



The Law-Forensic Science Disciplinary Divide

The Canadian Experience

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MARRIAGE COUNSELLING

LET'S WORK ON
A MUTUAL UNDERSTANDING, MUTUAL RESPECT
AND MUTUAL RELIANCE.



•WOLF

“Not working effectively with one another is no longer an option for either discipline, if it ever was.” *Condlin (1999)*

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I. Introduction and Background

In this report we seek to provide a comparison between the learning and teaching of Forensic Science at university level in UK with that in Canada. The choice of Canada for such a comparison is due to the fact that forensic-legal policing education has been developing there with the building of stronger relationships between practitioners and HEIs.

Forensic science education and forensic science practice in the UK has undergone a number of developments over the last decade, but the pace of change and challenges to both have increased

The nature, scope, delivery, and practice of forensic science, has never been under such scrutiny.

exponentially over the last 12 years. A number of independent, national level enquiries into forensic sciences driven specifically (although not exclusively) by high profile miscarriages of justice, have produced a plethora of recommendations requiring action by the forensic-legal-policing triad and supported by government supported funding. (HMIC, 2002; SEMTA, 2004; NIJ, 2004; House of Commons S&T Select Committee, 2005; Mennell, 2006; Quarino and Bretell, 2009; Skills for Justice, 2009; Jackson, 2009; Kobus and Liddy, 2009).

The closure of the UK Forensic Science Service (FSS) in early 2012 and the creation of small independent companies has caused concern within both the forensic and legal communities. A number of high profile miscarriages of justice over the last two decades associated with issues associated with forensic science provision have warranted close scrutiny of the process of forensic science and its intersection with the criminal process. Equally, the introduction of student fees in UK Higher Education Institutions (HEIs), coupled with the closure of the FSS as a major employer for forensic science graduates, has caused concern to HEIs who deliver forensic science courses.

Concurrently, austerity measures are putting considerable strain on the criminal justice system. Policing budgets have been cut across the board by 20 per cent, with some forces choosing to reduce spending on forensic science provision and 'in-sourcing' many forensic processes. The 2011 'Review of Police Leadership and Training' (Neyroud, 2011) also suggested significant changes to police training and education, recommending a move away from 'in-house' training and advocating 'partnerships' with HEIs, including much greater training in forensic science.

Legal aid, supporting criminal defendants and paying for forensic testing for the defence, is being cut and the provision of legal services is experiencing much change (LETR 2012a).

Meanwhile, the Solicitors Regulation Authority, the Bar Standards Board, and the ILEX Professional Standards organizations are reviewing legal education and training in England and Wales. Their recommendations are set to re-shape the legal education landscape and impact upon the standards, which ensure that legal education remains ‘effective and efficient’ (LETR 2012a). However, while there continues to be commitment to the Qualifying Law Degree (QLD), there is ‘substantial variation in views as to its required contents and ‘fitness for purpose’ (LETR 2012b:3). Whilst the QLD continues to have high ratios of applicants to places within universities, and high student satisfaction, these are ‘limited proxies for quality/‘fitness for purpose’ (LETR 2012b:14). There remain a wide range of views among both professional bodies and educational institutions about what ‘foundation subjects’ should constitute the QLD, whether the degree should be skills-based, or knowledge based (LETR 2012b) or indeed, whether the university law degree should be a professional qualification at all or considered a liberal arts degree.

What is evident is that amid all this discussion and debate about forensic science, and the legal system, is that still none of the voluminous documents discuss measures to broaden the education of forensic scientists or law graduates. This would require legal professionals and forensic scientists to understand the basic principles, vernacular, and nomenclature of both science and law, as well as the working practices and customs of each group of practitioners including those of their policing counterparts. Yet while these calls have been easily made and reported in the literature, there have been few attempts to identify or indeed to fund those who will ensure that this understanding is acquired. The National Research Council and the Committee on Identifying the Needs of the Forensic Sciences Community (2009) produced the most high-profile recent reports calling for greater interdisciplinarity. It firmly places the responsibility for imparting this understanding with prequalification legal educators: “It might be too late to effectively train most lawyers and judges once they have entered their professional fields. For the long term, the best way to get lawyers and judges up- to-speed is for law schools to offer better courses in forensic science in their curricula” (NRC 2009: 8-15). Such proposals are laudable, and yet leave most law educators with a daunting task—how to go about such remodelling of their educational structures? Who is going to make the connections with the forensic science scholars?

“Judges, lawyers, and law students can benefit from a greater understanding of the scientific bases underlying the forensic sciences”.

(NRC 2009:27)

When undertaking any new challenge, it is always good practice to discover how others have previously surmounted similar challenges. However, as Merlino and colleagues (2008:193) point out, “No clear

picture exists of the educational landscape with respect to interdisciplinary education about science in law schools.”

So where should a keen law lecturer turn for inspiration or guidance? It is not as straightforward as well intentioned committees may suppose when advocating such modifications to degree programs, to make significant changes, even without the additional complication of crossing disciplines. The need for an improved dialogue between law and science is clear: educational boundaries need to be attenuated if forensic science is to deliver real benefits for the criminal justice system, with attendant risks minimised. However, despite exhortations through the years, progress on breaking down the barriers between ‘law’ and ‘science’ in HEIs cannot yet be discerned.

2. The 'Drawbridges' Project

In 2005 the House of Commons Science & Technology Committee Report '*Forensic Science on Trial*' made the point that there was a lack of training in forensic science for lawyers:

“While we have no particular complaints about the quality of guidance available to lawyers on the understanding and presentation of forensic evidence, **it is of great concern** that there is currently no mandatory training for lawyers in this area.”

This exhortation appeared to have little impact. Such 'gaps' in legal and forensic education were again highlighted in the 2009 NRC Report(8-17):

...lawyers and judges often have insufficient training and background in scientific methodology, and they often fail to fully comprehend the approaches employed by different forensic science disciplines and the reliability of forensic science evidence that is offered in trial... Better connections must be established and promoted between experts in the forensic science disciplines and law schools, legal scholars, and practitioners... Law schools should enhance this connection by offering courses in the forensic science disciplines, by offering credit for forensic science courses taken in other colleges, and by developing joint degree programs. And judges need to be better educated in forensic science methodologies and practices.

The authors, as a legal academic and a forensic science academic, were motivated to seek a response to such criticisms and in 2009, funding was received from the University of Leeds to commence a project to facilitate the building of vital connections in the academy to ensure that legal and forensic science undergraduate education remained 'fit for purpose' well into the 21st century. The '*Lowering the Drawbridges: Legal and Forensic Science Education in the 21st Century*' Project, aimed to initiate the process of bringing science to law students, and law to forensic science students, in the hope that by commencing cross-disciplinary study during the pre-qualification stage, there is created the potential for ending the 'dialogue of the deaf' at the professional stage of their careers. (And if they do not proceed into a legal/forensic science career, their greater knowledge base may accrue other 'transferable skills' or benefits.) In early 2009, two surveys were emailed to law and forensic science lecturers to gather information on the teaching of law to forensic science students, and forensic science to law students.

In May 2009 a workshop was held, attended by over 40 academics and practitioners from scientific and legal backgrounds. This workshop addressed issues related to teaching forensic science and law, exploring avenues for improving understanding, collaboration and communication between the two disciplines. Discussion at the workshop quickly revealed that the specific issues under consideration comprised only a sub-section of a host of issues that emanate from the highly complex array of aims and interests (and stakeholders) of these two disciplines, only some of which were complementary. It was readily apparent

that glibly stating that academics need to find the time to design more pedagogically robust material that can cross-disciplinary boundaries was obtuse, if not impertinent, given the levels of dedication and effort already demonstrated by many forensic science and law academics across the UK.

What could be easily concluded without much contestation is that achieving anything like true cross-disciplinary educational aims requires a far more fundamental rethinking, necessitating a new common language in order that those academics working in diverse areas of academic pursuit can understand one another. This is an essential prerequisite before 'systems' can be made to communicate (to facilitate student and/or staff movement across schools/faculties etc.), and ultimately, students can be taught to study, converse, and be understood beyond law/science borders. Finding the route(s) to cross-disciplinary experiences for students is, however, highly complex, although this did not preclude insightful

'the 'cultural divide' between science and law should not be taken to be so wide as to be beyond the legal and forensic science academy to bridge'.

(Cassella&McCartney, 2011).

discussion throughout the workshop (McCartney *et al*, 2009). What does exist are powerful external drivers that should motivate the introduction of science (and statistical method) into law degrees. Miscarriages of justice involving forensic evidence have provided plentiful opportunities for the legal and scientific communities to reflect upon failings and seek preventative medicine. Most often, trial lawyers have found convenient fall guys (Walker & McCartney 2005) in experts.

The workshop was the commencement of efforts to facilitate the building of vital connections in the academy to ensure that legal education remains 'fit for purpose' in

the 21st century. This requires that law educators and science educators 'lower their drawbridges' and seek mutually beneficial solutions to common educational problems. This, and conjoined projects, have led to a series of talks and publications (McCartney and Cassella, 2008a,b,c,2011,2012, McCartney, Cassella and Chin, 2011).

3. Present Project Extension: Looking to Canada

The current project centered upon revisiting, and updating the findings from the 'Drawbridges' project and furthering discussions with colleagues in the legal and forensic communities. During this time, it emerged that the Canadians were developing their forensic-legal-policing education and pivotal relationships between practitioners and Canadian HEI's were improving the educational landscape.

This anecdotal evidence required further interrogation. Casting an eye internationally to seek solutions to problems can often be beneficial, particularly when issues affect many nations similarly:

“Engagement with those who practice similar forensic sciences in other countries can help with the transmission of research, best practice protocols, and exposure to different, perhaps better ways of conducting forensic work. Global engagement can also help create connections that can facilitate peer review and quality assurance programs, the recruitment of talent, and the development of a common sense of professionalism.” (Roach 2009:77).

In order to learn from the Canadian experience, we sought the advice of a number of individuals from organisations within the forensic-legal-policing triad. With a restricted time-scale and budget, it was not possible to visit everyone on our Canadian 'wish-list'. However the individuals who offered us their time and expertise provided us with a range of perspectives and were knowledgeable about their own, as well as partner communities. They were all able to offer a micro- as well as macro-level account of developments and their rationales, locally and nationally, including the socio-political climate that engendered the developments. These individuals included: judges (Justices); defence and prosecution lawyers; forensic practitioners (some of whom are also warranted Police officers); and forensic science and legal academics.

The research sought to address the multi-layered nature of forensic science-legal education and makes no apology for not concentrating upon *just* academia or *just* practitioners.

However, attempts to encompass the full complexity of the educational landscape, requires a broad-brushed interpretation of

“An important driver of forensic science policy and reform in Canada has been the conduct of a series of public inquiries, headed by judges that have examined the contribution of forensic science to a series of wrongful convictions.”

(Roach 2009:72)

'education' (often conflated with 'training'). This is necessary to demonstrate the 'good will' and enthusiasm required by those working within HEIs and the criminal justice system to cross professional as well as disciplinary boundaries.

One clear requirement for progress is the necessary blurring of the dividing line between 'academics' and 'practitioners', a demarcation that is no longer so inflexible in Canada.

An objective of the research was to outline examples of good practice from Canada, including lessons on how the Canadians proceeded and the current and possible future risks to the systems in place. This could then be imported as a template for the important 'next steps' in the UK and provide some renewed impetus to work toward solutions to the issues facing the law and forensic science interface in the UK.

3.1 Why Canada?

Whilst there are some differences in the legal establishment and the criminal process in Canada (in particular, it is a federal country, although criminal law and procedure is exclusively a federal matter and not delegates to States and Territories)it overlaps with the English and Welsh criminal justice system in most important respects.

The Canadian system has had its own issues in the delivery of justice as supported by forensic science, with a number of high profile cases including the Sophonow case (1982), the Goudge enquiry into Paediatric Forensic Pathology in Ontario (2008) and the Kaufman enquiry in 1998. However, since these, they have made progress in reaching across the law/science disciplinary divide.

These influential reports placed interdisciplinary communication between law/science at the top of the criminal justice reform agenda. For example, the report into the wrongful conviction of Paul Morin alone recommended that:

- ...the limitations upon the inferences to be reliably drawn from forensic fibre comparisons need be better appreciated by judges, police, Crown and defence counsel. This requires better education of all parties, improved communication of forensic evidence and its limitations in and out of court, in written reports and orally (Recommendation 3);
- The Centre of Forensic Sciences, the Criminal Lawyer's Association, the Ontario Crown Attorney's Association and the Ministry of the Attorney General should establish some joint educational programming on forensic issues to enhance understanding of the forensic issues and better

communication, liaison and understanding between the parties. The Government of Ontario should provide funding assistance to enable this programming (Recommendation 18).

- The Centre of Forensic Sciences should develop an educational program for its staff, including all scientists and technicians, which specifically addresses the role of science in miscarriages of justice, past and potential... Its design should be effected through the cooperative assistance of prosecutors and defence counsel. Adequate financial resources should be committed to ensure the program's success and its availability for all Centre staff, both new and established. Ontario law schools and the Law Society of Upper Canada, Bar Admission Course, should consider, as a component of education relating to criminal law or procedure, programing which specifically addresses the known or suspected causes of wrongful convictions and how they may be prevented. The judiciary should consider whether an educational program should be developed which specifically addresses the known or suspected causes of wrongful convictions and how the judiciary may contribute to their prevention (Recommendation 73).

In 2002, the Federal, Provincial, and Territorial Heads of Prosecutions (HOP) Committee in Canada established a Working Group on the Prevention of Miscarriages of Justice in response to a number of wrongful convictions. Their mandate was to develop best practice to assist prosecutors and police in better understanding the causes of wrongful convictions, and to recommend proactive policies, protocols and educational processes to guard against future miscarriages of justice. In providing clear, comprehensive and practical recommendations for improvements to the criminal justice system, the HOP Committee Report focused on the education of justice system participants.

It suggested that such education must be multi-faceted and directed at all participants in the justice system to be effective, because the errors that lead to wrongful convictions are multi-layered and often the result of a combination of events. The message to educate *all* justice participants about the causes and prevention of wrongful convictions is echoed in recommendations from more recent Canadian inquiries and has led to the creation of continuing education courses and seminars for justice professionals.

With forensic science and forensic medicine both situated in funding-restricted government ministries, neither have been able to undertake scientific research to an adequate degree. Equally, education is limited to what other government-based ministries or officials request. As [Canadian] academic institutions do not provide a platform for such research, a dedicated forensic institute is required to undertake these R & D and professional (CPD) educational tasks.

Gruspier asserts that scientific research that is 'forensically focused' is the only way to decrease analytical errors and that a dedicated forensic institute would be able to provide on-going education for justice system professionals. Such a facility is nearing completion in Ontario.



Forensic Services and Coroner's Complex under construction in Ontario (2012)

Whilst clearly the Forensic Services and Coroners Complex will considerably strengthen the provision of forensic science and medicine in Ontario, there already exist at least two establishments, which are exemplary for their work in blurring the dividing lines between law and science, academia and practice. We were fortunate to be able to visit both the Centre for Forensic Science and Medicine (CFSM) at the University of Toronto, and Osgood Hall Law School, at York University. The Director of the CFSM, Michael Pollanen MD, PHD, FRCPATH, DMJ (PATH)FRCPC, appears to be a legend in his own lifetime. His name came up in every conversation during our visits, with praise for his efforts knowing no bounds.

He created the CSFM, which has interdisciplinarity at its core. The Centre, opened in September 2008, holds regular seminar series, special public lectures, as well as conferences and workshops, to advance teaching and research in the forensic disciplines. The CFSM is forging a forensic research network, while unifying the forensic community, creating an environment that fosters interdisciplinary research. The Centre has developed forensic educational programs across the entire training spectrum and through inter-professional education.

A concurrent effort is being undertaken at Osgoode Law School, to educate students across the law/science divide, providing experiential learning opportunities and creating working collaborative

partnerships with justice professionals. The School has both an Innocence Project and a 'Criminal Law Intensive' clinic. Both of these involve extensive work with the local and national forensic community, and advanced education for law students in forensic science. The Criminal Law clinic includes visiting a live autopsy, as well as spending time in forensic laboratories.

Both the CFSM and Osgoode Law School provided much food for thought on what can be achieved, when the legal and forensic communities are committed to working together within educational settings.

This, combined with the progress that has been made within the justice system since inquiries into miscarriages of justice, (particularly with respect to the on-going education of legal representatives and judges) and the similarity of their legal system to our own, made Canada an obvious choice when looking internationally for inspiration.

4. Law and Forensic Science in Practice

Aside from the obvious examples of miscarriages of justice, research has demonstrated the need for scientific understanding to be more widespread among the legal profession, in order for the legal system to work effectively:

“To do justice in a technological world, judges – and lawyers educating them about their cases – must learn to grapple with the scientific method” (Beecher-Monas 1998:75). Gatowski *et al* (2001), surveying US State judges, found a lack of scientific literacy, demonstrating the need for more science-based judicial education. The authors argue that:

“What judges need to know is not how to design the best scientific study, but how to evaluate imperfect ones. Judges do not need to be trained to become scientists, they need to be trained to be critical consumers of the science that comes before them. This is an important distinction...Determining just what constitutes a sufficient level of scientific understanding for the judiciary is a question for future study and policy development. Those involved in legal education at every level should make efforts to raise the scientific literacy of all of those involved in the legal system”. (Gatowski, 2001:455).

‘If, after all, university scholars and teachers decline to keep their subject in good theoretical, pedagogical and practical shape, who else will be motivated or qualified to take up the challenge?’

(Roberts 2007:21).

This project has attempted to develop an understanding of how, at the practitioner level, the interaction between the legal system and forensic science occurs, and how each profession is educated to understand and interpret the other during their encounters.

This has to then link directly back to the HEI community, with lessons to be learnt on what education is required at the undergraduate/ postgraduate level, and how best to devise and deliver syllabi. Attempts to keep separate these moieties would continue to deliver the outcomes that we currently see, which include miscarriages of justice.

As many reports have attested, academics must respond to the working realities of the law-forensic landscape in the 21st Century and raise the standard of their academic offerings and

ensure they are 'fit for purpose'. For what occurs in the real-world affects the delivery and the drivers associated with both legal and forensic science education in HEI's in the UK. These factors act as direct drivers and for curriculum development and content and trickle-down into the lecture theatres and laboratories for the Universities that deliver forensic science education at University degree level. They also affect the industry in-house training, which often has input to or collaborations with these Universities.

Faigman (2001) asks: 'how are lawyers to learn enough science to supervise the scientists effectively?' Faigman produced a 12 step programme for those with a policymaking role or legal professionals. Faigman's philosophy was that in reaching the twelfth step, non-scientists would be sufficiently empowered to intelligently integrate scientific knowledge into decision making without being required to become a fully-fledged scientist in the process: "they must merely be good consumers of science" (Faigman2001). Much resistance to the blurring of the law/science divide in the UK focuses upon this point: not wishing to turn lawyers into scientists and vice versa. This is not a rational sticking-point and lawyers and scientists can, and must, achieve a sufficient point of overlap in order to operate effectively and cooperatively within the criminal process.

HEIs in the UK appear to be struggling, as do the Canadians, to straddle the student and practitioner level. Whilst there is clear evidence of good will and efforts by academics to reach out to both forensic practitioners and legal professionals, it has been challenging to determine if such collaborative relationships actually exist between HEIs, forensic practitioners, and legal professionals. Certainly at practitioner level, clear demarcations still exist, with the Canadian Society of Forensic Science (CSFS) stating that it is:

"a non-profit professional organization incorporated to maintain professional standards, and to promote the study and enhance the stature of forensic science. Membership in the society is open internationally to professionals with an active interest in the forensic sciences. It is organized into sections representing diverse areas of forensic examination: Anthropology, Medical, Odontology, Biology, Chemistry, Documents, Engineering, Firearms and Toxicology."

It does not however, (on the website at least) consider its links to the legal system or HEIs. Indeed the CSFC multi-authored document entitled "*All you ever wanted to know about forensic science in Canada but didn't know who to ask!*" does not mention lawyers despite emphasizing that:

"Forensic science is the application of science to law... The word forensic in today's world simply means the application of something to a legal situation. Therefore, on its own, the

word forensic means very little. When used in the term “forensic science” it means applying a SCIENCE into a legal setting.”

Yet miscarriages of justice and failed police investigations most often result not from a single error but a composite of failures. These include the gathering, interpretation, and communication of forensic evidence and the subsequent legal use of such evidence.

In addressing this issue within the wider remit of an exhaustive examination of forensic sciences, the US National Research Council Report (2009) heralded the latest call for greater collaboration between the ‘law’ and ‘science’, particularly in higher education institutions (HEIs). The NRC report echoed calls that have often been made in the UK, including in the House of Commons Science & Technology Committee report ‘*Forensic Science on Trial*’ (2005).

Both reports recognise that while improvements are needed in educational provision for forensic scientists, there also needs to be a broadening of forensic science education to incorporate those who also have to understand forensic evidence (in this instance, judges magistrates, lawyers, but arguably more importantly, police). Both reports present a challenge to educators to take preventative action and bridge the science/law divide at undergraduate level, firmly placing the responsibility for imparting this understanding with prequalification legal educators. Yet little reaction has been apparent amid law or science faculties. Indeed, research in the UK is showing that ‘cross-fertilisation’ between law and forensic science degree programs in the UK remains relatively unusual as indicated in our previous report (McCartney, Cassella and Chin, 2009).

Progress on this essential part of the criminal justice jigsaw is vital before advancing plans to increase, or devolve entirely, police training to HEIs. Serious deficiencies in the education of legal professionals and forensic scientists within HEIs having already been identified, plans to incorporate police officer training within this flawed model raises the potential that rather than ‘professionalising’ the police, they will simply fall foul of the existing difficulties experienced with legal professionals and their understanding of ‘science’ and forensic scientists and their understanding of the ‘law’. Such developments will work against the aim of preventing miscarriages of justice and enhancing police investigative capacities.

In the myriad cases that involve scientific evidence, judges should be confident about the limits of science and expertise in these areas so that they can prevent flawed testimony being adduced during trials.

‘the task of transcending entrenched disciplinary boundaries should not be underestimated.’
(McCartney *et al* 2011)

A feature of discussions with Canadian legal colleagues was an understanding that dealing effectively with scientific evidence is part of the duty assumed by the judiciary and Crown attorneys and not a specialised role or 'optional extra'.

A number of well-received continuing education programs have shown the legal profession to have embraced science in the courtroom. The Ontario Crown Attorneys Association and also Justices (judges) have undertaken numerous workshops in diverse areas such as: pain; autism; persistent vegetative state; neuroscience; and the SARS pandemic, among others. The drivers for this should be obvious, but the backing of the Chief Justice of Canada and buy-in from the senior judiciary has clearly assisted in the acceptance and take-up of these educational workshops. Such training assists in ensuring that the courts in Canada are not admitting 'junk science'.

There is also a 'science handbook' under development, created specifically for the Canadian judiciary. This handbook contains chapters covering both a wide variety of qualitative and quantitative sciences (including statistics), but also on diverse areas such as the pitfalls associated with wrongful convictions, forensic science ethics, and the role of the scientist in the courtroom. Concerns may be raised about how to resolve a potential scenario where evidence offered by an expert in the courtroom is at odds with what may be stated in the handbook. However, as the Honorable Madam Justice Kent explained, it will prompt a judge to ask for clarification of the expert evidence, rather than present an insurmountable obstacle to the admissibility of the evidence, and may nonetheless serve a vital role in preventing misinterpretations or misrepresentations of scientific evidence to be allowed into evidence.

There are clearly valuable educational opportunities provided in Canada at practitioner level particularly amongst the legal community. Of note is the training and education conducted by the Ontario Crown Attorneys Association (OCAA), which promotes the continuing education and training of Crown Attorneys, Assistant Crown Attorneys and Crown Counsel. There is a clear drive by the OCAA to develop the skills and education of its members in the many facets of science that may be used within the courtroom.

Both James Chaffe and Jeffrey Manishen make it clear that continued training and education in science for legal professionals accrues enormous benefits for those attending, as well as the integrity of the legal process. There is a clear commitment and enthusiasm for the widest engagement with the scientific community who serve the Courts. Taken together with the on-going curriculum developments at Osgood Hall Law School, York University, and also those driven by the Justices, the outlook for the law and forensic science interface in the Canadian criminal justice system looks incredibly positive.

What is harder to fully comprehend is *why* there has been such a positive systemic response in Canada (in contrast to other nations), to inquiry reports that have placed interdisciplinary communication at the forefront of criminal justice reforms. The changes appear to have been more deeply rooted there than mere platitudinous responses to recommendations. It was suggested that an understanding of the Canadian psyche is pertinent. A UK Detective Sergeant has reported that when working with forensic science colleagues in Canada, it becomes apparent that the pragmatic approach of Canadians is a key factor in their development of robust processes. The suggestion then is that where miscarriages of justice have occurred, and have been examined and reported upon, the lessons learned are quickly translated into concrete improvements. The development in the latest 'best practice' is then disseminated and an open and willing profession accepts changes with minimal complaint or resistance. Such reform processes are aided by the prior existence of a highly structured training and education regime operating across the legal and forensic communities, mirrored in the diversity and extent of the on-going education offered to Justices in Canada.

5. Law and Forensic Science in HEI's

A number of Universities across Canada offer forensic science programmes at both undergraduate and Masterslevel. These courses vary at undergraduate level from: forensic bioscience; forensic physics; digital forensics; forensic psychiatry; and forensic science with [anthropology, chemistry, psychology], being mirrored at Masters level.

Forensic Science University Courses Available in Canada:

Province	University	Undergraduate or Post Graduate	Course Details
Alberta	Calgary	Graduate	Forensic Psychiatry
British Columbia	British Columbia	Graduate	Forensic Psychiatry
Greater Toronto Area	Toronto	Graduate	1. Forensic pathology 2. Investigate and Forensic Accounting
Greater Vancouver	See British Columbia above		
Manitoba	Manitoba	Graduate	Forensic Psychiatry
New Brunswick	St. Thomas University	Undergraduate	Forensic Anthropology
Nova Scotia	St. Mary's University	Graduate	1. Forensic Sciences 2. Forensic Anthropology
Ontario	University of Ontario Institute of Technology	1. MSc Forensic Bioscience 2. PhD Forensic Bioscience	Forensic Bioscience
Ontario	University of Toronto	Graduate	Forensic Pathology
Ontario	McMaster	Graduate	Forensic Psychiatry
Ontario	University of Western Ontario	Doctor of Medicine	Forensic Psychiatry
Ontario	University of Toronto - Mississauga	Graduate	Investigative and Forensic Accounting
Saskatchewan	University of Regina	Graduate	Forensic Psychology

The nature of the curriculum, modular content, and delivery of these programs would not be unknown to UK academics.

The accreditation process offered in the UK by the Forensic Science Society (<http://www.forensic-science-society.org.uk/accreditation>) has, for over a decade, been used as a template in curriculum design in the absence of any UK 'Quality Assurance Agency for Higher Education' (QAA) benchmark statement, although one is currently being drafted. Canadian HEI's seek accreditation for their forensic science offerings as a measure of quality, but do so through the American Academy of Forensic Sciences – Forensic Science Education programs Accreditation Commission (FEPAC, 2003). The FEPAC accreditation requires at undergraduate level:

- an introduction to the law;
- courtroom testimony; and
- ethics and professional practice.

This is reinforced at graduate level with core topics in forensic science programmes of:

- the 'law-science' interface; and
- ethics and professional responsibilities.

In the UK, the standard on 'Interpretation, Evaluation and Presentation of Evidence' states that a course should have sixteen outcomes and be designed so that a student is able to:

- Express the interpretation of results in a manner comprehensible to the intended recipient such as lawyers or a jury.
- Demonstrate good oral and presentational skills that would enable the student to be understandable in a court of law.

Whilst both sets of criteria show some commonality it may be speculated that the FEPAC criteria leave no room for equivocation about the importance of the legal components required within a forensic science programme in Canada.

However, there appear to be no great differences in the forensic science undergraduate and postgraduate provision between the two countries, possibly reflecting the underlying common nature of science, with the only variable being the legal context.

In 2004, the US National Institute of Justice (NIJ) produced a report on '*Education and Training in Forensic Science: A guide for forensic science laboratories, educational institutions and students*'.

The report set out best practice for educational curricula, formulated by an impressive technical working group comprising of experts from academia, laboratories, forensic science organisations and the legal profession, across the United States and Canada. The working group recommended a 'solid educational background' in natural science with extensive laboratory course-work. The document however did not recommend greater liaison between law and science faculties, contrasting with the many reports that have asserted that this be a focus of pedagogical renewal and improvements. Indeed, while the NIJ document specifies that the strengths of a model undergraduate forensic science degree include the 'acculturation' of students into the forensic science and justice communities, it goes no further than that. What it does stress is securing increased funding to meet the demonstrated needs of the profession. According to the report, there is no sustainable source of State or Federal funding to support forensic science education or research and such funding is seen as essential. Perhaps further funding would enable the NIJ to further explore broadening their focus on the forensic community to include the legal profession, with whom forensic practitioners must work.

In the UK, Mennell and Shaw (2006) have argued that while universities had the resources to fulfil an important role in forensic science, to date they had not been successful in demonstrating this capability to key stakeholders. This was compounded by concern that UK universities were 'profiting' from forensic science in terms of student recruitment, the allegation being that the finances that follow such a rich mine of students and reputations that were being built upon high (media) profile courses, were not reflected in high quality degrees or high student satisfaction (Wojtas, 2007)

The then Deputy Chief Constable of North Wales Police, referred to the majority of forensic courses as a "savage waste of young people's time and parents' money" (Wolfendale, 2005). Non- Russell group university strategic decision-making processes was further questioned as "combining relatively unpopular subjects such as chemistry with superficial, attractive forensic modules to entice applicants to take the hook" (Forrest , 2004). Currently there are 219 courses containing the word 'Forensic; listed across 54 Universities in the UK (<http://www.ucas.ac.uk/students/coursesearch/>). There are 3 Universities running Higher National Diploma level courses. This explosion of undergraduate courses in the UK over the last 12 years (Mennell, 2006) has *not* been mirrored in Canada despite the wide appeal of such courses in the USA and attempting to unravel the reasons for this lack of a forensic science 'explosion' in Canada is confounding. Perhaps the apparently stronger relationship between the legal and forensic fraternities is partly a consequence of not having so many forensic programmes in Canadian HEIs. It is easier to build relationships with local practitioners and providers when there are not several HEIs vying for their attention?

An example of collaboration between practitioners and an HEI demonstrates what can be achieved. Osgoode Hall Law School at York University has a clinical program, which sets a standard not just for the rest of Canada but also for their UK equivalents. The Osgoode 2012-2013 syllabus indicates that there is a Level Three 'Forensic Science and the Law' module, and also an 'Innocence Project' within which students may be heavily involved in forensic evidence, including forensic DNA testing. There is an 'Intensive Program in Criminal Law' in which students are exposed to the forensic sciences such as toxicology, pathology and biology. Students attend a post-mortem (autopsy) and receive instruction from a forensic pathologist. This is a novel pedagogical approach to legal education, particularly as in the UK, such advanced forensic instruction and interaction with forensic practitioners is only available to a very few forensic science undergraduates never mind undergraduate law students.

6. Conclusions

It will assist those who are presented with scientific evidence to begin to understand the evidence before them—or even to spot common errors or misunderstandings, or make an educated guess about the reliability of a technique—to have a rudimentary understanding of the scientific method and basic statistics. It is possible that at least some of the well-publicised forensic science 'failures' might well have been avoided had the evidence at the time been adequately tested pre-trial and in the courts by knowledgeable and well-prepared lawyers. Likewise, it would assist all forensic science graduates to have a full and sound understanding of the forensic aspect of their profession, requiring at minimum some basic grounding in law. As Latham (2010:34) exhorts, we are not interested in turning lawyers into scientists and vice versa, but building a foundation of understanding and respect upon which they can build during their professional lives.

**“Instead of melding
the two cultures,
we need to
establish
conditions of
cooperation,
mutual respect,
and mutual reliance
between them.”**

(Latham 2010: 34)

Miscarriages of justice are to be avoided at all possible costs. However where they do occur it is essential that the system learn from miscarriages and implement procedures to prevent them from re-occurring.

The multi-layered reasons behind any miscarriage indicate the need for clear and constant dialogue and educational dialogue between the various users of science and the legal system in which it serves. As Faigman (2001) observes:

“The law will never become a sophisticated consumer of science until the lawyers and lawmakers become conversant in the language of science and are comfortable in its culture”.

There should be a high degree of optimism that UK legal and forensic science educators and practitioners can, and will, effectively work cooperatively to respond to critics and forge new paths in learning and teaching in both law and forensic science, creating an opportunity to take stock and enrich our disciplines. Such critical self-reflection and improvement is vital, as Roberts (2007:21) observes:

“It is essential periodically to take stock of the unremarked incremental changes that build up over time to shift the ground beneath our feet. In times of rapid change more than ever, there should surely be periodic checks to ensure that our discipline has not ossified or been left behind. Nor is this only a question of pre-empting anachronism and irrelevance. We should constantly be on the lookout for new opportunities to enrich [law] teaching and scholarship.”

Clearly, Canadian experience demonstrates that there is a clear need for discipline specific leads (‘champions’), who can facilitate the intertwining of education and practitioner environments. Roux *et al* (2012), also suggest that to move forward we should look back. They consider forensic science to be a patchwork of disciplines, which if not in crisis, is at least suffering from anomalies and serious limitations. Historically, forensic science (or ‘criminalistics’) was taught from within criminology schools (i.e. Berkeley) and was intimately connected with criminology and the law. It was largely considered an applied social science, using natural science techniques to detect crimes – the province of the criminologist. Roux and colleagues propose a possible solution to current problems: to revive forensic science educational roots. This should lead to holistic educational models, which integrate both technologies and disciplines. Not only then is the forensic-law divide able to be tackled, so too is the forensic-science divide. It is a laudable plan, which can, as Roux suggests, offer a positive future. What is required is a rethinking of the forensic paradigm and fundamental principles from which a distinctive science can re-emerge, focused upon its fundamental object of study: the detection of traces relating to unlawful activity.

The overarching impression of the authors’ visit to Toronto, Canada is one of a hive of activity amongst organisations involved in forensic science.

University departments (both scientific and legal), provincial and federal police, Crown attorney's and Honorable Justices, have all embraced the crossing of disciplinary boundaries. The watchword during this fact-finding visit was **'will'**. This willingness has allowed disparate communities that serve justice to learn *not only* more about the science, but also more about each other, themselves, and justice. As Faigman (2001) observes:

“...the good citizen and the good government will have to have a strong education in both the arts and sciences of policy.....science can never dictate what is fair and just, it has become an indispensable tool on which the law must sometimes rely to do the fair and just thing”.

One observation is the respect they have for one another, and the open communication channels that exist. Each representative was already in a constructive dialogue with others from complementary institutions. There was evidence of an overarching belief in working in partnership, perhaps reflective of the pragmatism shown by the Canadian people at a wider socio-cultural and political level. There was also a readiness to engage in reflection and most importantly (and in contrast perhaps to the UK situation), a willingness to be self-critical in the light of miscarriages of justice in recent years, and an acknowledgement of prior failings and remedial actions that may still be required.

“The need for an improved dialogue between law and science is clear: educational boundaries need to be attenuated if forensic science is to deliver real benefits for the criminal justice system, with attendant risks minimised.”(McCartney

Both the US National Research Council Report *'Strengthening Forensic Science in the United States: A Path Forward'* (2009) and the House of Commons Science & Technology Committee report *'Forensic Science on Trial'* (2005) threw down a gauntlet to educators to take preventative action and bridge the science/law divide. Both firmly placed the responsibility for imparting this understanding with prequalification legal educators. Yet little reaction has been apparent amid law or science faculties. Indeed, research in the UK is showing that 'cross-fertilisation' between law and forensic science degree programs in the UK remains very rare (McCartney *et al* 2011). This could even be stymying the effective use of forensic science, as Magnusson (1996) commented:

“Used professionally, science is ready to offer much more to the justice system than it can now... it will become less vulnerable to people who mislead or confuse the courts by capitalizing on the complexities which forensic science unavoidable carries with it.”

As a forensic scientist and a JD, Gruspier (2007) argues that an extra-departmental centre in a Canadian university that includes the faculty of law can only be of great assistance to the justice system. Within such a centre, education can be provided that, on the one hand, assists lawyers and judges in better understanding the strengths and limits of science, and, on the other hand, exposes forensic scientists to legal concepts, such as the presumption of innocence and reasonable doubt.

However, despite such exhortations through the years, progress on breaking down the barriers between ‘law’ and ‘science’ in UK HEIs cannot yet be discerned. Universities delivering forensic science courses clearly have their roles to play in the development of courses, which are more robust in their interactions not only with their own law schools, but with the wider legal community. Whilst science academics have worked hard to gain forensic science employer engagement and develop relationships for both teaching and research opportunities, the rate of progress has been frankly painfully slow.

Forensic science within academia accepts the ‘traditional’ forensic model and as such is generally taught as an application of techniques, tools and enabling sciences rather than as a scientific discipline on its own right with its distinctive object of study (Roux *et al*, 2012). Therefore, change is now a necessity, not just an aspiration or as part of natural pedagogical evolution. In doing so, the role and scope of the forensic scientist in the criminal justice system, currently poorly identified and poorly articulated, regardless of the forensic service organisational setting (Margot 2011) can be re-defined.

A step-change is then required, especially in the light of the closure of the UK Forensic Science Service in March 2012. In order to continue to produce employable students, we must give them the opportunity to engage with the legal communities within which they must work. It is at this pre-professional stage of a scientific career that students must develop the essential skills of good laboratory practice, ethical conduct in research, and effective communication skills within and without their particular communities. When is there a better time for young forensic scientists to become acclimatised to the multi-layered practices of policing and legal process?

It is a truism that there must be greater collegiality and collaboration between forensic science educators, practitioners and the ‘users’ of forensic science (primarily, the police and legal professionals) to prevent miscarriages of justice and enhance police investigative capacity (albeit forensic methods are just one element of an effective investigation). However, there is scant evidence that the present difficulties with specialisation within UK universities will be overcome soon. Inertia within regulatory bodies and higher

education institutional management is a sufficient deterrent for those who may entertain thoughts of tinkering with the status quo.

7. Recommendations

The recently published 2012 Canadian Harthouse report recommends that multidisciplinary cross-training of police, forensic scientists, judges and lawyers is encouraged. Also, that support and development of graduate and postgraduate training is to be continued along with the promotion of uniform basic training and professional development in expert witness testimony. The Report reaches the conclusion that in order for forensic science to strengthen its progress in Canada, it is vital that all areas embrace the full cycle of service, teaching and research.

The authors, reflecting upon this and other experiences gained from our Canadian research, would seek to recommend for the domestic UK audience:

1. The creation of a UK based working group to promote improved liaison between the legal and forensic community at undergraduate and postgraduate level for mutual training and education. This working group should have appropriate representation from industry (legal and forensic) and the judiciary. The discipline leads from the Higher Education Academy for the Physical Sciences and for the Law would be appropriate leads for the establishment and development of this working group possibly in collaboration with the UK Forensic Science Society and Skills for Justice.
2. The commencement of collecting quantitative (and where appropriate, qualitative data) to allow for analysis of trends within the HEI sector of forensic related degree courses and for law degree courses. Such data will allow for: the development of future accreditation components in forensic science; to inform the development in HEI's of specific skills required by employers and to generally improve the 'fit' with the employment sector in forensic science in the 21st Century.
3. An invitation to the UK Forensic Regulator to work with HEI's to facilitate an improved curriculum development process across the UK HEI sector for forensic awareness in law degrees and vice versa.

4. The establishment of an Anglo-Canadian forum in order to share good practice and developments in the delivery of law-forensic science education and training, and also between both legal and forensic practitioners. This forum would consider miscarriages of justice as well as good (or 'best') forensic-legal practice and to disseminate to all interested parties for training and education.
5. The initiation of a discussion needs with the UK and Canadian judiciary with a champion from each country (e.g. the Honorable Mr. Justice Gudge for Canada) in order to facilitate the development of a culture of critical reflectiveness whereby both forensic and law HEI courses consider all miscarriages of justice and issues of ethical behaviour to better prepare their forensic and the legal undergraduates for the workplace.
6. The sharing across the legal and forensic professions of good forensic-law practice in the Courtroom as exemplars in order to begin to balance the negativity perceived by the numerous reports on miscarriages of justice and to facilitate these as models of good practice. In addition, to seek funds for research into miscarriages of justice and reflect upon how the legal-forensic divide at all levels of education and training which could have been a contributory factor.
7. The encouragement at all levels of greater collaboration in the courtroom as an external driver to lead change in HEIs. As Carp and Stidham (2001) state: "the Courtroom should be more than functioning as an occasional gathering of strangers of resolve particular conflict and then go their separate ways, lawyers and judges who work in a criminal courtroom (should) become part of a working group." This should also include forensic scientists and doctors. Therefore an exploratory working group – possibly as part of #8.1 should be created to determine if this structure offers benefits to the system. The work from this and the model created should be trickled down to HEI's so that Faculty's of Law and of Sciences should see Law students as well as Forensic Science students working together in a similar fashion.

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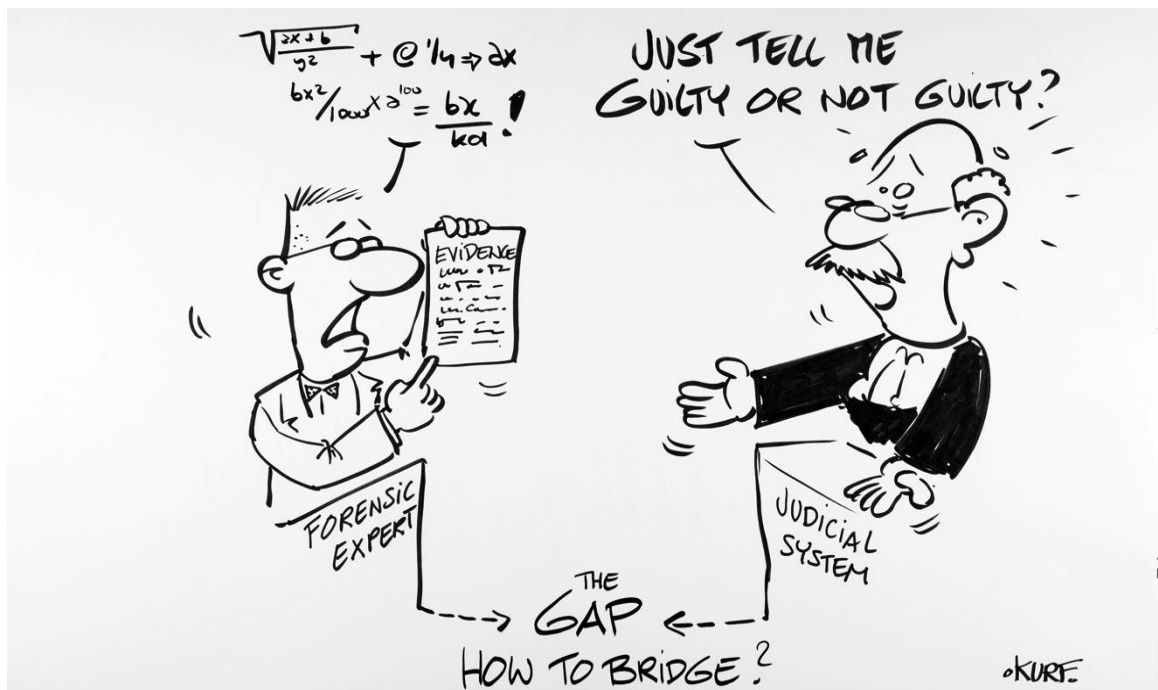
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This document has been created to assist the forensic-legal-policing community with dialogue. We have attempted to present the current educational landscape in relation to law-science. However, should there be factual errors in this document, the authors would be pleased to correct them – please contact the authors via e-mail. The authors would also value any thoughts and contributions on this topic to further enhance the on-going dialogue.

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