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Engineering Students' Moot Court Debates the Question: '*Is Software Patentable*?'

Hong Kong Universities Debate:
'*Standardised Testing of English v. Use of English Standard*'

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Abstract

The University Grants Committee (UGC) Hong Kong, has put pressure on Hong Kong universities to implement a 'voluntary' 'exit' exam in English to remedy declining English standards in universities. There is no doubt that A-Level scores in English and Chinese are falling - presumably because students must take four other exams where they expect to benefit more from the other subject matter. To fill university places, university entrance level English average scores must follow students' scores, downward.

UGC's intent is doubtless well-meaning. That is not the point. All of their directives are well intended. The problem is that they all seem to involve standardised approaches - standardised testing for entrance, standardised testing now for English 'exit', standardised courses (stressing web-based teaching), and, inevitably, standardised teaching. The poorer universities do suffer from lower standards resulting from the democratic (over?) expansion of the past 20 years. Obviously some remedy is needed, but not by bureaucratic mandate without prior consultation.

Is there an alternative remedy for declining language standards? Yes. Use of English, or use of Chinese for that matter, fortifies analytical and reasoning power on which the only meaningful standard of fluency in any language is based! A declining English standard is symptomatic of a stultified teaching standard, where rote learning and standardised testing is the measure of successful preparation for university and tends to take over university as well. The author describes the experience in a course in Intellectual Property and IT Law for engineering students, who have learned to make use of dormant language and verbal skills in a tutorial and moot court.

> **Keywords**: Moot Debate, Hong Kong University, IP and IT Law, Engineering Students, Communication Skills.

1. Introduction: Hong Kong Universities' English Language Dilemma: Cure Poor English by Testing?...or through Use?

University heads in Hong Kong were first reported to have rejected a proposal from the University Grants Committee (UGC), the 'non-statutory' Government agency in charge of university funding, for still another example of standardised testing in Hong Kong - a mandatory TOEFL , IELTS, or other so-called 'exit' exam in English for university graduates, who are admittedly deficient in their use of English. Events seem to have overtaken us, however, since it is now reported that the university heads have accepted an 'agreement' for 'voluntary' 'exit' testing of university graduates 'to be reported on transcripts'.

1.1 Falling A-Level English (and Chinese) Language Scores

UGC is not wrong in their assessment that English and Chinese standards among school and university graduates in Hong Kong appear to be declining. Average
A-level scores in English are very low - doubtless, among other reasons, because

secondary school students have more interest in 'practical' quantitative subjects rather cultural studies such as English or Chinese. The problem exists for many reasons, in part because the schools did not keep pace with the vast democratic expansion of numbers of university places over the past 20 years. It could be argued that articulate speech, ordinary courtesy, and writing and reasoning skills, are all generally neglected in Hong Kong today - in Cantonese and Mandarin as well as in English.

The analogy with Singapore fails here. Singapore has an ethnic majority of Chinese, but the Government there has long recognised that peace in the region depends upon maintaining the former colony's multicultural, English language, international business, and open opportunity orientation. However, Hong Kong is essentially a Chinese city connected to the mainland. There are sizable ethnic minorities, including a largely expatriate international business community. International business is largely conducted in English, but even there, the inner office operates in Cantonese.

1.2 No Standardised Testing without a Cram School Please !

University instructors who have taught in the US, Britain, or Commonwealth countries that require the TOEFL or other standardised tests of English for university admissions for overseas students, have ample experience to recognise that while high scores on these tests may indicate knowledge of rules of grammar and usage, they certainly do not reflect fluency in ordinary speaking or writing ability. Overseas students often report very high scores, but arrive with very little practical knowledge of the language. Before massive expansion of local universities, when competition for overseas places was more intense, Hong Kong cram schools used to have a widespread reputation for aceing these exams.

If you give a cram course for the HK A-Levels (HKALE), you know that you have to get your students across some examination hurdle, and then into a university somewhere. But getting into university as an undergraduate is only just so hard. We can see from the HK Joint University Programmes Admissions System (JUPAS) reports that a C+ median is good enough. D- can still get you in, and an E+ in English - *and/or in your own native language* - will do! All you have to do is steer the students well, help them cram - a few questions culled from last year's exam, a few tips on avoiding the pitfalls etc.

1.3 HR Managers Recruiting Style and 'Quantified Data'

For an expatriate American university Professor, requiring a transcript for job applications smacks of invasion of privacy. It is commonplace in Hong Kong, however. Quantified Data of any kind is preferred by HR managers, who screen without interview and do not even reply to application letters unless all scores and personal data are decisive. In brief, 'voluntary' 'exit' testing is, therefore, illusory. Where HR practice is to scan and store rejected resumes by class and year, scores last forever. No job applicant should be advised to sit for a standardised test without taking the relevant cram course. Present university 'English enhancement' courses are not equivalent - at best they address real speaking and writing deficiencies. Universities and standardised testing agencies have different constituencies.

There is an 'elite' class in Hong Kong who recognise the practical importance of English in international business, which is the life of Hong Kong. Those who can afford it send their children - sons and daughters of government agency heads, leading business managers, and professionals - to the international schools, or abroad. These graduates are often bilingual. Frequently they also have prestigious foreign degrees. HR managers recognise the 'bilingual' label, but are not equipped to judge degrees. Nevertheless, there is a fast-track and a slow track - and local graduates tend to fall into the latter. As an alumni interviewer for ivy league admissions, I am proud to see our recent graduates in demand. As a Professor in a local institution, I would be glad to see our own local graduates get at least a comparable reception.

1.4 Education Policy and Social Engineering

Not all social engineering in education policy has been detrimental to Hong Kong, however. Over the past 20 years there has been lavish and unprecedented growth in the 'tertiary' education sector. We are told, for example, that full time enrolments increased from 42,000 in 1990-91 to 62,000 in 1995-96, roughly 47% in five years. This is still only about 18% of school leavers, and the Government is committed to a future expansion to admit 60%. The secondary level, however, has never kept up, and quite naturally, there is disparity in language preparation. Yet, while the funding agency is all too aware that university places cannot be filled without lowering entrance requirements, grants remain dependent on enrolments.

Furthermore, there are many separate agencies involved who advocate competing, often outdated, Western education theories: universities are pressured to give standardised 'exit' exams, while local subsidy schools are scolded for contemplating solely 'written' English language entrance exams because it conflicts with 'whole person development'. 'Mother-tongue' instruction policy in lower band schools was in part intended to overcome poor English language instruction, but must be self-defeating if a rising English-speaking standard is a social goal. Modest income families would like to send their children to qualified English language schools, but these are few. Most families lack financial independence to choose private schools, and they face an intransigent bureaucratic system. 'Innovation' with 'interactive' IT tools is promoted, when teachers themselves need more IT instruction, and students need less emphasis on rote memory aids. 'Student teaching evaluation', the American Vietnam-era solution for everything to do with students, caters, at university level, to student demand for even greater standardisation - if your career has been successful on a diet of memorisation and multiple choice questions thus far, why break your winning streak?

1.5. Education Policy and 'Quality of Teaching and Learning'

Hong Kong students already seem to be over-tested. The last four years of secondary school are taken up with first the HK Certificate of Education Exam (HKCEE), then the HK A-Levels (HKALE). What we need at university level is emphasis on sound education in the chosen field - not taught with multiple choice answers in mind, but with reasonable reliance on the student's ability to use language practically (English, or Chinese, for that matter) to read, analyse, and report on research - exposing the students'

ideas to criticism and development, and *not* how to employ 'innovative' technology to equip students with more rote learning without effort.

There are, however, other policy questions that independent institutions of higher education must consider, such as prior consultation, academic freedom, legal objections to having a stigma attached to a transcript, etc., which all arise in ordaining either a 'voluntary' or mandatory standardised test intended essentially for the benefit of private sector employment screening.

I teach Business Law and 'Cyberlaw' to Business and Engineering students. I have to admit that the JUPAS average scores in English and Chinese for entering students in the various Engineering School and most Business School departments are disappointing. However, that does not detract in the least from the ability of significant numbers of our students to be able to stand up and argue critically and analytically that leading decisions are either defensible (or sometimes totally misconceived!) before they finish the course.

It is not that our Engineering students are inherently more talented on stage, or more gifted in public speaking that brings out their ready responses in these debates. Far from it. It is common parlance among Engineering students, as I am afraid with all Hong Kong school leavers (the kindergartens, by contrast, are quite lively!) - that if your classmates do not speak out, you do not speak out. If *they* do not speak in proper English sentences, *you* do not speak in proper English sentences. In part, of course, this is because many cannot do either. But occasionally ungrammatical, unidiomatic, or even broken English, is no barrier to speech improvement with reasonable use and effort. The key here, particularly amongst Engineering students, is that the social stigma for undue individual excellence does not apply to co-operative team efforts. So hurrah for the team spirit!

My fear is that, in attempting to satisfy all such social problems with a greater emphasis on standardised testing in university (which could include the imposing of standardised courses and teaching methods), that although may achieve some better performance in pure data handling, could actually sacrifice what is left of the 'liberal arts' or substantive 'general education' traditions, such as training in problem- solving, decision-making and the thoughtful use of language, which still survive in universities today.

2. The 'Moot Court' Debates

The montages in the Appendix are taken from videotapes of the year 2000 'moot court' debates of the Hong Kong University of Science & Technology course 'Intellectual Property and IT Law' ('Cyberlaw'). This is a course primarily offered to Engineering students by the Law Program of the Department of Accounting of the School of Business and Management. The course is required for all Computer Engineering (CPEG) students, in order to satisfy the law requirement for certification of the Hong Kong Institution of Engineers.

'Moot Court' is the law student's traditional way of demonstrating a talent for verbal and legal reasoning. But cross-disciplinary work really becomes interesting where the students of IP and IT Law are *Engineering* students, who are far more accustomed to sitting

silently by - absorbing data and purely quantitative measures. Nevertheless, when questions of law go to questions of mechanical, electronic, and computer engineering, these students have demonstrated a hidden talent for verbal depiction in a language strange to lawyers, where cases turn, for example, on 'attribute data objects' and 'structure of attributive data models'.

What we can see in the montages are action shots from the year 2000 'moot court' debates - undertaken in lieu of the final examination in the Cyberlaw course. Those students who elected this option, re-argued the decisions in some of the leading cases in IP and IT Law that they had studied during the previous semester. At the conclusion of the individual 'debates', the students took questions from the floor from a panel of outside judges.

2.1 Does Talent for Legal Reasoning differ from Talent for 'Scientific Method'?

The objective of these 'debates' - like the objective of the course - is not to make lawyers out of engineering students. Rather, the intention is to demonstrate that principles of law - while they can be learned like the data in so many other courses these students have taken in their university careers - have to be applied by human beings to real-life situations. The point is that Law, as a field of study, and as a profession, deals far less with abstract rule-making or rule-finding, than with practical problem solving and decision-making in cases where statutes and rules provide only general guidelines.

Although the rules of law themselves may seem to be clear, they can only be applied once we know which rules apply to which facts. Therefore, we first have to establish:

> What the FACTS of the case are. That is:
> 'Who are the parties?';
> 'What have they done?'; and
> 'How has what each has done affected the other?'
>
> The sum of the FACTS should tell us:
> 'What LEGAL PROBLEM arises here?' i.e; - 'Who is suing whom for what?'

To solve that PROBLEM, we look to underlying LEGAL ISSUES - that is, we must determine:

> 'Which legal rules apply to the particular disputes we have isolated?'; and

That enables us to analyse:

> 'What has been the judicial RESOLUTION of any particular case?'; and/or:

> 'Was an ALTERNATIVE RESOLUTION desirable or possible?'

Some of us watch lawyer detective stories on television. These TV mysteries are often

dramatically solved in the courtroom. The lawyer detective will have discovered clues that lead to uncovering new information that can be used in cross-examination to lead an unwilling witness into admitting that he or she committed the crime.

But that is NOT how legal reasoning really works. Most of 'law' is not about *discovering data* that reveals who committed the crime. It is about *deciding* what is 'fair, just, and reasonable' in dealing with the facts of a case. Therefore, law in the courtroom is not simply a matter of applying rules and formulas to data. It is about how to apply sometimes ancient customs and modern legislative rules, along with principles of equity (or principles of what we sometimes call 'natural justice'), and the experience of how these rules and principles have been applied in the past. In other words, 'law', as 'rules', is also subject to 'equitable principles' and prior 'decided cases'. Yes, we do attempt to apply the literal language of statutory rules to the facts of a case, but, at the same time, we attempt to keep 'equity' alive - that is, we attempt to keep purely 'black letter' law from being applied in ways that would clearly offend conscience.

2.2 Re-Arguing Leading Cases in Intellectual Property and IT Law

Many of the frontline issues in Intellectual Property and IT Law have arisen in American cases. Decisions once made in a globalized 'digitalized' world, tend to have broad effect worldwide. Therefore, these decisions were central both to the 'Cyberlaw' course and to the year 2000 'moot court' debates. Typical 'moot court' debate questions were:

What is 'uncopyrightable' in software? CPEG students debated the outcome in *Lotus v. Borland* (a 1995 US federal appeals court case). Here the menu command hierarchy for Lotus 1-2-3 was held to be an uncopyrightable 'method of operation'.

> 'Copyright law protects 'expressions' of ideas, but not the ideas themselves. The Court decided that 'expressive' choices of what to name the command terms and how to arrange them did not magically change the uncopyrightable menu command hierarchy into copyrightable subject matter'.

That is what the appeals court in this case decided, but any Engineering or Business student for example, can easily see that fortunes turn on applying a decision defining the concept: "expressive' choices in menu commands'. Our debaters' background in computer engineering provided an insight both into how such menu choices in competing software are made and also awakened interest in how this relates to the recent US decision in *State Street Bank & Trust v. Signature Financial Group* (1998), allowing patentability of a business process.

Is software therefore patentable? The decision in Lotus v. Borland and related decisions (e.g; In re Alappat, and In re Lowry) have led the US Commissioner of Patents and Trademarks to declare that patent protection would be available:

> for aspects of a computer system, a computer-implemented process, or components of a computer system'.

In In re Lowry , the Federal Circuit [court] ruled that an 'electronic structure,' constructed as a memory containing information stored in a particular arrangement, can serve as the basis for a patentable invention. The Lowry invention was an attributive data model containing 'attribute data objects'. An attributive data model defines a structure for a set of attributes, i.e; certain information defined in terms of its characteristics and relationships to other information. Lowry asserted that a memory containing data organised by the structure of this attributive data model permits a computer to efficiently access and to use the stored data.

If the language of these decisions is the language of the future of Cyberlaw, then clearly law students must learn to do what the judges in these courts have obviously done before them: that is, they too must take crash courses in Computer Engineering. Similarly, engineering students must also be more keen to articulate exactly how an invention works - lest that is overlooked by a technically less gifted patent attorney. Regardless, of whether Mr. Alappat was correct that his patent would have been infringed as alleged, or not, one of our debaters objected with lawyerly technical acumen: Alappat's invention had not been 'infringed' because he had failed to include that particular possibility in his patent application 'claims'.

2.3 What is 'Teaching and Learning Quality'?

Had these debates not taken place, the instructor freely admits, he would frankly, never have known what these students had learned or could have learned from the course. Hong Kong students have an entirely different notion of what 'Teaching and Learning' is from accepted notions in the older, traditional schools in England and America. The concerns expressed above about re-thinking already decided cases would almost certainly never have arisen for them. 'Teaching' in the Hong Kong high school vocabulary, involves merely the efficient, well-organised, and *anonymous*, transmission of data; 'Learning' in local usage means primarily data-acquisition, with the formulas of how to apply it.

Asking the student to give a verbal answer of how to apply recognised legal concepts or how to apply doctrines and principles of law, on the other hand, tends to be regarded as 'unfair'. To do that, the student must come out into the open, deal with reasoning, that is not data oriented, and perhaps reveal that his or her English is less than perfect.

'Unfair' in the Hong Kong student vocabulary tends to mean anything that violates the principles of how professional testing organizations, i.e., HKAL or HKCEE, conduct large scale standardised testing. Consequently, what students expect - and demand - is *anonymity, uniformity, packaged courses, model questions, model answers, and curved results*. If university lecturers adhere to those principles, even the most mediocre student knows that he is guaranteed equal opportunity with every tycoon's son to memorise and repeat his or her course material, and compete, score for score, for the key jobs of Hong Kong.

The liberal arts ideals of education, on the other hand, ideals that stress individual thinking and development of the personality, *ideals that many traditional university teachers, including the instructor for Cyberlaw, still firmly adhere to, tend to violate*

every one of those precepts.

2.4 Are the Debates a Proper Model for 'Quality Teaching and Learning'?

Then what is the proper model for 'Teaching and Learning' in the 'tertiary' institutions of Hong Kong? And what really goes on in our classrooms?

> 'We should teach all courses the way we would teach majors in our courses in the United States',

the Founding President of the Hong Kong University of Science & Technology, is reported to have opined. But is this to be taken seriously in a university where the President has also declared that:

> 'We have fired lecturers on the basis of student evaluations',

and where the University Grants Committee panel assigned to conduct the recent Teaching and Learning Quality Process Review (the TLQPR) at HKUST have expressed their concern that:

> 'There appears to be little systematic monitoring of teaching and learning quality [at HKUST] other than through the [student] teaching evaluation questionnaires …'.

Should any other university instructor take these debates as a model for classroom instruction? It is clearly risky. Not only does it violate many Hong Kong students' perceptions of what teaching and learning is all about, it also violates the perceptions of many of those Hong Kong university faculty members who were brought up under the standardised testing regime.

The problem is not that students do not know what is going on in their lecture/ tutorials. The problem is rather that this does not comply with their received notions of what teaching and learning is all about, so that they do not know what to make of it. In a kind of recollection of the tutorials in their Business Law course - similar to the old Engineering Law course, the editors of the Accounting Students Society *Addressbook* once wrote:

> In the tutorial, Dr. Lee encouraged us … to speak out and to discuss [legal concepts]. He arranged students into several groups in order for them to present the arguments of various cases. Yet, whenever, students attempted to make their presentations, Dr. Lee intervened more positively, and those students who had come forward to make their presentations ended-up standing aside and listening to what he had to say. Their presentations became, in the end, Dr. Lee's presentations ….

In other words, the instructor's tutorial techniques appeared to have been a kind of

doddering - if your notion of proper handling of classroom work is only standing back and watching student recitations of relevant data. It escapes the writers of this student days' *memoir* that a tutorial worth the name must go deeper than a simple *recitation of data in bullet points*. The tutorial is not another form of lecture but rather time set aside for an *intellectual encounter in reasoning*.

It does not matter whether the tutorial is in English or in Cantonese. It can only succeed as an exchange of ideas, and that can only begin when one student says something. It is the record of exchange: student to tutor; and tutor to student. The tutor pursues a reaction to oblige the student to draw his conclusions - to finish his thought. This was no easy task with, then, 50 students in a 50 minute 'tutorial' (for the engineering students, it had grown to70 students in a 'lecture/tutorial' of the same length). But if anything is clear from the videotapes and stills of the debates, these students are not simply 'standing aside and listening'.

158 students took part in the 'moot court' debates the first year we tried this experiment. 192 students took the traditional final exam (including some who would not simply rely on their verbal skills alone and took the final exam as well). The course grades reflected typical results of a distribution curve for 350 students. However, the debates grades were higher - as you can see from the clips (from the fourth such 'moot court' debates) that they might be. It was an experiment that worked. It is however highly impractical to try to organise an event of that magnitude, during the final exam period. If you have confidence in the results, however, there is nothing like watching 150 of your students stand up to the questions of outside judges they have never seen before!

Not one of these students had not previously complained that the language of the law cases was too difficult. The results of the debates, where students clearly demonstrated command of arguments on both sides of their cases, did not show that. Not bad, for what the newspapers have been telling us about the declining level of English language proficiency among Hong Kong university students. While clearly many of these students needed more practice in classroom use of English, not one of the students who took part could not make himself understood - and did not have a fairly good grasp of the concepts of law and legal issues at stake in the debates. What is more, the students did not simply rely on the cases they had studied during the year, they researched and studied the underlying cases as well.

The difference these debates made over the past four years was to give *engineering* students the opportunity of putting their talents to work, in teams, to give a practical demonstration of their abilities to analyse a real socio-legal problem, establish what the legal issues are, and reach a reasoned verbal response to the problem presented in the case law they have studied. In that respect they fully demonstrated the course objectives.

The 'moot court' debates have succeeded, if they have demonstrated that the talents involved in solving a legal problem - *which is not simply data oriented* - are not fundamentally unlike the talents required in solving any other business, social, ethical, or perhaps even engineering, problem - *which is not simply data oriented*.

The Following Passage is not from Wittgenstein's *Tractatus* - but from a recent US Patent Decision, *In re Lowry:*

> ' Lowry's invention seeks to optimize both structural and functional expressiveness. Lowry discloses a data structure accessible by many different application programs. Lowry's data structure is based upon the 'Attributive data model.' The Attributive data model represents complex information in terms of attributes and relationships between attributes. According to Lowry's specification, ' [a]n attribute expresses the idea that one thing is attributed to another thing.' Thus, the Attributive data model capitalizes on the concept that a database is a collection of attributions, whereby information is represented in terms of its characteristics and relationships to other information'.

> 'In accordance with the Attributive data model, Lowry's data structure comprises a plurality of attribute data objects (ADOs) stored in memory. An ADO is a single primitive data element 'compris[ing] sequences of bits which are stored in the memory as electrical (or magnetic) signals that represent information.' It contains information used by the application program and information regarding its relationship with other ADOs. Lowry asserts that his data structure is functionally expressive by virtue of its representation of information in terms of attributes. Lowry also states that ' [s]tructural expressiveness is achieved by making that primitive data object extremely simple and allowing for highly unconstrained interconnections between attribute instances'.

> 'According to the claimed invention, ADOs have both hierarchical and non-hierarchical interrelationships. A few specific rules govern these relationships. Because the claimed invention uses single ADOs governed by simple organizational rules, Lowry asserts that it may flexibly and accurately represent complex objects and relationships. The hierarchical relationships form a conceptual pyramidal structure. Hierarchical correlations describe 'holding' or 'being held' relationships. An ADO can 'hold' one or more other ADOs. Each ADO, however, can 'be held' by only one other ADO. Thus, while capable of holding many others, an ADO can be held by only one other ADO. One ADO, called the apex ADO, holds at least one other ADO but is held by no other ADO. This apex ADO is the only ADO that lacks a being-held relationship. From the apex ADO, the hierarchical relationships fan out in a pyramidal structure'.

Easily Such Language Favors the Computer Engineering Student over the Common Law Lawyer.

Appendix

The main menu of Lotus 1-2-3
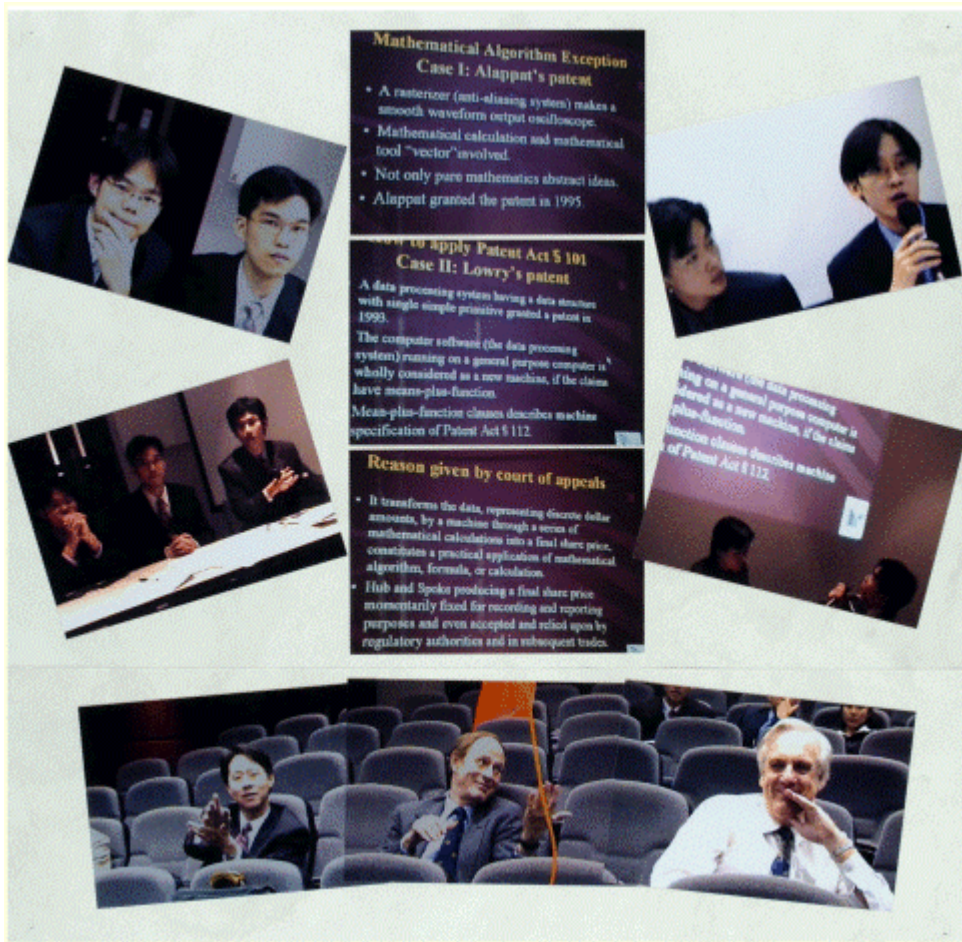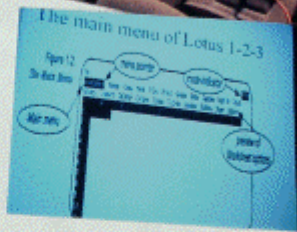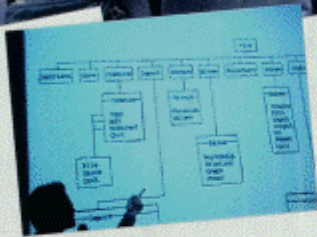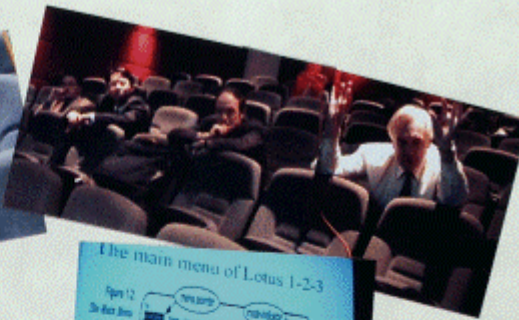
Background Information (1)

- In late September 1987, Borland announced Quattro, Borland's first spreadsheet product. In November, Borland shipped the Quattro product.
- On July 2, 1990, Lotus filed the complaint against Borland about Borland's Quattro products infringe the Lotus 1-2-3 copyright in the District of Massachusetts.

US Code: Title 17, Section 102

Are Alappat's claims patentable?

Analysis
◆ What did Alappat invent or discover?
◆ Claim 15 as a whole claims old circuitry elements in an arrangement defined by a mathematical operation, which only performs the very mathematical operation that defines it. There is no "application" apart from the mathematical operation