TEACHING DOSSIER

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I Biographical Information

Personal.
Date of Birth: March 6, 1939.
Citizenship: Canadian
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Degrees:
M.A. 1960, University of Aberdeen, Scotland
(1st Class Honours in Mathematics and Natural Philosophy).
D.Phil. 1963, University of Oxford, England.
(The Physics of Elementary Particles)

Employment History
University of Toronto since 1970

Full Professor since 1990
Acting Chair 1993
Graduate Chair 1987-92
Undergraduate Chair 1980-86

Fermi National Laboratory (Visiting Scientist) 1968-70
University of Toronto (Postdoctoral Fellow) 1966-68
University of Natal (Lecturer) 1964-1966

Languages
English, French - fluent speaking, writing
Japanese, Spanish - medium level speaking

II Teaching Philosophy

All teaching philosophies presuppose – explicitly or not – a view of human psychology. I believe that a central part of our nature is our innate curiosity and a pressing need to make meaning of our world. It follows that my main task as a teacher is to support and, where necessary, re-vivify my students' natural curiosity, for it is this that provides the motivation necessary for effective learning of lasting value. For many students this intrinsic motivation has too often been replaced by the more extrinsic demands of achieving a good grade. While I must respect this reality by providing fair and responsible evaluation of my students, I do not have to allow it to dominate my teaching. Thus in addition to persuading the students that their learning has value in its own right, I also aim to persuade them that the knowledge I encourage them to acquire will be of value to them in their future careers and as educated members of a civilized society.

A central tenet of my philosophy, which I emphasize by precept and example in my training of young teachers, is that education is only truly transformative when students are actively engaged in their own learning. I ensure that all my lectures are highly interactive, and have devoted much of my teaching and research in recent years to the study, organization, and development of the undergraduate laboratory.

I am also convinced that one of the most important methods of teaching is by living and spontaneous example. Thus I use my lectures and my one-on-one interactions with my students to communicate my own enthusiasm for, and fascination with, all aspects of physics. Although I am excited by the other avenues for learning that the technological revolution has provided, I believe that a live, interactive, passionate, and idiosyncratic human teacher is a unique and irreplaceable essential of higher education.

Finally, I believe that I have a responsibility to pass on my teaching experience to the generation that follows. My teaching in two graduate courses and in many training workshops for Teaching Assistants exemplifies this belief, and I consider that this work with *graduate* students is among the most important of my contributions to *undergraduate* teaching.

III Teaching Highlights

In my thirty years of teaching I have taught physics courses at all levels, from first-year undergraduate to graduate. In recent years my undergraduate teaching has concentrated on first year teaching; a lecture course for non-scientists and a laboratory for physics specialists. At the graduate level, I teach two courses that prepare M.Sc. and Ph.D. candidates for their own teaching careers. In this abbreviated dossier, I have chosen to concentrate mainly on highlights of the last decade.

My main contributions are listed below, and discussed at greater length in the following sections. (See Appendix 1 for a list of these courses).

- The development and teaching of three completely new courses for physics students:
  - a first year undergraduate course for non-scientists
  - a laboratory for first year students specializing in physics and physical science
  - a graduate course on communication and teaching - the first course its kind in this Department
- The teaching and coordination of two other courses:
  - a first year laboratory course for general physics students (enrolment around 1400)
  - a graduate course on teaching in higher education for senior graduate students from all disciplines
- a wide variety of original workshops and lectures on physics and physics teaching

- many workshops on training Teaching Assistants for their work with undergraduates in tutorials or laboratories: several of these workshops have become annual events
- research in Physics Education Research; this involved research design on several topics, supervision of two M.Sc. students, preparation and publication of reports and papers

IV Courses Taught and Teaching Innovations since 1993

Though I have taught university courses since the year of my first appointment, I include here only the courses I have taught over the last decade. Since the graduate courses I now teach aim at the improvement of the teaching skills of graduate students, I include them here as additional evidence of my contribution to undergraduate teaching.

My proudest teaching achievement over this time has been the development of three completely new courses (*The Magic of Physics*, the *PHY140Y Laboratory*, and *PHY1600S - Effective Communication for Professional Physicists*) and one of the developers and original professors of a fourth *(THE500H - Teaching in Higher Education*). For the first three, the course design - syllabus, organization, grading methods, etc. - was entirely mine, though in the PHY140Y Laboratory I had strong support from several colleagues. For each, I prepared new lectures, course materials and readings, and designed the now obligatory Web sites.

Undergraduate Courses

In the following sections I briefly describe the courses I have taught since 1993, with particular emphasis on innovative and original developments or approaches.

PHY100F - THE MAGIC OF PHYSICS (1993-1999)

This is a completely new course that I developed for non-science students in 1993. In part, the Course Description reads:

> In 1905 Einstein presented the first of a quartet of papers which revolutionized our understanding of gravity. He commented: "Hardly anyone who has truly understood this theory will be able to resist being captivated by its magic." The general theory of relativity is not the only theory of physics which is magical, and Einstein was not physics' only magician. We uncover the magic of the classical and the quantum world courtesy of Kepler, Newton, Faraday, Maxwell, Einstein, Heisenberg and others. We will discuss topics such as planetary motion, chaos, the nature of light, Schrodinger's cat, time dilation and time travel, black holes, and quarks.

The challenge was to teach the most exciting developments in fundamental physics using no mathematics whatsoever. Over the years, the enrolment has increased steadily, from around sixty to almost two hundred students.

Innovations. I produced a comprehensive set of notes for handout to the class, since there is no one book which covers the content I chose without the use of mathematics. Many of these notes, extensively rewritten and added to over the years, are incorporated into our "Virtual Bookcase", which includes notes of general interest from a variety of courses, accessible from the departmental Web site. I also developed a set of homework questions which closely follow and exemplify the lectures; since I use no mathematics whatsoever, the questions are entirely conceptual in nature, quite in the fashion of current pedagogy.

As is usual in my lectures, I used many methods to involve the class: in-class quizzes, multiple choice and open-ended questions for discussion (similar to Mazur's Peer Instruction), minute papers, informal evaluations, and at least one demonstration each class. In several of the years I offered students the option of doing a project instead of an essay, under my close supervision. Based on these projects I developed several experiments, two of which have been further developed and incorporated into the undergraduate laboratories: *The Making of a Hologram*, now in Second Year, and the *Speed of Sound in a Solid*, now a Core experiment in the First Year Laboratory and the subject of a paper published in the Physics Teacher.

FIRST YEAR LABORATORY (1994-1998)

In the years in which I taught and supervised this laboratory (in collaboration with a Senior Lecturer), it served all 1400 students in our first year full courses.

Innovations. In addition to the daily running of the laboratory, and the supervision of the 45 or so Teaching Assistants, my colleagues and I made a variety of innovations and improvements:

- the introduction of formal training hours for the Teaching Assistants
- a complete redesign of the Laboratory Manual, including new sections on Error Estimation and Data Analysis and transfer of all documentation to electronic form
- complete rewrites and updates of many of the 40 or so experiments
- the development of several completely new experiments, among *them Charge and Discharge of a Capacitor, Speed of Sound in a Solid* (also see above).
- the re-organization of the schedule: all experiments were assigned during the first term. This gave more support to the learning of the students, by providing an easier introduction to experimentation and making it easier for new Teaching Assistants to gain competence in their teaching
- the introduction of several formal lectures on data and error analysis

PHY140Y LABORATORY (2000-present)

Before the 2000-2001 academic session, all first year courses shared a common laboratory, including PHY140Y, our main physics course for students intending to specialize in physics or the physical sciences. The PHY140Y students did less well, and liked the laboratory less than students in any of the other three courses. Accordingly we decided to design a completely new laboratory for these students. Subsequently this new course also became part of our first year physics course for Engineering Science students.

Innovations. I designed the new laboratory with the assistance of two other faculty members and our technical staff. I developed from scratch half a dozen new experiments, assisted in the layout of the designated space, and generally supervised the overall implementation. For the early experiments I was guided by my knowledge of current Physics Education Research (PER), and used some of the excellent commercial equipment that has been developed in recent years. I designed and wrote completely new manuals, and a new set of Web pages. I also integrated the laboratory section with the lecture section, by commandeering eight lectures throughout the year to discuss such topics as experimental methods, statistical and data analysis. The selection and increased training of the Teaching Assistants associated with the new laboratory followed my suggestions. I am now in the third year of teaching in this laboratory. Enrolment is typically 140 students. The Web page is http://www.upscale.utoronto.ca/PHY140Lab.html

Graduate Courses

THE500S - TEACHING IN HIGHER EDUCATION (1996-present)

This Woodsworth College (University of Toronto) course is aimed at senior Ph.D. candidates who intend to make a career in the academy. Many of the classes feature invited guests, outstanding scholars and teachers, who are chosen to present higher education topics in which they are expert. I teach the first and last class (of thirteen) classes, provide overall coordination, mark the assignments, and provide individual consultation. I have been involved since the year of inception in 1995. The course has been a huge success and two additional sections have been added; I now teach one class as a guest lecturer in each of these other sections. Enrolment is capped at 40 students per section.

Innovations. In addition to planning my own teaching to coordinate with that of our guests, I have been central to the current design, suggesting topics, designing a unique method of providing in-class feedback and the recording of minutes by class members, and developing criteria for the awarding of the Pass/Fail grade.

PHY1600S - EFFECTIVE COMMUNICATION FOR PROFESSIONAL PHYSICISTS (2000-present)

I developed this unique course to fulfil a perceived need - that of providing our graduate students, who work or have worked as Teaching Assistants, with a solid background to support their oral and written communication. It provides theoretical background with practical approaches to teaching at the undergraduate level and scientific communication in general. The course homepage is at www.physics.utoronto.ca/~key/phy1600.htm

Innovations. The entire course is innovative, being an original meld of a wide variety of topics; discussions of results and applications of physics education research, video-taped micro-teaching sessions, teaching techniques, writing skills, pedagogy theory, in-class observation, etc. I use many different techniques of presentation, developed from my store of teaching experience. I place emphasis on class interaction and participation using games, modeling behaviour, quizzes, and discussion groups.

V Teaching Evaluations

The data in this section is taken from the annual Faculty of Arts and Science student evaluations (summaries printed for general distribution, individual anonymous responses returned to the faculty member), the Woodsworth College course evaluations (for consideration by the steering committee), the departmental course evaluations, the evaluation of the Teaching Assistants' Training Progamme, and, in one case, less formal results from some of the mid-course evaluations I request from students in all my courses.

PHY100F - THE MAGIC OF PHYSICS

From the Faculty Evaluations; student responses to the question – "All things considered, (the instructor) performs effectively as a university teacher"are summarized in the table below. Where available, Departmental averages are indicated in square brackets, and a comparison with all other courses and section is indicated by "Rank" in the last column.

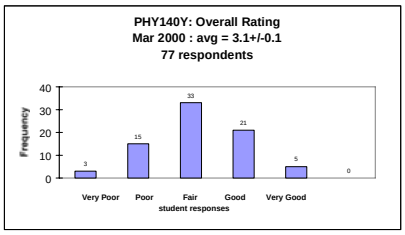
Year	Retake	"Performs effectively as a university teacher"		Mean (7 pt scale)	Rank
		Good	*Very Good / Outstanding*		
1993-94	88%	28%	61%	5.8	
1994-95	70%	7%	81%	6.1	
1995-96	72%	16%	70%	5.9	
1996-97	78%	18%	78%	6.2	
1997-98	83% [63%]	16%	75%	6.2 [5.3]	3rd of 60
1998-99	81% [57%]	6%	88%	6.4 [5.2]	2nd of 55

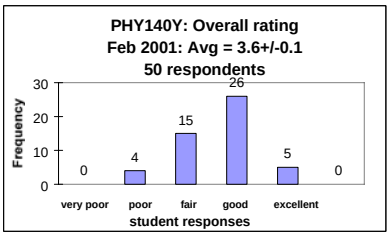
I list below a selection (about 50%) of the comments received for the last year I taught this course.

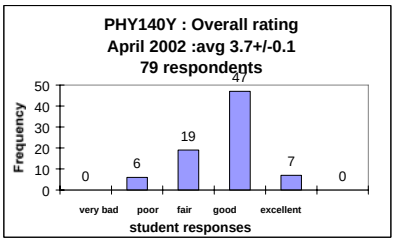
- *Tony Key is one of the best instructors I've had in university*
- *Overall, this was my favorite class this term. The demonstrations and examples shown in class were excellent. He presented the material enthusiastically and clearly.*
- *Tony Key was a fantastic lecturer in every respect.*
- *His love for the subject was obvious to all, the lectures were amazing and Prof. Key's enthusiasm is very much. The material was fun to go through and I felt that I learned a lot.*
- *Professor Key was a brilliant instructor. Professors rarely get as good.*
- *Tony Key is an excellent Prof. Explains concepts clearly and shows a lot of enthusiasm!*
- *Without exaggeration the best course I have taken at the University of Toronto*
- *Prof. Key is amazing. I never tired of attending lectures, they were always well planned and delivered in an enthusiastic manner. He's the best instructor I ever met in this university.*
- *Tony Key made this the most memorable class thus far. I really enjoyed his teaching style.*
- *fantastic course - great in everything - excellent Professor - very well prepared - very creative, enthusiastic and available to students. I enjoyed every minute of it.*
- *I was extremely happy with this course, and particularly with the Professor. I would have liked it to go on for 2 full semesters. very interesting course!*
- *Prof. Key is a wonderful teacher, it is fine to listen to him and he explains the material very well. Excellent teaching. very good web pages. very nice experiments.*
- *Professor Key is a remarkable instructor. Very enthusiastic.*
- *Tony Key is the most dynamic, enthusiastic, brilliant Professor I have ever had the pleasure to have taken a class with. He is extremely knowledgeable and helpful, he provides many, many overheads, experiments, endless things to aid us in understanding. The Web page was very useful and interesting.*

PHY140Y LABORATORY

The lab has been extremely successful. Student evaluations exceeded our best expectations (see the table and figures below). Previously only 34% of the class rated the laboratory as Good or Very Good. In its first year of operation, 62% of students rated the lab as Good or Very Good, and in its second year this number increased to a rather astonishing 68%. Selected student comments are shown below. Student understanding of laboratory practice and error analysis also showed a solid increase. The class average for the Error Test (an interactive computer test given every year) increased over previous years' results from less than 70% to 75% and 74% respectively in the first two years of the new laboratory.







Year	Poor, Very Bad	Excellent, Good
2000-01 (Mar)	23%	34%
2000-01 (Feb)	8%	62%
2001-02 (Apr)	8%	68%

THE500S - TEACHING IN HIGHER EDUCATION

Student reviews of this course have been uniformly enthusiastic. In the interests of brevity I include the latest available evaluation carried out by Woodsworth College, that for the 2001-2002 session. This evaluation is typical of those from all earlier years. For question *v)* below, my average of 3.8 on the four-point scale from 1 to 4 compares well to the 3.2 average given the other expert teachers who presented to this course.

Please rate the coordinator, Tony Key, on each of the following

	Poor	***Fair***	***Good***	***Excellent***	
i) presented topics in an effective way	*0*	*0*	*8*	*14*	
ii) listened and responded effectively to questions	*0*	*0*	*1*	*21*	
iii) provided useful feedback	*0*	*0*	*4*	*18*	
iv) available for individual consultation	*0*	*0*	*3*	*14*	
v) overall effectiveness as a teacher	*0*	*0*	*5*	*17*	*3.8*

I include **all** the write-in comments received from students in the most recent available evaluation.
Enthusiastic, professional, committed scholar
I enjoyed Tony's enthusiasm and commitment
Tony was very nice guy
An excellent speaker
Good job!
Very nice and flexible. Encouraging comments on assignments
Approachable
I liked the way you 'personalized' the entire class
Thank you Dr Key

PHY1600S - EFFECTIVE COMMUNICATION FOR PROFESSIONAL PHYSICISTS

In 1999-2001 the enrolment in this course was13, compared to the departmental average of 7.7, and 23 courses were evaluated by the department. 91% (10 of 11 responses) of the students evaluated my performance as an instructor as "excellent", second only to one other instructor (all 6 of whose students gave that rating). By the following year (enrolment 7, departmental average 5.5), 100% of the students evaluated my performance as an instructor as "excellent", the highest of all instructors in the 27 courses evaluated. In both years the "retake" rate ("knowing what you know now, would you have taken this course?") was 100%. This year, enrolment is 15, and course evaluations are not yet available.
Here are a few student comments from both years selected from the departmental review:

- This is one of the best classes taken in my entire university career.
- Tony is an excellent instructor who preaches what he practices. Well done!
- The course was very useful - it gave me plenty of things to keep thinking about in the future. In particular, the work on teaching (microteaching sessions, reading class discussions) was very helpful.
- The course is great! I would recommend it to all physics students. Very useful!
- The instructor is very knowledgeable, giving good advice, excellent assignments!
- Every class was interesting

EVALUATION OF WORKSHOPS

Space does not permit the inclusion of the evaluations of the many workshops and lectures I have given over the years (see below). I include the most recent.

Workshop for Teaching Assistants, Department of Physics, September 2001.
(*The rating of my performance by the 19 respondents in anonymous, in-class evaluations gave an average 8.5 out of a possible 10).*

Teaching Small Classes. University of Toronto, September 2001.
(Attendance was 65; the Teaching Assistants' Training Programme evaluation - on the scale from Not Useful *to* Extremely Useful - *was 4.5 out of a possible 5)*

Teaching Small Classes. University of Toronto, September 2002.
(Attendance was 29; the Teaching Assistants' Training Programme evaluation - on the scale from Not Useful *to* Extremely Useful - *was, again, 4.5 out of a possible 5)*

VI Teaching Related Activities

Over the years I have been involved in a wide range of activities that have been aimed at improving the quality of undergraduate education in physics. I summarize these in this section.

Teaching Assistant Training

The workshops and lectures I give in the area of TA training form a significant part of my contribution to the teaching of undergraduates in the Physics Department, the University of Toronto, and elsewhere. All are by invitation, and many are repeated annually. A partial list appears in Appendix 4.

Invited Lectures and Workshops

Over the years I have given many invited lectures and workshops in the areas of Teaching (techniques and psychology of teaching and teachers), and communication. I list a representative sample in Appendix 3.

Contributions to Conferences

From 1978 to 2002, I made many contributions to teaching conferences in the areas of Physics Education, Pedagogy, and Communication, either individually or with my colleagues or graduate students. These are listed in Appendix 4.

Outreach Activities to Schools, etc.

While not a direct contribution to undergraduate teaching, contact with the schools is an important, though relatively minor part of the duties of a university physics teacher. Appendix 5 lists a few representative examples.

Individual Counseling

During this last year, the Department has asked me to undertake individual consultation with three Teaching Assistants about whom complaints had been made. In all three cases I was able to improve the communication between the TA and the students.

Validation of the New Ontario School Curricula

In 1999-2000 I was the University of Toronto Institutional Representative working with the Council of Ontario Universities on the Validation of the new Grade 11/12 curricula proposed by the Ministry of Education and Training. I was responsible for contacting all disciplines across the University of Toronto, collating their responses, and reporting to the Provost and COU.

Undergraduate Physics Review, Trent University

I was requested to undertake a review of the undergraduate programme of the Department of Physics at Trent University. I spent three days on-campus and submit my report to the Dean of the Faculty of Arts and Science in January 2003.

VII Physics Education Research

In this section I present an abbreviated account of my continuing research on physics education (including graduate supervision in this area.

Teaching Related Publications.

1. A.W. Key and B.B. Schiff, *The Application of the Principles of Gestalt Therapy to the Training of University Teachers*, Ontario Psychologist **10** 31 9 pp (1978).

A report on an experimental course given to Teaching Assistants from a variety of disciplines. A training methodology is described, and the results of its application discussed. This course formed the basis for much of my later work on TA Training.

2. Milton From, Tony Key and Robert Smidrovskis *"Measuring the speed of sound in a solid in the undergraduate laboratory"* The Physics Teacher **38**, 76 2pp (2000)

A brief note on an innovative way of measuring the speed of sound in a solid that also teaches the use of an oscilloscope.

3. Jan van Aalst and Tony Key, *Preprofessional students' beliefs about learning physics*, Canadian Journal of Physics, **78**, 73 6pp (2000)

Results obtained with the Maryland Physics Expectations (MPEX) survey in or first year courses. The data suggest that the context of learning must be taken into account in research on students' beliefs about learning physics.

4. Zahra Hazari, Tony Key, and John Pitre, *Effective Behaviors of Laboratory Demonstrators*, Electronic Journal of Science Education, ISSN 1087-3430 Vol. 7 - No. 3 - March 2003 . http://unr.edu/homepage/crowther/ejse/hazarietal.pdf .

A study of interactive and affective behaviors of laboratory demonstrators in our first year physics laboratory. Our results indicate that the proactive exchange and affective demeanor of a demonstrator are measurable and good predictors of student enjoyment and appreciation of the physics laboratory.

4. A. Key, *A Course on Communication for Physicists*, Physics in Canada, Vol.59, No.6 (2003), pp.331-334.

5. David Harrison, Zahra Hazari, and Tony Key, *Gender Differences in Student Grades and Teaching Assistant Grading in a First Year Physics Laboratory*, in preparation.
The influence of student and Teaching Assistant gender on grades is studied in two years of our largest first year course. Female students perform marginally better in the laboratory than male students, who, however, perform marginally better in the theoretical part of the course. Student grades awarded by female teaching assistants in the laboratory are significantly lower than those awarded by their male counterparts. Possible reasons for this difference are discussed.

6. Zahra Hazari and Tony Key, *Student Evaluations of Teaching Assistants: Is there a Grade Bias?*, Submitted to Physics in Canada.
There is controversy about the relation between student evaluations and the grades they receive. Our data indicates that students are quite capable of distinguishing between good teaching and lenient marking if the evaluative questions are sufficiently well-designed.

M.Sc. Students supervised (Physics Education).

- Z. Hazari, University of Toronto, M.Sc thesis (2000) *The Teaching Behaviours of Teaching Assistants in the First Year Undergraduate Laboratory*
- M.Mandic, University of Toronto, M.Sc thesis (2001) *Gender Performance Differences in First Year Physics.*

VIII Teaching Awards

1993 Dean's Excellence Award, University of Toronto.
This award is given to those faculty members who, in the Dean's opinion, have made an outstanding contribution during the year. Although the Dean does not vouchsafe the exact reasons for giving the award, I imagine my work as Associate Chair and Acting Chair, in addition to my teaching, played a large part.

2002 Outstanding Teaching Award (Sciences),
Faculty of Arts and Science, University of Toronto.
Two of these annual awards are given to faculty in the Science departments who have been judged to have made outstanding contributions to teaching. Nominations come from the department.

2003 Canadian Association of Physicists,
Medal for Excellence in Teaching.
This is an annual award to honour "…. faculty members who have a comprehensive knowledge and deep understanding of their subject and who possess an exceptional ability to communicate their knowledge and understanding in such a way as to lead their students to high academic achievement in physics."

APPENDICES

Appendix 1. Courses Taught (since 1993)

Undergraduate Courses

1993-98	PHY 100F - The Magic of Physics
	First Year Laboratory (with Dr Milton From)
1998-99	PHY 100F - The Magic of Physics
	First Year Laboratory (with Dr Ruxandra Serbanescu)
2000-present	PHY140Y Laboratory

Graduate Courses

1996-present	THE500H - Teaching in Higher Education
2000-present	PHY1600S - Effective Communication for Professional Physicists
2002	PHY2707 – Experimental Methods in Physics Education (Individual study).

Appendix 2. Teaching Assistant Training

Training Teaching Assistants, Invited talk presented as panel member, Office of Educational Development Workshop, April 1980.
TA Orientation Consultant to Department of Political Science, University of Toronto. One-day workshop(1991).
TA Training, Arts and Science Faculty teaching forum for new faculty, "Teaching in a Research University" March 1992.
Teaching Assistant Orientation Workshop, Faculty of Arts and Science, University of Toronto, September 1984, 1985.
Workshop for Training Teachers; *a Gestalt Approach*. National Taiwan Normal University 1996-present.
TA Workshop, Physics Department, University of Toronto, offered every year from September 1988-present.
Teaching Small Science Classes; *Tutorials and Lab Groups;* Teaching Assistants' Training Programme, University of Toronto, January, September 1998, January 2000.
Teaching Small Classes - Tutorials, Lab Groups, etc. Teaching Development Seminars, York University, November 2001.
Teaching Small Classes: Lectures and Tutorials. Teaching Assistants' Training Programme, University of Toronto, September 2001,2002.

Appendix 3. Invited Lectures and Workshops

Gestalt and Education, 3 day workshop presented at Second Language Teaching Workshop, Scarborough College, University of Toronto, May 1981. Also at Department of Psychosomatic Medicine, Tokyo University, August 1982.
Effective Teaching Techinques. Hunan Physical Society, Changsha, September 1986.
Effective Teaching Techniques, Faculty of Arts and Science, University of Toronto, February and June 1986.
Problem Solving (workshop). Counselling and Learning Skills Service University of Toronto, February 1986. Also at Fudan University, Shanghai, September 1986. Also at Department of Physics, University of Delaware, November 1987. Also at Department of Physics, University of Toronto, October 1988.
Teaching Problem Solving. Hunan Physical Society, Changsha, September 1986.
Teaching Problem Solving. Arts and Science Faculty teaching forum for new faculty, March 1993.
Communication and Gestalt Therapy, Gestalt Centre, London, England, February 1989
Problem Solving for 1st and 2nd Year Students (workshop). Department of Physics, University of Auckland, June 1989.
*Teaching Techniques (*workshop*).* Department of Physics, University of Auckland, June 1989
Communication for Physics Faculty, Consultant to Department of Physics, Auckland, New Zealand. evening workshop, June 1989.

Mécanique University of Toulouse (Albi Campus); a series of lectures/tutorials for first year university students Spring 1994.
Beginner's Quantum Mechanics. Canadian Association of Physics Lecturer 1998, 1999. Trent University, University of Manitoba, University of Winnipeg, March 1998; Queen's University and Royal Military College, Kingston, March 1999.
Good Presentations, and How to Give them; a talk given to science graduate students at Scarborough College, February 1999
Round Table Discussion on Lecturing. Panel Discussion; Lecturing Techniques. Teaching Assistants' Training Programme, University of Toronto, January 1999.
Simulating Effective Discussion. Invited lecture to students in THE500-Teaching in Higher Education, Woodsworth College course, 1995-present.
Teacher, Know Thyself. An eight week course for teachers, trainers, and educators run with a co-leader at the Gestalt Institute of Toronto, January to March 2003.

Appendix 4. Contributions to Conferences

The Application of the Principles of Gestalt Therapy to the training of University Teachers (with B.B. Schiff). IV International Conference on Improving University Teaching, Aachen, p. 469, 8 p, July 1978.
Piaget and Physics Teaching, (with D.M. Harrison). 8th International Conference on Improving University Teaching, West Berlin, July 1982.
Tutorial Teaching, a workshop presented at the XI International Conference on Improving University Teaching, Utrecht, July 1985.
Problem Solving Techniques, XII International Conference on Improving University Teaching, Heidelberg, July 1986.
Tutorial Teaching, International Conference on Physics Education, Nanjing, September 1986.
Teaching Techniques. XIV International Conference on Improving University Teaching, Umea, June 1988.
Teaching Behaviours in the Undergraduate Laboratory; Tony Key, Zahra Hazari, and John Pitre, CAP Congress, York University, June 2000.
Identifying Characteristics of Effective Laboratory Demonstrators, Zahara Hazari. STHLE 2000 conference, Brock University, June 2000.
Identifying Characteristics of Effective Laboratory Demonstrators in a First-Year Physics Lab: Zahra S. Hazari, Tony Key, and John Pitre, AAPT National Meeting, Guelph, July 2000.
Identifying Characteristics of Effective Laboratory Demonstrators in a First-Year Physics Lab: Zahra S. Hazari, Tony Key, and John Pitre, AAPT Winter Meeting, San Diego, January 2001.
Transforming the Traditional Laboratory. Tony Key, John Pitre and Joe Vise. Contributed talk, OAPT Annual meeting, Carleton University, May 2001.
Gender Performance Differences in a First Year University Physics Laboratory; Marina Mandic, Tony Key and Zahra Hazari. Poster session, AAPT Summer meeting, Rochester, New York. June 2001.
TA training, marking issues. Large Class Teaching mini-conference, May 2002. University of Toronto.

Appendix 5. Outreach Activities to Schools, and other Divisions.

Introduction to Special Relativity, June 1996. Two lectures to two OAC Physics classes at Thornhill Secondary School, Toronto.
Faculty of Arts & Science Options. Representative of Department 1997,1998 (jointly).
Faculty of Arts & Science: Science Saturday. Representative of Department, 1999 (jointly).
Member of the University-High School Liaison Advisory Board, Faculty of Arts and Science, 1999, 2000.
An Introduction to Physics and the Physics Department. Transitional Year Programme, University of Toronto, March 2002.
Principles of Science. Invited talk to the Transitional Year Programme, University of Toronto, January 2003.