (1989) remarks:

When you do give rewards, give them for creativity as well as for correct work. In this way, your students will clearly get the message that creativity is allowed, encouraged and valued in the classroom (p. 144).

These observations have interesting implications for the

assessment regimes used by most institutions of higher learning. But by implementing a student-centred approach that focuses on active learning, creative activity and emotional engagement, we can empower our students and thereby encourage them to take ownership of their own learning.

Teaching in higher education is not without its challenges. Excessive evaluation, extreme levels of competition, restricted choices, conforming pressures, frequent failures, rote learning, rigid physical environments that do not allow for students to engage in a variety of activities, and an emphasis on extrinsic rewards can easily destroy creativity in any educational setting. Conventional perceptions of academic achievement need to shift to value the power of the imagination. By nurturing, valuing and acknowledging creativity in our students, we learn about our own teaching, which in turn enriches the learning journey for everyone. Creativity is too important to remain on the fringes of our teaching!

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# Creativity and Craft: Exercises in Fiction Writing



Shashi Bhat,  
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There's a quote from John Barth that I like to include on the syllabus for my advanced fiction writing workshop class: "My feeling about technique in art is that it has about the same value as technique in lovemaking. Heartfelt ineptitude has its appeal and so does heartless skill; but what you want is passionate virtuosity"

(Barth 24). In teaching the subject of creative writing, a subject that actually includes the word "creative" in its name, I have discovered that many students hold the misconception that passion and creativity is all a person requires to write a good story. For this reason, the purpose of each writing exercise I give is always twofold: 1) to prompt creativity, and 2) to improve technique. Exercises span a range of skills, including plotting, setting, character development, and style.

My favourite range of exercises involves imposing restrictions, because such limits can force creativity. I ask my class to write stories exactly 100 words in length. Then I challenge them to take that same story and cut it down to exactly 50 words, without a loss of quality. The assignment fits nicely into our micro-fiction unit, but more importantly I hope it will give them practice in writing concisely. I also believe it will help them to realize that for such a short piece to have any effect it must possess intensity: sharpness of word choice, a twist, a surprise.

Another way I impose strict parameters to prompt creativity and improve technique is by bringing a large bag of fortune cookies to class. I have all the students read their fortunes aloud. Then they write stories that use the exact fortune wording somewhere in the piece. In another exercise, I have students list their ten favourite words. After they have composed their lists, I instruct them to write poems from eight to ten lines that include all ten words. The range of words they come up with – marigold, mercury, bootylicious – make the poems sound otherworldly; and because the poem length is quite short, they must find new ways of combining words into phrases, often through gorgeous use of metaphor. I have found that if I impose these constraints, if I force these aspiring novelists into literary corners, they come up with glorious, creative, sometimes genius results.

When teaching dialogue writing, I emphasize skills such as writing clear dialog tags without overusing adverbs and how to write dialog that sounds natural and real, dialog that moves, dialog that does not just fill up space but smolders with underlying tension. John Gardner has a great exercise in his book, *The Art of Fiction*, where he instructs students to write a dialog scene with two characters in conversation. Each character has a secret that he or she does not reveal (Gardner 203). One of my students wrote a scene where the husband's secret was that he had just bought the wife a new puppy. The wife's secret was that she had accidentally run over a puppy in their driveway. Another student wrote a scene where both husband and wife were trying to poison each other over the course of a dinner.

In my advanced fiction writing class, we have a chat about the dangers of writing about one's own life, and how it is best not to write stories based on one's classmates. Then we discuss how that old advice is not meant to be taken literally – or Tolkien never would have written *The Lord of the Rings* – and consider indirect ways that life experiences might provide inspiration for fiction. I tell the story of how Eudora Welty came up with the idea for her famous short story, *Why I Live at the P.O.* (1941), where a woman has a disagreement with her family and moves to the post office. While working as a photographer for a newspaper in a small town, Welty had gone into a post office and spotted a woman ironing in the back room. This simple experience ignited her imagination. After this discussion, I give my students a "write what you know" writing prompt, to help them learn that though ideas can come from real life, fiction is more than thinly veiled autobiography.

Exercises can cross between disciplines and involve different media. To show students the importance of detail in writing and to give them practice developing their personal styles, I ask for two volunteers to draw dragons on the board while their classmates watch. Then I have the class compare the drawings. For example, one might have intricately drawn scales, another jagged wings. One might take a threatening pose and one might lounge in front of the entrance to his lair. The point is that my dragon is different from your dragon is different from anybody's dragon, so if they just write "dragon" in a story, they are



not presenting an accurate image. After this, I have students write descriptions of dragons, with a mission to create the most vivid, precise fantasy creature possible. In another cross-genre exercise, I hook my laptop to a data projector and have them call out possible countries for me to Google, and then I have them all write settings based on the images we find. In another, they storyboard action scenes before writing them, and in another, they try to mimic classical music in writing – not just through story, but through syntax and tone as well. Or, they write character sketches and then each student takes on the role of his or her character while the rest of the class pose questions.

While, of course, to compose a piece of fiction the writer must start with an idea, and the writing exercises that I, and many instructors, use in fiction and poetry classes are idea-generating prompts, I teach my students based on the belief that good fiction comes partly from inspiration and innovation,

but equally from craft. The exercises I give are experiments; they help develop skill through a trial-and-error process, leading to new, sometimes risky writing decisions the writer might not have had the guts and experience to make otherwise. Writing good fiction is not simply having an idea and typing it up; it's, as Barth says, having "passionate virtuosity". A four-year-old could – and probably has – come up with the basic idea of a person transforming into a bug, but has never attained Kafka's renown in *The Metamorphosis* (1915). And any suspicious fellow could decide to write a novel about pedophilia without earning the place of Nabokov's *Lolita* (1955) on nearly every list of the best books of all time.

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## Forum on Student Engagement 2012



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In October 2008, the Senate Committee on Learning and Teaching (SCOLT) with the support of the Centre for Learning and Teaching (CLT) held a Student Engagement Forum to which various representatives of the university community were invited. Over 80 faculty members, instructors, administrators, and students

gathered together to discuss their ideas for the future plans for student engagement at Dalhousie. Among the ideas generated were a peer mentor program, experiential learning, capstone courses, and first year seminars. Over the last three years the Centre for Learning and Teaching and participating Faculties have worked to develop some of these activities throughout the university. This work has been greatly assisted by funding from the Office of VP Academic through the Student Engagement Initiatives that are managed and awarded to projects through the CLT. To date, five projects have been funded - most of these have been active for more than two years.

To celebrate Dalhousie's progress on student engagement since October 2008, the Centre for

Learning and Teaching held the second Forum on Student Engagement on January 26, 2012. Four of the five projects that have received funding from the Student Engagement Initiatives since the grant program was implemented in October 2008 were highlighted. In addition, the winners of the *Change One Thing Challenge: 2011-12* (see page 11), also participated in a panel session. Opportunities were provided throughout the day for group discussions on current student engagement activities, and suggestions for future directions.

The five projects supported through the Student Engagement Initiatives funding program include:

### **Dalhousie Peer Partnership Program**

This is a multi-faculty collaborative project with the Faculties of Engineering, Computer Science, Management, Science, and Arts and Social Sciences together with the Office of Institutional Analysis and Research, the Registrars' Office, and Student Academic Support Services. The aim of this initiative is to ease the transition of incoming 1st year students to the university by matching them with a senior Peer Mentor from their own Faculty. This project involves the collaboration of five Faculties with an infrastructure consisting of: An Advisory

Group, five Working Groups, a research associate, and student employees on a casual part-time basis (up to 40 individuals). Over 600 Mentors have been trained to support this program since 2009. Outcome measures include student information on performance and retention, and data from student focus groups and surveys. Descriptive statistics from an impact assessment suggest that having registered as a Peer Partner has positive effects on student retention and performance.

### **Applied Animated Computing and Social Networking for First Year Students**

In 2009, the Faculty of Computer Science implemented two first year computer science courses 1106 and 1107 which are designed to attract students to computer science through applied computer techniques in animated computing and social networking. To date, evaluation data have indicated that the number of women and non-computer science majors registered in these courses has increased. Results from the CLASSE, which measures student engagement in the classroom, indicate that students enjoy learning computer techniques that they can apply to real-world situations, and that their learning is more enhanced through group work with their peers. In addition, students' critical thinking skills improved as it appears that over time less students were memorizing facts and a higher proportion were synthesizing and organizing ideas. The developmental phase of this project will be completed in April 2012 and the results of the evaluation study will be available in August.

### **Certificate in Sustainability Leadership**

This initiative, a collaboration between the College of Sustainability and the Centre for Learning and Teaching, offers students the opportunity to work towards a Certificate in Sustainability Leadership while completing their undergraduate degree. The requirements for the certificate include: foundation and elective coursework, 60 hours of community-based service learning, a learning portfolio, and attendance at three weekend conferences on sustainability leadership. The development of the project is facilitated by a working group that comprises representatives from the CLT, and the College of Sustainability, and students. The first pilot weekend conference on sustainability leadership

was held at Dalhousie on March 24, 2012. Outcome measures will include student data on performance and retention, and acquired skills and attitude development over the duration of the program.

### **Preceptor Training and Community Engagement to Improve Community-based Educational Experiences for Students in the Health Professions**

The focus of this project between the Faculty of Health Professions Practice Education Committee and the CLT is to develop an interdisciplinary preceptor's on-line training program, in part, based on students' feedback. At this point, four modules are in various stages of development. The first two modules entitled "*The Role of the Preceptor*", and "*Supporting Students' Learning Needs*" are near the completion stage and will be uploaded to the Faculty of Health Professions website within the next few weeks. Two additional modules in this series include "*Feedback and Evaluation*" and "*Goals and Objectives*". The first modules will be available to preceptors in the summer of 2012 and evaluation of the project will be conducted over the academic years 2012 and 2013.

### **Intercultural Competency in French Language**

The aim of this joint project between the Department of French and the Centre for Learning and Teaching is to determine the extent to which two different kinds of intercultural experiential learning opportunities may contribute to increased intercultural competence. In one class (FREN 2002), students have the opportunity to participate in community service learning with a local francophone organization; class time is not devoted explicitly to the study of intercultural communication, but the experiential component fosters this goal. The second class (FREN 2022) pairs domestic students with francophone students; class time focuses explicitly on intercultural communication. The evaluation component will compare the level of intercultural competence of the two groups of students as measured by two multi-method data collection techniques. The first, the Intercultural Development Inventory (IDI) is a tool widely used for research and education in the field of intercultural studies. The second approach will be the use of personal interviews with the study population. The project began its first cycle in the winter term of 2012.

# Promoting Innovation Through Real-World Teaching



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This article introduces three teaching approaches that address a fundamental teaching dilemma in architecture – the relationship of the student project to the “real world” project. In North America, teaching architecture balances large classes in history and technology with one-on-one teaching in design courses. Students’ work on design projects

at their desk in the “studio”. Each project is their individual response to a building scenario set for the whole class. The completed projects are presented for criticism to internationally known practitioners and academics in school-wide events that occupy the last week of the semester.

The students’ work in these public critiques consists of drawings, models, and oral presentations, some done by hand, many done with computer assistance. When complete, their projects are assessed for overall building design, an internally consistent argument, and so on. By and large, assessment is based on an analogy: the students’ work (their drawings, their models, and their ability to speak), in fact, the very craft and resolution of their presentation, stands in for the proposed building. This approach to assessment parallels practice in an interesting way, as many clients assess architectural proposals by looking at the presentation work, only partially seeing the eventual building. After all, most architects don’t build structures; rather they depict and organize future building constructed by others.

If you have ever been part of a building design committee, you might have seen architects draw to translate your verbal ideas during meetings. Students learn how to do this for others and, more importantly, for themselves during the design process. But this is just the tip of the design iceberg. Many studies show that design is a distinct type of knowledge. Making, reflective thinking, and reframing “problems” are important aspects of this knowledge.<sup>1</sup> This means that models and drawings are actually processes not

products, that the brain is a responsive critic rather than just an intellectual engine of analysis, and that preconceived notions should be challenged.

My teaching extends design thinking to one of its limits by asking students to use their hands to test, explore and think, using real materials and techniques, not just the materials and techniques of representation. I agree with Richard Sennett when he says: “All skills, even the most abstract, begin with bodily practices; second, ... technical understanding develops through the powers of imagination.”<sup>1</sup> We use actual construction, contact with real community, engagement in real materials, and research into innovative technique. These are all areas of bodily practice. As students perform them, they develop specific instances of technological understanding. Imagination extends this understanding to other situations. And imagination triggers a desire to do it differently, to innovate. These innovations are communicated by model and drawing to others and to oneself. As Sennett says, it starts with bodily practice and it results in the need to imagine and depict technological re-vision.

One approach, the Building Studio, pioneered at Dalhousie in the 1980s, asks the student to construct a full-scale building fragment with real materials. A second approach, the Free Lab, introduced in the 1990s, asks the student to build in real contexts, often for community clients. This approach is an important part of Dalhousie’s reputation in contemporary architectural education. The Building Studio and the FreeLab work with real materials, and the FreeLab engages in a real situation. But each tends to be idiosyncratic rather than prototypical, i.e. it can be different without being influential or, in other words, original without being innovative. A third strategy, the Coastal Studio, is now several years old. In this approach students build innovative full-scale buildings. This approach includes an effective overlap between teaching and research.

## **Building Studio:**

This studio concentrates the students’ attention on the manner in which



<sup>1</sup> The journal *Design Studies* has thirty years of social, psychological, and pedagogical scholarship on design knowledge and design research.



different materials come together. Like a carpenter's vocabulary of wood joinery, the occasion of materials meeting is an opportunity in building design. In making an original full-size building fragment, the student has to consider how the design of this occasion implies the larger building design. Rather than making scale models that one imagines larger, student designers use the actual materials, learning their real properties and the real techniques of working with them. The conversation about the work addresses some fundamental architectural issues of craft, industrial production, the role of the worker, and ornament. The materials and their assembly must perform technically and aesthetically. The critique takes place in a gallery setting, prompting visual and haptic (sense of touch) assessments of the finished work.

### **FreeLab:**

The student-originated design project is fundamental to architecture and fine arts pedagogy. The intent of the original



FreeLab reversed this process and instead students worked on a faculty-led project. All faculty were invited to lead projects. Gradually this was expanded to include recent graduates and practitioners. The course lasts just over two weeks in July for all two hundred students in the school. It radically reconfigures the curriculum since during this time it is the only course the school offers. The course makes a 24/7 demand on students, who have to mobilize resources to build projects in an incredibly short time frame. The work is often like that of the Building Studio; full-size building elements such as walls in the landscape or theatrical sets that act as art installations. The work is usually ephemeral and sometimes fills a real community need.<sup>2</sup>

### **Coastal Studio:**

At the graduate level, design studio is taught in conjunction with all other courses; one faculty member can teach every course in a semester leading to a significant focusing of student energy. The Coastal Studio has two co-requisites: a course about the philosophical, historical



and social concepts of technology and a course on the engineering of building technology. The central task is to realize an actual building, an innovative structural prototype. Students learn how to innovate, how to improve the innovation through testing and experimentation, and how to work on details without compromising the whole.<sup>3</sup> The ambition of this studio is to introduce a new building process to Canada, to resuscitate a historic technique, and to work with improved computer modelling tools.

Each of these three approaches struggles to assert its independence from convention. For instance, the setting for the critique of building fragments appears like a sculpture gallery, not a technology lab. In the FreeLab, the community client is beguiled by student ideas, suspends disbelief, and responds with a bemused "Why not?" And in the Coastal Studio, the necessity of realizing technological innovation puts all conventional responses out of bounds. Hopefully, the students carry the understanding of originality based in innovation with them into their future projects and recognize the wonderful world that results from creativity grounded in real materials.

This article is not an argument for primacy; it is about three similar approaches to teaching in a necessarily diverse curriculum. Each approach is a counterpoint to the conventional curriculum, and depends on its conventional context. Each approach emphasizes practice, sometimes at the expense of theory. The very particularity of real materials, real contexts, or real innovative techniques demands incredible student investment of time, energy and thought. After the projects are done, considerable pedagogical attention is paid to ways of extrapolating general lessons from them. Interestingly, final critiques operate best for the students at the general or conceptual level. Critics burrow into projects for nuggets of real scholarship not normally found in student work. Then, almost naturally, the conversation extends to consider wider implications.

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- <sup>1</sup> Richard Sennett, *The Craftsman* (Yale University Press, 2008) p. 10.
- <sup>2</sup> Christine Macy, *Free Lab: Design-build projects from the School of Architecture, Dalhousie University, Canada, 1991-2006* (TUNS Press, 2008).
- <sup>3</sup> <http://dalcoastalstudio.blogspot.com/>

# Future Tense - Engaging Students' Curiosity in a First-Year Italian Language Class



Paolo Matteucci,  
*Italian Studies Program*

First-year language classes offer fertile ground for experimental activities centered upon the students' own interests. To foster a challenging, productive and comfortable environment, I devise imaginative approaches

to in-class work that develop the students' linguistic and communication skills. From the first day of classes my students are encouraged to interact in Italian by working together in pairs, in small groups, or as a whole class. In addition, they are called upon to share information about themselves and their world-views while developing strategies to listen and interact proficiently with their peers. Language classes at Dalhousie facilitate the creation of this type of classroom environment as they typically run for two consecutive terms and meet several times a week. The frequency of classes allows the students to get to know each other well. These factors, combined with a reasonable faculty/student ratio, contribute to creating a learning environment where the students' intellectual curiosity can be engaged and their enthusiasm can emerge.

One of my goals in the *Italian for Beginners* course is to introduce the usage of the future tense of Italian verbs towards the end of the second term. By this time, students are usually quite familiar with a variety of engagement activities, and they are comfortable expressing themselves in Italian. In preparation for the lesson that introduces the future tense, the students write intensively about themselves in their homework. More specifically, I ask students to write about their academic curriculum, the most important projects they have currently under way, and their wider ambitions in personal and professional life. These preliminary assignments are crucial because they provide relevant information about the interests and motivations of each participant in the class. Also, in the weeks preceding the introduction of the future tense, the class program covers the use of reflexive verbs alongside the vocabulary of clothing and fashion. This means

that students know, and can use, reflexive verbs such as *mettersi* (to put something on), or *vestirsi* (to dress up).

On the day I teach the future tense, I bring to class a few props, including a ring, a scarf, and a hat. Students use the reflexive verbs they already know to describe in Italian these garments, as well as the fact that I am putting them on. After this warm-up activity, I continue to wear the props and I take on the persona of a fortune teller. To add emphasis, I dim the classroom lights and I pull out of my bag a soccer ball covered with aluminium foil that becomes my crystal ball. These details create a learning environment that excites interest and curiosity about the content of the lesson.

Next, I move around the classroom wearing the scarf, the hat and the ring. Holding the crystal ball in my hands, I start predicting the future (in Italian) to the class in general, as well as to each specific student. All predictions are positive or optimistic, and they are tailored to the students' personal interests. Using the information collected when checking home assignments, I can for example foretell an interesting trip abroad for those who have applied for an international exchange program, prognosticate the positive outcome of an academic project currently in progress, or predict the ultimate success of a student planning to graduate in a given academic year.

In the following step, I encourage the class to infer, gather and then clearly outline the function and the proper conjugation of the verbs introduced in the future tense. For example, if I have used the verbs *andare* (to go), *fare* (to do) and *vedere* (to see), I ask the class to create short sequences of sentences featuring the usage, in the future form, of the same verbs in a logical order. I review the students' input using the blackboard and the textbook, and I allow a proper amount of time for questions, answers, clarifications and further examples. Students are then prompted to demonstrate their newly acquired knowledge, speaking Italian in pairs. Each student foretells the future to her or his classmate, predicting such events as the fulfilment of a personal wish, the accomplishment of an ambitious project, or the



realization of one or more career goals. As the students practise I move around the classroom to monitor their progress and to provide advice.

I first introduced this activity in my *Italian for Beginners* class of 2010-11, and it met an exceptionally positive response. In fact, after having practised in pairs, the students spontaneously started predicting the future of the whole class, as well as my own! Most student predictions, besides being properly formulated in Italian, included a number of quite amusing statements, for example concerning the contents of the end-of-semester written exam. “You will grade the final exams generously” joked one student in Italian. Playing along, another added that “the written exam will not include the *trapassato prossimo* (past perfect).”

This role-playing session was effective in leading the students to rapidly master the intricacies of the future

tense of Italian verbs. Both the class’s performance and the feedback received after the lesson showed that this activity caught the students’ imagination and inspired their interest in understanding the grammar topic under consideration.

I firmly believe that effective teaching not only requires versatility, commitment, knowledge and enthusiasm, but also the instructor’s constant dedication to finding the inspiration to create productive and stimulating in-class activities. The instructor needs not only to come up with creative ways to engage the students’ curiosity, but also to be willing to take on the (moderate) risks involved in activities such as role-playing, and to support the students in the same risk-taking. In the context of a first-year foreign language class, the “risks” of role-playing are comparable to the challenges all students face as they learn to communicate in a foreign language.

## Imagination in the Learning and Teaching of Mathematics



*Keith F. Taylor*  
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Facility with calculus is essential to the deeper understanding of any discipline in which the dynamics of quantities are important. Students of quantitative subjects, from business to atmospheric physics, need to master a set of techniques of differentiation and integration, as well as to develop some understanding of the principles involved,

so they can interpret the implications of their calculations. Lower-year math majors are mastering calculation techniques and learning what it means to prove something as well. Upper-year math majors and master’s students are undergoing a maturation process as their thinking becomes increasingly mathematical in nature.

In any discipline, it is important for students to take command of their own learning, and this is critical in mathematics. Each individual has a unique thinking process and must construct a personal way of understanding a concept or a whole theory. However, each student’s way of understanding needs to be logically consistent and sufficiently correlated with

the understandings of others to enable communication. Constructing a way of understanding requires good role models, but also sustained mental engagement in class and especially outside of class.

Most people engage best when their imaginations have been excited. There are many ways to spark students’ imaginations and engage them in creative thinking. I begin with the lecture as a key starting point for initiating conversations with students. Lectures should bring mathematics alive so that students can absorb the process as much as the content. There is a certain rhythm to the flow of calculation when I work out a mathematics example in front of the students, which is not as clear when students read the same example in the text.

In a lecture, I try to feed off the reactions of the students and adjust on the fly. This is where the lecturer has some influence on developing the thought methods of the students. I find the students stay most engaged if I respond in real time to their comments or their answers to my questions. To do this, and still maintain coherence of delivery, I must be in total command of both the content generally and my particular goals for that lecture. I wholeheartedly agree with Krantz (1993), who writes that “preparation is the core of effective teaching” (p. 2).

Beyond the ongoing exchanges and discussions in lectures, there are other methods I use for stimulating the imaginations of students and encouraging them to take personal command of their learning.

There are some concepts where interactive technology outperforms what I can do at the blackboard. I have a collection of “mathlets” (mathematical applets) that I have either located on the web or created with the help of undergraduate summer research assistants. Some are done in Excel or Flash, but most are written in Java. Besides using such mathlets in class to illustrate a certain point, they are available to the students for their own experimentation. Sometimes their use can be incorporated into assignments to ensure that all students take up the opportunity for such experimentation.

Two examples of mathlets can be found at [www.mathstat.dal.ca/~kft/Farey/FareyArticle.html](http://www.mathstat.dal.ca/~kft/Farey/FareyArticle.html) and [www.mathstat.dal.ca/conics/biglaboratory/generalExy.html](http://www.mathstat.dal.ca/conics/biglaboratory/generalExy.html). I designed the first mathlet for a pre-university readiness course so that students could play around and “see” how fractions are arranged along the number line, has turned out to be useful at many levels of learning. It allows users to explore at their own pace and there is not much of a learning curve to operating the controls. That being said, I recommend that you follow the instructions alongside the mathlet. Playing with this mathlet myself improved my own understanding of rational approximations to irrational numbers. Experimenting with mathlets can empower students to take control of their own learning, at least in the intellectual environment related to the mathlet.

Homework in mathematics need not be limited to problem solving, constructing proofs or playing with technology. From time to time, an essay assignment

that stimulates some serious contemplation can be very effective. I have had success in engaging students’ imaginations when I create a scenario in which students can imagine themselves, for example, as a consultant hired to optimize a process, and then write a consultant’s report communicating the non-trivial mathematical content to non-specialists.

One of my most successful courses over the years, in terms of student engagement and outcomes, was one in which I had two writing assignments, along with the usual computation based homework. I find this approach particularly successful if students have at least two opportunities to write and if I provide feedback on their first drafts before final versions are submitted for grading.

Finally, I believe it is most important to be mindful of one’s students and one’s interactions with them. We are all social animals and it is natural for students to tend to synchronize their imaginations with their teacher’s if they sense the teacher cares about their learning and the course material. In class, I like to occasionally bring in a personal connection or anecdote that reveals my excitement about the topic. For any course, I can find something from my research area that integrates nicely with the content and level of the course, but that cannot be found in the text. An example would be using a class period in calculus to explore the Shannon wavelet ( $\sin(x)/x$ ) and illustrate how a wavelet may be used in signal processing. By sharing these connections that excite my own imagination, I hope to encourage students in their own explorations.

### Reference

Krantz, S. G. (1993). *How to teach mathematics: a personal perspective*. American Mathematical Society, Providence, Rhode Island.

## Recording Teaching Accomplishment: Two-Part Workshop Series on the Teaching Portfolio

The teaching dossier (or portfolio) is widely used by university academic staff to document their teaching skills and responsibilities and to provide evidence of the quality of their teaching practice. In many faculties and departments at Dalhousie, candidates for appointment, re-appointment, tenure, or promotion are required to submit a teaching dossier as part of their application. Beyond this purpose, the act of compiling a dossier requires university teachers to closely examine their teaching practice—an exercise that can help to identify strengths and weaknesses and to guide plans for teaching enhancement and innovation.

**Part 1: May 28 • Part 2: May 30**

9:00am to 12:00pm, Room B400, Killam Library (basement)

# The Change One Thing Challenge 2011-12

During the Fall semester of 2011 the Centre for Learning and Teaching invited faculty, instructors and teaching assistants to share their student engagement activities during the ***Change One Thing Challenge***. The challenge invited the university teaching community to describe a student engagement activity that had been developed within the last 24 months, that was still part of their current teaching practice, and that they believed had a positive impact on student learning.

Twenty entries were submitted and three winners were selected through a peer-review process. The entries were judged based on the described rationalization for the activity within the teaching context and how well the individual explained the connections between student engagement and learning. The winners received a Scholarship of Teaching and Learning Grant for up to \$500 to support travel to a teaching and learning conference. In addition, each winner participated in a panel at the Forum on Student Engagement 2012 and presented their activity to members of the university community. All individuals who submitted a proposal were invited to present a poster at the Forum. The Centre for Learning and Teaching is pleased to present the following initiatives selected as the 2011-12 winners of the Change One Thing Challenge:

## ***Darcy's Law and Contaminant Transportation in Ground Water: A Collaborative Project Between ENVS 1000 Tutorial and EARTH 1090 Laboratory***



*Janice Allen is a PhD student and teaching assistant in the Earth Sciences Department at Dalhousie University. Her previous studies include an MSc in environmental science from the University of Northern B.C. and undergraduate degrees in geology and engineering physics. She has also worked as a consulting engineer, specializing in structural design. Janice loves to teach, and is always looking for ways to improve her teaching.*

*Darcy's Law and contaminant transportation in ground water* is a project developed to combine the resources of first year geology (ERTH 1090) and environmental science (ENVS 1000) courses, and to expand learning potential of students in both

disciplines through hands-on measurement and practical application of sediment properties. Students in both courses collaborate to address the real world problem of contaminant transportation via ground water, drawing on expertise as well as available space, time, and materials from both disciplines. Students in ENVS 1000 gain hands-on experience measuring sediment properties, while students in EARTH 1090 conduct practical applications of the sediment property data during laboratory experiments. Because neither group has access to the time and resources needed to fully engage in both hands-on measurement of sediment properties and analysis of their real world application, this collaborative project combines the efforts of both groups of students, thus maximizing learning potential and encourage a cross-disciplinary approach to problem solving. Students of EARTH 1090 measure all of the relevant sediment properties, and share their data with the ENVS 1000 class. ENVS 1000 students measure porosity of the samples in addition to experiencing visual and tactile assessment of sediment samples. A summary of the case study is presented to the EARTH 1090 students in the following week's laboratory session. Ms. Allen believes that this project's approach of cross-disciplinary problem solving will facilitate a deeper understanding of sediment properties among students of both courses, and reflects the collaborative strategy students can expect to encounter in the workforce.

## ***"Allegro! Teaching the Future Tense in First-Year Italian Language Classes"***



*Paolo Matteucci is Assistant Professor of Italian Studies in the French Department, where he enthusiastically teaches Italian language, literature, cinema, and culture. He holds a Master of Education in foreign language*

*teaching, a Master of Arts in comparative literature, and a Ph.D. in the same discipline. His research interests include Modern and Early Modern visual and material cultures, Italian literature, and contemporary European thought.*

This classroom activity created for students in his Italian 1010 course aimed at fostering intellectual curiosity through a challenging and productive, but comfortable learning environment. The activity is also aimed at reinforcing students' linguistic skills



while promoting awareness and respect for cultural and personal differences. For a full description of Dr. Matteucci's activity please see the article on page 8.

***Able@Dal: An Orientation to Accommodations and Support at Dalhousie University***



*Gaia Aish is currently a MSc. student in Chemistry at Dalhousie after completing her BSc (Dal) and an Applied Chemistry and Biotechnology Diploma at Camosun College in British Columbia.*

Gaia's *Able@Dal* pilot project was a collaboration between the Student Accessibility and Accommodation Office (SAAO) and the School of Occupational Therapy. At Dalhousie, SAAO provides

accommodation services to students who face learning and physical challenges while at university. However, new students still require help to understand how to access the appropriate services. *Able@Dal* is an interactive orientation program, by students for students, in order to provide:

1. knowledge of available resources and how to access these services; and,
2. the skills to become confident to self-advocate.

The orientation is meant to simplify the transition from high school or other universities by highlighting the changes and differences in the new environment. Other major Canadian universities also deliver learning disability specific orientations, however, this was the first time an orientation focused on students with disabilities was held at Dalhousie.

## **Dalhousie University Writing Centre**

### **Writing Connections**

#### **GRADUATE STUDENTS and FACULTY**

The Writing Connections at Dalhousie listserv offers a place to share information and resources, seek advice, post research queries, and post announcements relevant to writing for graduate students and faculty.

To join, send an email to [listserv@lists.dal.ca](mailto:listserv@lists.dal.ca) containing the following in the body of the text: 'sub listname firstname lastname'. For example, 'sub writing-connections-at-dalhousie Joe Smith'

For information about other writing related topics, please visit  
<http://dal.ca.libguides.com/writingcentre>



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