Student engagement, problem based learning and teaching law to Business students

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ABSTRACT

Teaching Law to Business students presents particular challenges. Chief among them is the need to engage students with legal material and a legal method while presenting a context for understanding that is relevant to their program of choice. This paper identifies challenges in the teaching of an introductory Business Law course delivered to first year, first semester students as a required course of study in their Business degrees. A pedagogical framework for fostering deep learning approaches through active learning as a dimension of student engagement is examined. A strategy for teaching the Doctrine of Precedent, as a case study in the teaching of Business Law, is detailed which links active learning with legal problem-solving.

Keywords: Business law, first year experience, student engagement, active learning, problem-based learning.
Introduction

Do you ever ask yourself, when you’re teaching, how much are my students taking in; is there a better way to learn the same material; are they really learning to think for themselves and developing skills that will be useful later in life; or – one of the worst questions – how much will they remember after the test or examination? (Cotton 2011, 22)

These are questions often asked by academics and they point to recurrent challenges across disciplines, programs and semesters of teaching. This paper addresses challenges in the teaching of law to Business students and begins by describing those challenges in the particular context of teaching an introductory Business Law course. According to Ramsden (2005: 84), the relationship between learning and teaching is predicated on a “connection between students’ learning of particular content and the quality of our teaching of that content”. Hence effective teaching must be predicated on an understanding of how students learn. The following discussion examines the character of critical thinking as a central outcome for higher education and links it to deep learning approaches, student engagement and active learning before examining a case study about teaching the Doctrine of Precedent. Emphasis is given to the traditional problem-solving approach characteristic of legal method, which is argued as similar to the problem-based learning adopted in other disciplines.

A Pedagogical Framework

Critical thinking is an analytical skill that reflects a deep learning approach, as opposed to a surface approach, as articulated by Ramsden (2005: 40-61). A deep approach is evidenced where:

...students are focussing on the content of the task and how it relates to other parts of the course or previous knowledge; they are trying to understand the task and relate its component parts to the whole. The process is internal: the students are concerned with integrating the new material with their personal experience, knowledge and interests (Ramsden 2005: 48-49).

A surface approach occurs where material is memorised or manipulated unthinkingly to satisfy an assessment task without any real understanding (Ramsden 2005: 46-49). Importantly, approaches to learning are not fixed characteristics of learners. Instead they are ways of relating to content that learners may use consistently or interchangeably. As a means of assisting students to relate to subject matter in a purposeful way and of developing skills for lifelong learning, effective teaching strategies are those that encourage deep learning approaches. As Ramsden (2005:45) notes, “In trying to change approaches, we are not trying to change students, but to change the students’ experiences, perceptions or conceptions of something”.

A deep approach to learning is facilitated by good quality teaching. Ramsden (2005: 108-112) identifies three theories of teaching: teaching as telling or transmission, teaching as organising student activity and teaching as making learning possible. These three theories, according to Ramsden (2005: 113), need to be understood within a hierarchical structure in which higher levels imply the strategies of lower levels. Hence the more complex theory of making learning possible assumes aspects of the other two, including for example the orderly presentation of content and the creation of opportunities for students to learn. In addition teaching as making learning possible sees learning and teaching as ‘two sides of the same coin’ in which teaching is “comprehended as a process of working cooperatively with learners to help them change their understanding” (Ramsden 2005: 110).
Good quality teaching is therefore about making understanding possible. Ramsden (2005: 93-99) identifies six principles of effective teaching in higher education, namely:

1. Presenting interesting material and providing clear explanations
2. Communicating concern and respect for students and student learning
3. Providing appropriate assessment and feedback
4. Provision of clear goals and intellectual challenge
5. Promoting the learner’s independence, sense of control and engagement; and
6. Learning from students to facilitate continuous improvement in teaching

The concept of ‘student engagement’ evident in the fourth of Ramsden’s principles has become an increasingly central focus for government and scholarly research over the past decade. It is a concept variously constructed by scholars and commentators (Leach & Zepke 2011: 193). Considerable investigation and reflection has been given to student disengagement in the context of concerns about retention rates and the impact of the first year experience (FYE) on undergraduate non completion (Kift, XXX: 2-4). Student engagement has become an umbrella term encompassing a broad complexity of factors relevant to the classroom, institutional systems, government policy and encompassing extra-curricular, employment and family activities that impact upon the student experience (see Larcombe 2009).

According to the Australian Council for Educational Research (ACER) (2008: vi) engagement means “students’ involvement with activities and conditions likely to generate high quality learning”. In each of the Australasian Surveys of Student Engagement (AUSSE) (2007-2009), ACER articulates six dimensions of student engagement – academic challenge, active learning, staff and student interactions, enriching educational experiences, supportive learning environment and work integrated learning. Leach and Zepke (2011) have developed a conceptual organiser for student engagement from a review of the literature on engagement augmented by a series of case studies encompassing 72 student interviews in Aotearoa New Zealand. They identify six key perspectives on engagement linked to various indicators. The six perspectives identified are:

1. Motivation and agency: engaged students are intrinsically motivated and want to exercise their agency
2. Transactional engagement: students engage with teachers
3. Transactional engagement: students engage with each other
4. Institutional support: institutions provide an environment conducive to learning
5. Active citizenship: students and institutions work together to enable challenges to social beliefs and practices
6. Non-institutional support: students are supported by family and friends to engage in learning (Leach & Zepke, 2011: 201).

Even from this brief examination of the literature on engagement, it is evident that there are numerous perspectives and factors to consider in course design and delivery which are said to have an impact on student engagement and hence effective learning. Quality teaching begs an awareness of these factors but there are limits to the sphere of influence of any given academic. Furthermore in the words of A. N. Whitehead (cited in Ramsden, 2005: 106): “I merely utter the warning that education is a difficult problem, to be solved by no one simple formula.”

It is worth noting however that in the search for the many factors influencing student engagement there is both a movement to include more than what happens in the classroom (real or virtual) and a movement away from this locus of interaction to what happens outside the classroom. Leach and Zepke’s conceptual organiser makes no mention of student engagement with the actual content of a course, although this might be inferred from the wider consideration of factors they examine. The ACER typology, by contrast, gives explicit attention to academic challenge and active
learning. According to Ahlfieldt et al (2005:5), the “new paradigm is to actively engage students with the material and with one another.”

ACER (2009:17) defines active learning as “the extent to which students are involved in experiences that involve actively constructing new knowledge and understanding”. Several indicators of students’ participation in active learning are measured in each of the Student Engagement Surveys (AUSSE) conducted by ACER (2007, 2008, 2009). These are measures of the extent to which students:

1. Asked questions
2. Made a presentation
3. Worked with students during class
4. Worked with students outside class
5. Tutored with other students
6. Participated in community based study, and
7. Discussed ideas from readings or classes outside class (2009: 19).

A particular strategy that encourages some, if not all, of the indicators of active learning above is problem-based learning. The idea of 'problem-solving' has immediate resonance with legal academics and lawyers generally. Legal problem solving is the essence of legal practice and legal curricula. Law students are taught legal principle with the purpose of applying it to the legal problems experienced by hypothetical clients.

The concept of problem-based learning (PBL) was introduced in medicine over 30 years ago and has since been incorporated in a numerous areas of study, particularly those with a professional focus (Ahlfieldt et al 2005: 8-9). According to Ramsden (2005: 141), PBL embodies several key principles of effective teaching and there is strong evidence that it encourages the use of deep approaches to learning. PBL requires students to identify the nature and scope of a given client centered problem, to gather the information needed to tackle it and to synthesise a solution (Ramsden 2005: 141). These three essential components reflect the process of legal problem-solving, which asks students to identify the legal problem experienced by a hypothetical client (in other words, the legal issue/s relevant to a fact situation), to identify the relevant law to be applied in resolving the problem and to apply the law to the facts in order to reach a probable solution.

PBL has also been associated with variations on these core features. In particular, it is a strategy often identified as a group-based teaching technique (Ahlfieldt 2005: 9). Problem solutions are said to be the product of group discourse which "consists of a dynamic sequence of conversational exchanges that evolves over time as the participants in the group collaborate to develop alternative models of a case and use them in solving a diagnostic problem” (Frederiksen 1999:137 cited in Ahlfieldt et al 2005: 9). Group processes are not necessarily employed in legal problem-solving. However two further key features are shared with problem-based learning, namely, providing opportunities for students to learn material in the contexts in which it will be used and bridging the gap between theory (or legal principle) and practice (Ahlfieldt et al 2005: 9).

Importantly problem-solving in a broad sense, and of which legal problem-solving is a species, is one of eight employability skills identified by the Australian Chamber of Commerce and Industry together with the Business Council of Australia (Kift 2011:6). The other skills isolated are communication, team work, self-management, planning and organising, technology, lifelong learning and initiative and enterprise.

Legal problem-solving, like problem-solving generally, equips students with skills which are transferable to other disciplines of study and which can be used as life-long learning processes. The following case study, which incorporates a problem-solving
approach to teaching and learning about the Doctrine of Precedent provides an example.

Context and challenges

Business Law and Ethics (BUS103) is a first year, first semester course offered through the School of Business at the University of the Sunshine Coast (USC). It is a foundational Business course, which means that is a compulsory subject for all students enrolled in the Business School at USC. Students enrol in either a Bachelor of Commerce or a Bachelor of Business and major in one (or two) of a range of programs, namely, Accounting, Information Systems, Tourism and Leisure, Management, Human Resource Management, Marketing and Finance.

Upwards of 600 students enrol in BUS103 in any given first semester of study. The student cohort is characterised by 49% from equity groups, including first in family (to study at University) and lower socio-economic groups. A smaller proportion of the student population are international students originating predominantly from European countries.

The course is delivered by a combination of two hour lecture and one hour tutorial, for which attendance is not compulsory. Two lecture streams are offered with approximately 300 students enrolled in each. Details of the course, the course outline and course materials are available on-line. Students are given access to recorded lectures, which are not intended to replace the face to face lectures, and are also able to access on-line learning materials provided in conjunction with course textbook. The course is delivered by a team of one full-time staff member and 5 or more sessional tutorial staff.

Challenges in delivery of this particular course to this particular cohort of students reach across issues in the teaching of large classes, first year experience, student engagement and retention, and teaching law to non law students. As Fitzgerald (2011: 113) notes, in law courses designed for non-law students where the student enrolment is large and diverse these challenges are magnified (see also Selby et al, 2008: 203-204). The scale of the challenge of teaching law to non law students is evident from a comparison of curricula in this introductory Business Law course and coverage of the same or similar topics in an undergraduate Law degree. In a thirteen week semester, BUS103 covers an introduction to the Australian Legal System, Sources of Law, the Law of Negligence, Contract Law, Consumer Law, principles of Business Organisations and Ethics. The first two of these and the next two successively would command two semesters of course delivery in a Law program. Students need to understand the introductory material, and within that the operation of the Doctrine of Precedent, as a scaffold for understanding later topics.

Particular discipline focussed challenges for students include coming to grips with complex legal concepts and, more generally, legal language. Tanner (2010) examines three categories of characteristics of legal language that may cause difficulties for non-law graduate students. The first relates to the vocabulary of the law; the second to the use by lawyers of complex sentence structures; and the third relates to the unstated conventions’ by which legal language operates, in other words, the second layer of meaning underpinning legal language but which is seldom stated within it. These characteristics pose similar difficulties for undergraduate students albeit in the context of differing learning objectives. A further challenge lies in understanding and applying a legal methodology.

A particular challenge for academics is engaging students with a legal methodology, which represents a particular way of thinking and communicating as well as knowing.
As Newlyn and Spencer (2010: 67) note, students undertaking undergraduate law degrees are repeatedly schooled in the art of thinking like lawyers, “sifting the legally relevant from the irrelevant and then reasoning through a problem scenario in this practised format.” First year non-law students studying Business Law are by contrast exposed to an unfamiliar way of thinking which they need to master within the limits of a single semester. A further challenge for academics is providing context for the meaningfulness and relevance of legal material for students’ Business programs. Students may experience Business Law as having a high degree of difficulty if experienced largely in isolation from their chosen field of study.

A conundrum for curriculum design, instruction and assessment in Business Law is steering a course which is true to the character and principles of the discipline of Law yet makes that discipline accessible, meaningful and relevant to Business students, who will not go on enter the legal profession. The question of what justifies the teaching of Business Law inevitably arises in a higher education climate that increasingly emphasises professional preparation. For students of Accounting, the justification is contained within professional accreditation standards that require them to study Law of Business Organisations and Taxation Law, for which a course such as BUS103 is an introductory pre-requisite. For the bulk of Business students an argument can be raised that an understanding of core principles in the stated curriculum is a necessary prerequisite for their chosen professional careers. But more than that, or at least in addition to it, an understanding of the fundamentals of law and legal processes is arguably a sound element of a liberal academic education.

An understanding of the Australian legal system is arguably part and parcel of preparing students for a lifetime of personal and professional citizenship. That good citizenship is as much a learning and teaching objective as professional preparedness is reflected in the push to fashion curricula to achieve ‘graduate attributes’. Graduate attributes have been defined by Australian Technology Network Universities as “the qualities, skills and understandings a university community expects its students to develop during their time at the institution and, consequently, shape the contribution they are able to make to their profession as a citizen.” (Bowden et al 2000 cited in Kift, 2011:5; & Kamvounias & Thompson 2008: 181).

Preparing students for good citizenship is therefore a good reason for teaching them the fundamentals of law and legal processes. Challenging them to acquire the analytical skill necessary for legal problem-solving is perhaps less easily justified. Fitzpatrick (2011: 115) notes for example that problem-solving requires a “reasonably high level of understanding” that the literature suggests is less likely to be demonstrated by first year students than later year students. Nonetheless, the challenge of understanding and applying a legal method is an exercise in mastering critical thinking, identified as a central aim of higher education (Ramsden 2005: 21-22). From a review of learning and teaching objectives in higher education across Britain, Australia and Canada, Ramsden (2005: 22) identifies three consistent aims, namely:

1. To teach students to analyse ideas or issues critically
2. To develop students’ intellectual/thinking skills
3. To teach students to comprehend principles or generalisations.

Pascarella and Terenzini (1991, cited in Wass et al 2011: 318) define critical thinking as the ability to do some or all of the following:

...identify central issues and assumptions in an argument, recognise important relationships, make correct inferences from data, deduce conclusions from information or data provided, interpret whether conclusions are warranted on the basis of the data given and evaluate evidence or authority.
Legal scholars and practitioners will recognise the elements of a legal methodology in this schema. A legal method is a particular form of critical thinking which demands a structured and disciplined approach to identifying legal issues in a given set of facts, searching for the appropriate law to address those issues, applying that law to the facts and reaching a conclusion based upon logical and often creative inference, deduction and interpretation. It is a logical and evidence-based thinking that, as a form of critical thinking, offers scaffolding for study in cross disciplines and in later years.

A combination of content and method are articulated in the learning objectives for BUS103 which are reflected in its two essential assessment criteria, namely

- Demonstration of knowledge of the law by accurately stating relevant legal principles and their sources; and
- Demonstration of an understanding of the law by a reasoned and coherent application of the law to given fact situations.

These two criteria encapsulate the matters of legal content that are contained in the curriculum and the legal method, which makes sense of, as well as use of, the substantive law. The method brings the content to life in a way that equips students to tackle a much broader array of both legal and non-legal problems. As Krause (2006: 6: cited in Armstrong 2009, 145) observes “the first year curriculum should be planned in a way so that students are not only motivated to learn content knowledge, but also have opportunities to learn how to learn as part of their transition to university.” Legal method is both a discipline specific problem-solving method and a way of thinking and doing which enables further learning to occur.

Having identified some of the significant challenges of teaching an introductory Business Law course and having pointed to good reasons for offering such a course, the following discussion explores a theoretical framework for specific teaching strategies.

**A Case Study: The Doctrine of Precedent**

The Doctrine of Precedent is challenging set of principles for non-law students, particularly as it might be covered (as it is in Business Law and Ethics (BUS103) at USC) in less than one week of course content. In BUS103, the doctrine is taught within the topic of Sources of Law and hence, within the one week devoted to that topic, students need to grasp principles in the operation of case law and of legislation. Understanding of sources of law is an essential pre-requisite for understanding any legal material. Understanding of later topics, such as contract law and consumer law, are require an understanding of the operation of case law and legislation. Coverage of specific topics chosen for their relevance to Business is presented by first providing a scaffold for understanding these essential legal concepts and processes. Consistent with the two essential criteria of assessment detailed above, students are expected to demonstrate knowledge of the relevant principles, and understanding of those principles by applying them to given problem scenarios.

Particularly challenging for non-law students is the need to grasp a complex set of concepts relevant to the Doctrine of Precedent. Students are introduced to a measure of legalese when asked to consider a series of core concepts, which include latin maxims, namely, *stare decisis*, binding and persuasive precedent, affirming, over-ruling, reversing and distinguishing, all within the framework of the detail of a given court hierarchy. To communicate this amount of content and complexity of conceptual
understanding with a two hour lecture and one hour tutorial to non-law students is a perennial challenge.

Furthermore, without an applied context in which students are introduced to a legal method, they have no active engagement with the material and at best can only memorise the key ideas with little or no comprehension. To facilitate understanding rather than teach as a means of merely transmitting the material to students, a problem-based scenario has been developed. This particular scenario has been used over successive semesters for several years and although not formally evaluated, has anecdotally received positive feedback from students. The problem introduces students to legal problem-solving and uses the traditional IRAC formula of issue, rule, application and conclusion.

Hence, the aim of this particular strategy is to engage students with the content being taught, the Doctrine of Precedent, by asking them to actively resolve a problem using concepts and processes introduced to them. It is evident from student feedback that once they apply a given concept to a problem scenario, or fact situation, they begin to understand it. This understanding is characterised by ownership of the concept in such a way that they can remember it (or research to remember it) because of its relevance to resolving similar problems. Presenting the material in such a way that it is applied to a given situation encourages a deep learning approach through active engagement.

The strategy is delivered in a lecture format. It is reinforced by tutorial review and the opportunity for individual questions and a recorded version is presented online as an aid for revision.

For this strategy, special emphasis is given to the context for framing the problem scenario. A context which is immediately relevant to students and one which is analogous both to the legal framework of a court hierarchy and a business context of organisational structures is chosen. The topic is introduced as how judges make law and the rules that govern their decision-making. An analogy is immediately drawn with organisational decision-making formalised as policy, and the context of university policy and decision-making is isolated as one example.

The problem presented to students is that of gaining an extension for an assignment. It engages students directly by nominating specific students in the class as actors in the scenario. An obvious limit of analogy with legal actions is noted, namely, that a contest between two adversaries occurs in law while in organisational problem-solving the issue may lie simply with an individual. A pretence is made that that there is no existing policy about assignment extensions. The State court hierarchy is reviewed as analogous with the decision-making hierarchy within the University – from Course Coordinator (Magistrates Court), Undergraduate Program Leader (District Court), to Dean of the Faculty (Supreme Court). As the problem unfolds a further analogy is drawn between the Deputy Vice Chancellor, sitting above all Faculty Deans, and the High Court.

The structure of the problem is outlined below:

Case A: A asks the course co-ordinator for an extension. A offers no reason for the request other than being behind in her work. The extension is denied consistent with the first formulation of policy, a precedent, or original decision, that no extensions will be granted in any circumstances.

Case B: B asks the same course co-ordinator for an extension. B reports that he has been unwell and unable to complete the work in time. He proffers a medical certificate. Students are asked if the course co-ordinator must decide as she did in Case A, drawing attention to the distinction between binding and persuasive...
precedent. Having established that the co-ordinator need not follow her own previous
decision, it is nonetheless suggested that she does so for the sake of consistency, and
hence that Case B is not granted an extension on the basis of the policy/principle that
no extensions will be granted in any circumstances.

Case B on appeal: B is unhappy and appeals to...? Students are asked to consider
where his appeal would go. He takes his case to the Undergraduate Program Co-
dinator (UPC). Students are asked: does the UPC have to affirm the decision of the
course co-ordinator? What policy will s/he apply? Students are introduced to the
concept of persuasive precedent – decisions from other hierarchies that may be, but
need not necessarily be, followed. The UPC decides that B can have an extension
based upon the fact that he has been ill and unable to complete his work and that that
illness has been evidenced by a medical certificate. He enunciates the policy that
extensions will be granted where illness has prevented completion in time and is
evidenced by a medical certificate. Students are here introduced to the process of
reversing a decision, namely the outcome of a case changed on appeal to a higher
court.

Case C: C approaches the course co-ordinator for an extension citing ill health and
evidencing that same with a medical certificate. Does the co-ordinator have to grant
the extension? Students are introduced to the concept of binding precedent – a
decision from a court higher in the same hierarchy that must be followed. Here the co-
dordinator must grant an extension based upon the policy developed in B’s case by the
UPC, a decision higher in the decision-making chain.

Case D: D requests an extension from the co-ordinator. He has not been ill but reports
that his mother has been unwell and that he has needed to care for her, which has
meant he can not complete the assignment in time. He evidences his situation with a
statutory declaration. Does the co-ordinator have to grant an extension? Here
students are asked to first consider the impact of a binding precedent from Case B,
and then to consider whether and how the co-ordinator might avoid applying that
precedent to D’s case. Here students are introduced to the concept of distinguishing
are asked to identify what facts are different across Case B and Case D that would
enable the co-ordinator to reach a different decision. Denial of the extension is posed
as a result for this case based upon distinguishing the facts of illness – mother of the
student and not the student.

Case D on appeal: D is unhappy with the outcome of his application and appeals to...?
Students are asked to re-consider where such an appeal would go. Students are asked
what the UPC is likely to decide – what is the existing policy? Does the UPC have to
follow his own previous decision in B’s Case? It si suggested that on appeal to the UPC
his application is rejected on the grounds that his circumstances do not fit the policy/
precedent from B’s case.

Case D on further appeal: Unhappy with the outcome from his appeal to the UPC, D
takes his case to the Deputy Vice Chancellor (DVC). Students are asked does the have
to follow the course co-ordinator’s policy in A’s case or the policy of the UPC from B’s
case? Again students are asked to consider possible sources of persuasive precedent
from other hierarchies (other faculties within the institution, other Universities,
domestic and overseas). Analogies are drawn to other state court hierarchies and
international jurisdictions. Students are asked to consider how the policy in B’s Case
could be reframed to encompass D’s situation. It is suggested that the policy could be
reworked to enable extensions to be granted in exceptional circumstances and that
those circumstances would include a student’s experience of ill health and a student’s
need to care for a close relative, subject to documentary evidence. Students are
introduced to the concept of over-ruling where the principle decided in one case is no
longer considered good law in a later case of similar fact and decided in a court higher
in the same hierarchy. Here B’s Case is over-ruled in its narrow application. Students are asked to compare over-ruling, involving two cases, and reversing involving the same case on appeal. As in B’s Case, here D’s Case is reversed on appeal—with the application of a new principle he is granted his extension.

Progression through the series of hypothetical applications for extension illustrates for students how case law changes and develops on a case by case basis. Students are introduced to the method of identifying a legal issue, which in law is code for a legal question requiring a legal answer. Here the recurrent issue is whether a given student can on application be granted an extension. The rule to be applied in answer to the legal question posed is the legal principle extracted from cases and in this analogy it is the policy developed through cases. Applying the policy to the facts of each student’s application is analogous to applying the law to the facts. A conclusion is reached based upon the synthesis of policy and situation/law and fact. A further limitation of analogy is finally noted – that generally policy is developed in a process resembling the development of legislation rather than on a case by case basis. But like legislation, policy responds to individual application and may be altered in response.

Concluding Remarks

This paper has canvassed some of the particular challenges in teaching law to non law Business students in a climate where student engagement is both a financial necessity for Universities and a focus for fostering good quality teaching. For Business Law academics, engaging students in the study of law requires them to remain true to the principles of their discipline while shaping an experience for students which is both relevant and accessible. In achieving these aims legal academics will often face the additional challenges of teaching large groups of first year students and of developing material and strategies that must facilitate understanding within limited time frames.

Student engagement is a multi-faceted concept. When considered in combination with the idea of a deep learning approach, engagement suggests active learning, or an active participation by students in their learning experience. Engagement and active learning have been shown to be facilitated by problem based learning strategies, which are argued here to resemble the problem-solving integral to a legal methodology. This paper has described a particular problem scenario used to demonstrate a legal method to first year Business students and to introduce them to the concepts and processes associated with the Doctrine of Precedent. Students’ understanding of this Doctrine is facilitated by their active engagement in the unfolding of the problem and the various phases of its resolution. Understanding is further facilitated by using an analogy with decision–making within more familiar organisational hierarchies and in particular, those of a University.

References


Pepper, C. 2010. ‘There’s a lot of learning going on but NOT much teaching!’: student perceptions of Problem-Based Learning in science. Higher Education Research and Development, 29(6), 693-707.


