OPENING SESSION

1. Approval of the Agenda
   Sarah Forgie

2. Approval of the Open Session Minutes of October 3, 2018
   Sarah Forgie

3. Comments from the Chair (no documents)
   Sarah Forgie

DISCUSSION ITEMS

4. University of Alberta’s submission to the Standing Committee on Industry, Science and Technology (INDU) on the Statutory Review of the Copyright Act
   Adrian Sheppard

5. Experiential Learning (no documents)
   Sarah Forgie

6. Recommendation from COSA re: Requirement for use of long-form handwriting for examination purposes
   Katherine Zwicker
   Rita Neyer

DISCUSSION ITEMS

7. Updates
   A. Centre for Teaching and Learning (CTL)
   Janice Miller-Young
   B. Information Technology
   Jeff Rawlings
   C. Learning Services
   Dale Askey
   D. General Faculties Council
   Eva Lemaire
   E. Academic Success Centre
   Robert Desjardins

8. Question Period
   Sarah Forgie

INFORMATION REPORTS

9. Items Approved by the Committee by E-Mail Ballots (non-debatable)
   (no items)

10. Information Items Forwarded to Committee Members Between Meetings (no items)

CLOSING SESSION

11. Next Meeting: December 5, 2018

12. Next General Faculties Council Meeting: November 26, 2018
Presenter(s):
Sarah Forgie  
Vice-Provost (Learning Initiatives) and Chair, GFC Committee on the Learning Environment

Adrian Sheppard  
Director, Copyright Office

Katherine Zwicker  
Manager, Student Affairs, Office of the Dean of Students

Rita Neyer  
Graduate Student, History and Classics, member of Council on Student Affairs (COSA)

Janice Miller-Young  
Academic Director, Centre for Teaching and Learning

Jeff Rawlings  
Director/Relationship Management, Information Services & Technology,

Dale Askey  
Vice-Provost (Learning Services) and Chief Librarian

Robert Desjardins  
Graduate Writing Advisor, Academic Success Centre

Documentation was before members unless otherwise noted.

Meeting REGRETS to:  
Meg Brolley, meg.brolley@ualberta.ca, 780-492-4733

Prepared by:  
Meg Brolley, Committee Coordinator

University Governance  
www.governance.ualberta.ca
OPENING SESSION

1. Approval of the Agenda

Materials before members are contained in the official meeting file.

Motion: Maraj/Miller-Young

THAT the GFC Committee on the Learning Environment approve the Agenda.

2. Approval of the Open Session Minutes of September 5, 2018

Materials before members are contained in the official meeting file.

Motion: Desjardins/Bhatnagar

THAT the GFC Committee on the Learning Environment approve the Open Session Minutes of September 5, 2018.

3. Comments from the Chair (no documents)

The chair mentioned a number of vacancies on the committee and encouraged members to invite colleagues to apply.

DISCUSSION ITEMS


_Purpose:_ Information/Discussion. The university has provided feedback to the Tri-agencies with regards to their draft Tri-Agency research Data Management Policy posted here: [http://www.science.gc.ca/eic/site/063.nsf/eng/h_97610.html](http://www.science.gc.ca/eic/site/063.nsf/eng/h_97610.html)
Dr Harder provided an overview of the documents and the consultation process to date.

Discussion:
Members provided comments on the following: scope and participation rate on the electronic survey; resource implications related to data management; questions on what data would be included; need for institutional data management strategy; open access; digital identifier to cite data; how access differed to what was currently available to the university community; the societal benefit of access to information; responsibility to provide data associated with tri-agency funding; ethics implications to secondary use of data; challenges related to intermingling of grants between researchers internationally; compliance challenges; definition of data that is appropriate across disciplines; methods of sharing data; where data is stored; data literacy and data training; and administrative burden.

5. **Update on Teaching Evaluation Policy (no documents)**

Presenter(s): Sarah Forgie

The Chair reminded members of the direction from GFC for the committee to review GFC Policy 111. She proposed a policy/procedure structure to incorporate the institutional commitment to teaching in a research intensive institution and the contract between teacher and student. She then spoke to teaching evaluation and procedural documents which would include multi-faceted evaluations, student evaluations, and noted the uniqueness of evaluation needs related to graduate students. The Chair referred to the work conducted by CTL and discussed by CLE over the last year, and the offer from St Joseph's College to pilot some evaluation processes.

Discussion:
The committee discussed how to approach these components sequentially. Members provided comments on: how to raise the profile of teaching in the academy; the need to provide mechanisms for multi-faceted evaluations as well as the challenges involved; the need to change the culture of teaching evaluation; and evaluation of the graduate student supervisory role. Members noted the value of formative evaluation and the value of ongoing evaluation. Less dependence on USRIs was suggested and the need for buy in from community was emphasized. The committee discussed how to leverage peer evaluation in a positive and perhaps confidential manner and how to be sensitive to differences in individuals on how they wish to be evaluated in a manner most effective for them. Members commented on how students perceive the usefulness of USRIs; how to provide instructors with a safe space to be innovative; the fear of power imbalance in small graduate situations; and how to socialize and normalize feedback to instructors to allow them to integrate feedback into second half of course so students benefit from their feedback during the course.

6. **Election of Vice-Chair for 2018/19**

Brian Maraj was acclaimed Vice-Chair for 2018-2019.

7. **Updates**

A. Centre for Teaching and Learning (CTL) - Dr Miller-Young noted upcoming deadlines for grants at CTL including blended learning awards, TLEF, and OER awards. She indicated that the TLEF seed grants are designed to foster a culture of innovation.

B. Information Technology - Mr Rawlings provided updates on eClass, the moodle app for students, new polling software, classroom renewal, and the development of digital exams on student computers.
C. Learning Services - Dr Askey reported on Science literacy week. He noted the merger of Canadiana, an alliance of libraries, archives, and universities across the country dedicated to making Canada’s cultural heritage available online, with the Canadian Research Knowledge Network. He indicated that this was a transformational moment that would provide additional accessible digital content.

D. General Faculties Council – There was no report.

E. Academic Success Centre – There was no report.

8. Question Period
There were no questions.

INFORMATION REPORTS

9. Information Items Forwarded to Committee Members Between Meetings
There were no items.

10. Items Approved by the Committee by E-Mail Ballots (non-debatable)
There were no items.

CLOSING SESSION

11. Adjournment
The meeting was adjourned at 3:35pm.
Governance Executive Summary
Advice, Discussion, Information Item

Agenda Title: University of Alberta’s submission to the Standing Committee on Industry, Science and Technology (INDU) on the Statutory Review of the Copyright Act

Item

Proposed by: Dale Askey, Vice-Provost (Learning Services) and Chief Librarian
Presenter: Adrian Sheppard, Director, Copyright Office

Details

Responsibility: The Office of Administrative Responsibility for copyright matters is the Vice-Provost (Learning Services)

The Purpose of the Proposal is (please be specific): The proposal is before the committee because the results of the ongoing review of the Copyright Act could lead to legislative changes that would have considerable impact on the university. This information item is to inform the committee of how the university is engaging in the review process to ensure its concerns are properly considered.

Executive Summary (outline the specific item– and remember your audience): The INDU committee is receiving briefs to inform its review of the Copyright Act. The only requirement for such briefs is that they do not exceed 2,000 words. Briefs can be submitted before 11:59pm (EST) on Monday, December 10, 2018.

The purpose of the University of Alberta submission is to make recommendations to the INDU committee regarding key elements of the Copyright Act that are currently under review, based on how those elements impact the university and its stakeholders.

Supplementary Notes and context

Engagement and Routing (Include proposed plan)

Consultation and Stakeholder Participation: The University of Alberta submission was developed by the Copyright Office in consultation with the Vice-Provost (Learning Services), the Office of General Counsel, Government Relations, and the Provost’s Office.

Strategic Alignment

Alignment with For the Public Good: Participation by the university in the Copyright Act review is aligned with the goal of engaging communities to pursue outcomes in the broader public interest.

Alignment with Institutional Risk Indicator: For the university to choose not to participate in this review process could present a risk to its reputation as a leader among post-secondary institutions in Canada.
### Item No. 4

| Legislative Compliance and jurisdiction | Copyright Act; Use of Copyright Materials Policy. |

**Attachments (each to be numbered 1 - <>)**

1. U of A INDU Submission (REVISED DRAFT) – 27Sep2018

*Prepared by: Adrian Sheppard, Director, Copyright Office, adrian.sheppard@ualberta.ca*
Submission on the Statutory Review of the Copyright Act

The University of Alberta is a Top 5 Canadian university located in Edmonton, Alberta, and home to 40,000 students in a wide variety of programs.

The faculty, staff and students of the University of Alberta are both creators and users of copyright-protected materials. For that reason, any reforms of copyright law or revisions to the Copyright Act are of particular interest to, and have the potential for significant impact upon, the University of Alberta community.

Copyright is primarily a creature of statute, and as such it should be structured and implemented in a way that best serves the public interest. Copyright best serves the public interest through maintaining a balance between the interests of creators in being appropriately recognized and rewarded for their creative works and the interest of users in benefiting from and building upon those works.

Summary of Recommendations.

A. No changes to fair dealing;
B. Any tariff applicable to post-secondary institutions covering literary works should be expressly voluntary;
C. Circumventing a TPM for a lawful purpose should not be copyright infringement;
D. Crown works published and made freely available should immediately become part of the public domain or be openly licensed;
E. Strengthen the “internet exception” for educational institutions;
F. Copying for non-consumptive text and data mining should not be an infringement;
G. No extension to the copyright term;
H. Implement a process through which rights-holders can place material into the public domain before the copyright term has expired;
I. Staff and resource the Copyright Board in a manner that leads to more timely decisions; and
J. Separately explore the relationship of copyright to indigenous knowledge.

A. **Fair Dealing.** One issue that has gained significant attention leading up to the *Copyright Act* review is fair dealing (s.29). Essentially, fair dealing allows for the limited use of copyright-protected material without requiring the permission of or compensation to the rights-holder, provided the use is for one of the listed public-interest purposes and provided the extent of that use is fair. In this way, fair dealing plays a key role in supporting the public interest by preserving the balance between creator and user rights.

The *Act*, quite appropriately, contains no guidance regarding the determination of fairness, as application of the provision is intended to be fact-specific and to apply in the broadest range of cases. Fair dealing has been part of the *Copyright Act* since 1921, and it has operated in largely the same way since that time with no “bright lines” to define fairness. For all these decades, leaving the interpretation of fairness to the common law seems to have been working as intended.

In recent years, it has been suggested that there have been some adverse consequences arising from the addition, in the 2012 *Copyright Modernization Act*, of “education” as an enumerated purpose under fair dealing. Examples are cited that purport to demonstrate the unintended adverse consequences of this addition to the *Act*, with the suggestion that the remedy be to remove “education” as a purpose under fair dealing. To the extent it is true that educational institutions have altered their approach to fair dealing since 2012, these changes originated predominantly from the Supreme Court of Canada decision in *Alberta (Education) v. Access Copyright* ([2012 SCC 37](https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/9997/index.do)), which dealt specifically with teachers making short excerpts of copyright-protected materials for distribution to students. That case was decided a few months before the *Copyright Modernization Act* came into force.

While post-secondary institutions such as the University of Alberta are users of a significant amount of copyright-protected content, they also pay significant amounts directly to publishers to license access to and use of that content. Not surprisingly, the vast majority of content that is used, and licensed, by post-secondary institutions is scholarly content that is produced throughout the world.

This clarification does nothing to resolve the adverse circumstances that have befallen some Canadian authors and publishers in recent years, and it may be reasonable for other avenues to be sought to address the financial difficulties of certain authors and creators of Canadian content. However, that specific content does not form a significant percentage of the content used at the University of Alberta and other post-secondary institutions.

Further constraining how post-secondary institutions make short excerpts of protected content available to students under fair dealing will not turn back the clock on the shifting realities of an evolving sector. We recommend that no changes be made to fair dealing under the *Act*.

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B. **Mandatory vs Voluntary Tariffs.** Access Copyright has applied to the Copyright Board for a tariff that would apply to post-secondary institutions, and it argues that this tariff should be mandatory (i.e., applicable to all post-secondary institutions). The tariff proposed by Access Copyright is a blunt instrument that does not account for how different institutions approach the direct licensing of content—including rights to reproduce that content—and how those institutions manage copyright internally. Those differences are important.

It is reasonable for universities to take different approaches in structuring their affairs while pursuing the common objective of remaining compliant with copyright law. The University of Alberta spends millions of dollars each year licensing directly from publishers the right to use copyright-protected content. Our 2016-17 library collections expenditures totalled over $25M and can be reviewed in detail here. Given the range of options available for licensing rights to access and reproduce content, a mandatory tariff regime to cover literary works for post-secondary institutions that does not account for these options is unreasonable and would certainly lead to unfair outcomes.

The annual fee for the University of Alberta under the proposed post-secondary tariff would be approximately $910,000 (35,000 FTE students at $26.00 per FTE), irrespective of how much we are already paying to publishers to license the use of such content. It seems reasonable and practical for post-secondary institutions like the University of Alberta to opt to operate outside such a tariff, using a comprehensive program of direct licensing with publishers and the responsible application of fair dealing to remain compliant with copyright law.

While a voluntary tariff might be a useful option for some institutions, a mandatory tariff would hamper the ability of universities to explore all available models to best serve their communities through providing lawful access to and rights to use the broadest array of copyright-protected resources. We recommend that any tariff applicable to post-secondary institutions covering literary works be expressly voluntary.

C. **Technological Protection Measures.** In cases where a “technological protection measure” (TPM) can be readily circumvented, the presence of that TPM offers little to dissuade a knowingly infringing use of the work. However, if it is deemed to be an infringement of copyright law for a TPM to be circumvented for a lawful purpose, then the presence of a readily circumvented TPM does effectively prevent what would otherwise have been a non-infringing use of that work. This seems to be an unreasonable outcome that does not reflect the proper balance between creator and user rights. Accordingly, we recommend additional clarity be added to the Act to

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4 https://dataverse.library.ualberta.ca/dataset.xhtml?persistentId=doi:10.7939/DVN/TRSK5G
ensure that the circumvention of a TPM for an otherwise lawful purpose will not be deemed an infringement of copyright.

D. **Crown Copyright.** There may be valid reasons for preserving Crown Copyright in some form (s. 12). However, it seems reasonable that as soon as works created by the Crown have been published and made freely available by the Crown, those works should either immediately enter the public domain or be made immediately available for use under a minimally restrictive open licence. Such clarity would allow researchers, librarians, and archivists to use and preserve these works without concerns about possible infringements of Crown Copyright. We recommend such a provision be added to s.12 of the Act.

E. **Internet Exception.** Under s.30.04(1) of the Act, any material freely available on the internet can be used by educational institutions for educational and training purposes. However, rights-holders can unilaterally prohibit such use simply by including “a clearly visible notice” that prohibits it (s.30.04(4)(b)). It seems inconsistent with a balanced approach to copyright to allow rights-holders to restrict educational use of material freely available on the internet. We recommend that this limitation to the internet exception be removed from the Act.

F. **Text and Data Mining.** Digitization allows for significant research benefits through text and data mining within copyright-protected works. The University of Alberta recommends that a provision be added to the Copyright Act to confirm that copying of a work for non-consumptive use, such as text and data mining for research purposes, is not an infringement of copyright.

G. **Copyright Term.** The current term of copyright protection under s. 6 of the Copyright Act is generally the life of the author plus 50 years. This is the minimum copyright term consistent with the Berne Convention.

    The length of the copyright term serves a single purpose, which is to serve the public interest by providing an incentive for the creation of new works. The term of copyright protection in a work defines the length of the limited monopoly that the creator, or the rights-holder in cases where the creator transfers those rights, can control the use and generate economic benefit from the use of that work. Any proposed change to the term of copyright should clearly indicate the extent to which such a change is expected to increase or decrease that incentive.

    In general, having more works in the public domain better serves the broader public interest, therefore any undue extension to the term of copyright causes harm by limiting access to works and reducing the scope and breadth of the public domain. We therefore recommend that there be no extension to the term of copyright protection.

H. **Placing material into the Public Domain.** Only a small percentage of copyright-protected materials ever have significant commercial value, and in the vast majority of those cases that value will be approaching zero long
before the copyright term has expired. The Australian Bureau of Statistics estimates that: literary works provide commercial returns for between 1.4 and 5 years on average; 75% of original titles are retired after one year; and 90% of original titles are out of print after two years. However, creators generally want their works to be used, many older materials may have ongoing research and archival value, and this value can be more readily exploited without the limitations that copyright protection provides. Therefore, we recommend that a new provision be added to the Act to make clear how rights-holders can opt to place copyright-protected works into the public domain before the end of the term of copyright protection. A simple, clear and binding mechanism for doing so, perhaps similar to the Creative Commons CC0 designation, would be a significant step toward further augmenting the public domain.

I. Copyright Board. Given the importance of the role of the Copyright Board, and in light of some of the recent issues regarding timeliness of decisions, the Committee should consider the recommendations of the Senate Committee report and take steps to ensure that the Copyright Board has sufficient staff and resources to enable it to issue more timely decisions and to properly fulfill its legislative mandate.

J. Indigenous Knowledge. The history of copyright law has focused on individual authorship and upon the “fixation” of a work as a triggering event for copyright protection. These features have proven inadequate to properly address issues related to the traditional knowledge and cultural works of indigenous peoples. The University of Alberta strongly encourages the Committee, as part of its current review, to make a commitment to separately explore this issue, with a separate consultation process, to ensure respect and protection for indigenous knowledge as part of the overall copyright regime.

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For additional information about copyright at the University of Alberta, contact copyright@ualberta.ca.

Last revised: 27Sep2018

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6 https://creativecommons.org/publicdomain/zero/1.0/
7https://sencanada.ca/content/sen/committee/421/BANC/Reports/FINALVERSIONCopyright_e.pdf
Agenda Title: **Requirement for use of long-form handwriting for examination purposes**

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<th>Action Requested</th>
<th>Approval</th>
<th>Recommendation</th>
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<td>Council on Student Affairs</td>
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<td>Presenter(s)</td>
<td>Katherine Zwicker, Manager, Student Affairs, Office of the Dean of Students and COSA Chair</td>
<td>Rita Neyer, Graduate Student, Department of History &amp; Classics and COSA member representing the International Students’ Advisory Committee (ISAC)</td>
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**Details**

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<th>Responsibility</th>
<th>Provost and Vice–President (Academic)</th>
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<tr>
<td>The Purpose of the Proposal is (please be specific)</td>
<td>The Council on Student Affairs (COSA) recommends that the Committee on the Learning Environment investigate whether the use of long-form handwriting remains an appropriate assessment practice as students’ communication competencies have shifted away from handwriting to typing and word processing and current technological trends suggest that the use of technological devices and software will only increase and accelerate.</td>
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| Executive Summary (outline the specific item– and remember your audience) | Current university students complete much, if not all, of their coursework on computers using word processing tools, but, in many cases, complete mid-term and final exam assessments by hand. In addition to lacking practice in handwriting and composition without the use of word processing tools in university courses, the K-12 system has also provided students the opportunity to complete more of their coursework and examinations using computers. Alberta Education has embraced the use of technology in the classroom, for assessment and other coursework, and is committed to preparing current K-12 students to function in further educational or work environments making extensive use of technology. 

The recommendation to investigate whether the use of long-form handwriting remains an appropriate assessment practice, especially in disciplines with essay-based examinations, aims to ensure that the UofA continues to provide high quality educational experiences that are reflective of shifting technological tools and students’ communication competencies. 

Improved opportunities for professors to offer digital assessment has the potential to address the problem of university students’ poor handwriting fluency. Research conducted almost two decades ago showed that undergraduate students had the handwriting fluency of 11-year-old-children and that their slow handwriting fluency negatively affected their ability to complete higher order processes such as planning and editing (Connelly, Dockrell, Barnett, 2005). In addition to addressing this problem, improved opportunities for professors to offer digital assessment, whether in University computer laboratories or on students’ personal laptops coupled with software applications to ensure security, offers the opportunity to employ automated scoring applications to
reduce professors’ marking workload and establish greater fairness and equity throughout assessment.

If further investigation indicates the desirability of shifting to increased use of computer-based testing, the University of Alberta is well positioned to lead this shift given work being conducted in Information Services & Technology (IST), the Centre for Research in Applied Measurement (CRAME), and the Learning Assessment Centre (LAC). IST is in the process of developing an eClass-compatible application that would make it possible for exams to be written on personal laptops while maintaining a secure examination environment. CRAME, a research centre in the Department of Educational Psychology, is one of four centers across Canada focused on educational assessment and runs the most robust research program of them all. The LAC, which was, in part, created to facilitate assessment for large-scale flipped classroom courses (MOOCs) has been extremely successful in doing so as well as facilitating a shift to computer-based testing for courses from many Faculties, especially the Faculty of Education in which approximately 60% of the Faculty’s academic staff depend on the LAC to offer effective computer-based assessment. The LAC has the capacity to administer 400,000 student assessments over the course of an academic year, but is underutilized, likely due to cost-recovery fees.

Supplementary Notes and context

Engagement and Routing (Include meeting dates)

Consultation and Stakeholder Participation
(parties who have seen the proposal and in what capacity)

<For information on the protocol see the Governance Toolkit section Student Participation Protocol>

Those who are actively participating:
- Members of COSA (February 6, April 3, and October 2, 2018)

Those who have been consulted:
- Shannon LaFave, Facilitator, Learning Assessment Centre (Winter 2018)
- Janice Miller-Young, Director, Centre for Teach and Learning (Winter and Spring 2018)
- Adam Giraldeau, Manager, Strategy & Infrastructure, Information Services & Technology - Teaching and Learning Services (August 16 and September 17, 2018)
- Jeff Rawlings, Director, Relationship Management, Information Services & Technology - Relationship Management (September 17, 2018)
- Lili Chevrier, Senior Program Manager, Information Services & Technology - Business Transformation (September 17, 2018)
- Darryl Hunter, Assist. Professor, Educational Policy Studies (September 25, 2018)
- Mark Gierl, Professor, Educational Psychology and Director of the Centre for Research in Applied Measurement and Evaluation (CRAME) (September 26, 2018)
- Helen Vallianatos, Associate Dean, Office of the Dean of Students & Associate Professor, Anthropology
- Wendy Doughty, Assistant Dean, Student Success, Office of the Dean of Students
Item No. 6

Those who have been informed:
- Mike Carbonaro, Professor, Educational Psychology
- Cheryl Poth, Assoc. Professor, Educational Psychology and Associate Director, Assessment, Centre for Teaching and Learning
- André Costopoulos, Vice-Provost and Dean of Students
- Sarah Wolgemuth, Assistant Dean, Student Life, Office of the Dean of Students

Approval Route (Governance) (including meeting dates) N/A

Strategic Alignment

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<td>Strategy i. Foster, encourage, and support innovation and experimentation in curriculum development, teaching, and learning at the individual, unit and institutional levels.</td>
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<td>Strategy iv. Create and support an institutional strategy that enables excellence in the design, deployment, and assessment of digital learning technologies.</td>
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Attachments (each to be numbered 1 - <>)
1. Attachment 1 – 2018 02 06 COSA Minutes (pages 1 - 2)
2. Attachment 2 – 2018 04 03 COSA Minutes (pages 2 - 3)
3. Attachment 3 – 2018 10 02 COSA Minutes (page 2)
5. Attachment 5 – Nora Mogey, Jessie Paterson, John Burk & Michael Purcell (2010) Typing compared with handwriting for essay examinations at university: letting the students choose, ALT-J 18:1, 29-47. (pages 1-20)

Prepared by: Katherine Zwicker, Manager, Student Affairs, Office of the Dean of Students & COSA Chair, kzwicker@ualberta.ca
1. **Welcome**

Members introduced themselves.

**Members present:** Katherine Zwicker, Carlota Minero Marquez, Masoud Khademi, Michelle Kim, Angie Mandeville, Norma Rodenburg, Ilya Ushakov, Katie Allan, Maryse Ndilu Kiese, Rita Neyer, Crystal Snyder, Pranamika Dutta, Chaman Preet Singh, Sylvia Brown, Marina Banister, Karen Pirie

**Regrets:** Adam Brown, Kristin LaGrange, Connor Hastey Palindat, Alex Ho, IFC Representative

**Guests:** Tammy Hopper, Vice-Provost, Programs and Prof. in Rehabilitation Medicine

Katherine welcomed new member Carlota Minero, VP External, Panhellenic Council to the meeting.

2. **Approval of Previous Minutes** (December 05, 2017)
   Accepted as circulated.

3. **Approval of the Agenda**
   No changes.

4. **First Item - Exam booklets and longhand writing for midterms and exams *early discussion (15 minutes)*

   **Sylvia Brown (Professor, Department of English & Film Studies)**

   Sylvia shared common student complaint received by professors re the difficulty of handwriting exams, especially essay exams with significant writing. Students are no longer very practised at writing a lot by hand. Competencies have changed—research shows that students’ have the handwriting skills of 11 year-olds. Thus students must rely on a little used and inefficient tool when it comes to e.g. composing essays under time pressure. There is a mismatch between how they usually write essays (they compose on a computer) and how they are assessed for midterm or final exam essay questions.

   *Research conducted at the Univ. of Edinburgh* examines this issue and shows that fairness is a concern when considering handwritten vs. computerized assessment. The research also shows that security is not as big a concern as one might expect.
Masoud and other members inquired as to whether there has been a needs assessment done on campus? Not to anyone’s knowledge. Members questioned if this issue is more of a problem in writing-intensive disciplines (Faculty of Arts).

Group discussed public school curriculum and whether the norm is shifting toward composing essays and writing exams via computer keyboards rather than by longhand.

How do other universities handle this issue? Unknown.

- Katherine provided brief overview of the Learning Assessment Centre, run by Faculty of Education.
- Testing centre with 101 computers, open 9am-5pm with opportunity for evening and Saturday exams.
- Uses eClass exam platform and has screenshot system in place to screenshot work every 11 seconds to safeguard against lost work in the event of a computer malfunction.
- Administers exams for MOOCS with approximately 900 students—flexible week-long writing schedule to accommodate large number of students with different questions selected from exam bank to reduce cheating.
- Administers exams in multiple formats (MC, short answer and essays).
- Operates on a cost recovery model, so Faculties/units aside from Education have to pay for administration of exams.
- Approximately 50% of exams are through Faculty of Education, other 50% from other Faculties/units.

**Action Item:** Norma can ask Examinations and Timetabling to inquire on scheduling practices at other institutions to help determine if they are providing alternative assessment options, such as computerized exams.

**Action Item:** What can COSA do to address this issue? Potential to make a recommendation to an appropriate body on campus such as a GFC sub-committee—tabled until April meeting.

5. **Second Item – Update on COSA Review**

Katherine provided brief review of Report of the Ad Hoc Committee on Academic Governance Including Delegated Authority (April 2017)—report made recommendations for revitalizing COSA but indicated that further review was required. Working group has been struck to review purpose of COSA, including its relationship to GFC. Introduced Tammy Hopper, Vice-Provost, Programs and Prof. in Rehabilitation Medicine, who is chairing review committee.

Open discussion on past problems with COSA, whether there is value in COSA revitalization, and what factors should be reviewed:

- Committee structure and membership of the committee (need for broad student representation, GFC appointed students, at least 50% students, etc.)
- UofA has largest student representation in governance system, but are there still gaps in student consultation within governance process?
- Overlap with Dean’s Advisory Committee, International Students’ Advisory Committee, Registrar’s Advisory Committee, Residence Advisory Committee
  - Comment that COSA should serve a different function than these committees
Indecision among ad hoc Committee re whether COSA should focus on academic and/or non-academic student issues

Further conversations on ways of improving meetings and engaging members of the group

There will be further opportunities to provide feedback to the working group—in the meantime, please feel free to contact Tammy Hopper at tammy.hopper@ualberta.ca with any feedback you would like to share.

6. Third Item – Update on New Student Orientation (15 minutes)

*Katie Allan (Manager, Student Services, Students’ Union)*

Katie provided update on SU’s consultation process to decide on date for SU’s New Student Orientation Program for 2018. Programming will be held on both Friday, August 31st and Monday, September 3 (Labour Day).

Other Orientation programs (UAI’s Transitions, ASSC’s Bridges, GSA’s Grad Student Orientation, Residence Life’s Basecamp and Eastern Ascent, and Faculty Sessions) have been coordinated so that they don’t conflict and put students in the position of choosing between programs.

Update on Orientation Network activities—the Network involves all campus orientation stakeholders. Collaborating to develop joint registration system for all orientation programs, coordinated communications, and longer-term goals like online orientation programming.

7. Other Business

Chaman asked if there is an update on the Gender Neutral or All Gender Change room renovations? Part of funding secured for the project. The University and other stakeholders (SU and GSA) are continuing to work on securing remaining funding. Small working group recruited from COSA at December meeting will be contacted by Architect’s Office as soon as design process begins.

Is there a University policy re gender neutral/all gender washrooms in new buildings? Probably not a policy, but it is happening in practice. The University has approximately 50 gender neutral washrooms on campus. Accessibility, whether related to gender, or other accessibility issues, is something that factors into building design.

*Action Item:* Katherine will contact Facilities and Operations to inquire re building policies and practices.

8. Adjournment
1. **Welcome and Introductions**

Members all introduced themselves.

**Members present:** Katherine Zwicker, Norma Rodenburg, Michelle Kim, Crystal Snyder, Chaman Preet Singh, Rita Neyer, Ilya Ushakov, Katie Allan, Ryley MacDonald, Carlota Minero Marquez, Masoud Khademi, Karen Pirie

**Designate:** Jessica Ndagije for Adam Brown and Emily for Pranamika Dutta

**Regrets:** Angie Mandeville, Adam Brown, Pranamika Dutta, Sylvia Brown, Marina Banister, Maryse Ndilu Kiese, Connor Hastey-Pallindat, Kristin LaGrange, Alex Ho

**Guests:** Tammy Hopper, Vice-Provost, Programs and Prof. in Rehabilitation Medicine
Andrea Patrick, Governance

2. **Approval of the Agenda**

Accepted as circulated

3. **Approval of Previous Minutes (February 6th, 2018)**

No changes

4. **First Item – COSA Review Update & Consultation (20 minutes)**

*Tammy Hopper, Vice-Provost, Programs and Prof. in Rehabilitation Medicine*

Tammy provided updates from the working group on the future role of COSA and committee structure—COSA is not a GFC Standing Committee and is structured differently.

Recommendations from the working group include:
- Establish clear role of COSA in relation to GFC and revise COSA Terms of Reference as necessary.
- Not recommending COSA be disbanded, however, it is up to GFC on whether to keep or disband group.

Open discussion on restructure of COSA—would likely have different composition (membership) with a majority of voting members from GFC

Concerns raised that if voting members of COSA have to be GFC members, diverse student voices would not be well represented on COSA (e.g. Representatives for Residence, International Student Advisory Committee, student groups/Greek Life)
Andrea stated GFC consists of diverse representation with a total of 53 student reps. 
Q. How are students elected? A. Ex-Officio or elected by Faculty
Q. How well are those students interconnected? A. GFC caucus of student representatives exists.
Tammy will take feedback to working group that COSA values cross-appointed members and commitment to diversity.

Further discussion around mandate of committee being more structured as an opportunity for student consultation with COSA having authority to recommend.
Q. Does authority to recommend provide any real power? A. would provide much more authority than currently. Some GFC Standing Committees have authority to recommend and are still important part of governance process.
Tammy stated that if COSA becomes a standing committee of GFC the commitment on the part of COSA members will change—meet more frequently (monthly), more preparation and reading (amount of meeting materials varies - can be lengthy - min of 10 pgs.) Governance would provide support—orientation provided throughout the year, executive summaries to GFC and official minutes of meeting.
If GFC delegates authority to COSA, scope of committee may be circumscribed to align with GFC mandate.
Members of COSA encouraged to contact Tammy Hopper at tammy.hopper@ualberta.ca with additional feedback.

5. **Second Item – Dean of Students Portfolio Student Services Consultation (30 minutes)**

Katherine provided background on the student services survey, explaining nature of services, as Helen and Rob were not present.
DoS is looking for feedback from students on the range of services offered by the DoS portfolio.
Members of COSA were asked to complete the survey by indicating whether the services areas are essential versus nice to have, as well as provide comments and allocate a $100 budget across the service areas.
Ilya raised concern that this assessment is linked to budget cuts and will be used to justify cutting services.
Katherine clarified that this assessment was conceived well in advance of announcements re budget cuts and is just meant to provide members of the community an opportunity to provide their opinion. Users of services often have the opportunity to provide feedback on the services they use but it’s harder to get feedback from individuals who do not use a service.
It was agreed the conversation is valuable and opportunity for feedback on services and programs.

6. **Third Item – Follow-up on longhand writing in exam booklets for midterms and exams (30 minutes)**

Potential item to be brought forward to GFC standing committee.

Norma informed the group she had no data to share from her inquiry into whether other schools handle issue re: handwritten vs. computerized assessment. She received only one response. Opportunity to follow-up with colleagues at conference in June.

Katherine reached out to Governance Office to inquire re recommending to Committee on the Learning Environment.
Norma is a member of the CLE and agreed issue could be explored. The next meeting is scheduled for May. There was discussion on whether or not the template (Governance Executive Summary) be
prepared based on COSA’s February discussion of the issue or hold off until next fall with more consultation from COSA members. To ensure proper execution of the proposal, it was agreed there would be value in waiting till the fall with further consultation from multiple key stakeholders. Going forward Katherine will continue conversations with the Governance Office and Chair of CLE and work on the proposal over the summer and circulate to current COSA members for feedback.

Members raised questions to consider:
Who has the authority to decide if exams are written in a particular format? Decentralized?
What can we learn from high schools?
Is there research on outcomes tied to handwriting versus typing?

7. **Other Business**
   None

8. **Adjournment**
   Meeting adjourned 4:30PM
1. **Welcome**

   **Members present:** Marcus Kant, Rita Neyer, Osman Hojanepesov, Sympa Cesar (delegate for Kaylin Lynett), Katie Allan, Janice Johnson, Jane Lee, Amlan Bose, Akanksha Bhatnagar, Zhihong Pan, Selen Erkut

   **Regrets:** Angie Mandeville, Kristin LaGrange, Jennae Matzner, Pranamika Dutta, Nicole Inglis, Andre Bourgeois

   Welcome and introductions.

   Members all introduced themselves.

2. **Approval of the Agenda**

   Amlan, Zhihong

3. **Approval of Previous Minutes**

   Rita, Amlan

4. **First Agenda Item – Overview of Report of the Ad Hoc Committee on Academic Governance Including Delegated Authority and update on working group reviewing the future of COSA**

   April 2017 report made recommendations for revitalizing COSA but indicated that further review was required. Working group was struck to review purpose of COSA, including its relationship to GFC. Tammy Hopper, Vice-Provost, Programs and Prof. in Rehabilitation Medicine, who is chairing review committee visited COSA twice last year to consult with the members on issues such as:

   - Committee structure and membership of the committee (need for broad student representation, GFC appointed students, at least 50% students, etc.)
   - Overlap with Advisory Committees: Dean’s Advisory Committee, International Students’ Advisory Committee, Registrar’s Advisory Committee, Residence Advisory Committee
   - whether COSA should focus on academic and/or non-academic student issues
Further conversations on ways of improving meetings and engaging members of the group

- Working Group hopes to make recommendations regarding the future of COSA to GFC later this fall. Will provide updates.

- Akanksha reported that one of proposed recommendations is that COSA members who are elected members from GFC will be voting members whereas COSA members who are not elected members of GFC would be ex officio (non-voting). *Recommendations for a revised COSA Terms of Reference is scheduled to be presented at next GFC meeting, October 22. See GFCExecSummary_DraftCOSAToR document.

5. Second Agenda Item – Recommendation to the Committee on the Learning Environment re long-form handwritten assessment practices (see Governance Executive Summary distributed with agenda)

- Issue raised at February COSA meeting by Sylvia Brown, Professor in English and GFC-appointed faculty members. Raised concern that students’ handwriting competencies have declined as the use of computers and word/processing has increased, but COSA members were unsure as to whether the practice of handwritten exams (especially in disciplines with long-form writing, i.e. essays) is a significant problem on campus. Members recommended an environmental scan of assessment practices be conducted on campus.

- Revisited Issue in April COSA meeting. Discussed potential for making recommendation to Committee on the Learning Environment (CLE), a sub-committee of General Faculties Council (GFC) to investigate the issue. COSA members were in favour of making recommendation for further investigation.

- Governance Executive Summary template distributed with Agenda is a draft of the recommendation that would be presented at CLE. Opportunity for this year’s COSA members to ask questions or raise concerns regarding this recommendation to CLE.

- General discussion included questions on:
  - The Learning Assessment Centre (LAC) based in the Faculty of Education and now managed by IST (computer testing facility), and preference between writing computerized exams in the LAC or on personal laptops in classrooms.
  - Is there or would there be financial support for smaller Faculties wanting to use LAC?
  - If digital tools were used such as automated marking software, what would be the impact on TAs?
  - What will happen with this recommendation, i.e. what is the governance process for considering changes/making decisions?

- Clarification that by making a recommendation to CLE to investigate assessment practices and the use of paper or computerized formats, COSA is NOT making a recommendation to move towards digital assessment. Simply recommending further study so the university can make informed decisions in the future.

6. Other Business

None.
7. **Adjournment**
   Adjourned at 4pm
The slow handwriting of undergraduate students constrains overall performance in exam essays

Vincent Connelly, Julie E. Dockrell & Jo Barnett

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Undergraduates producing handwritten essays in university exams need to transcribe information onto the page in a rapid and efficient manner under considerable time pressure. In fact, capacity models of the writing process predict that the more automated students can make the transcription process then the more resources will be available for higher order writing processes. This study examined the impact of low level handwriting processes on undergraduate writing in pressurised and unpressurised tasks. Students completed a measure of handwriting fluency and provided samples of writing from exam conditions and a formative class essay. The results indicated that, compared to a class essay, exam writing was constrained by the low level writing skill of handwriting fluency. Surprisingly, it was found that the undergraduates were very slow writers whose writing speed was equivalent to published fluency data on 11-year-old schoolchildren. The relationships between handwriting fluency and writing quality were also very similar to those of published data on 11-year-old children, with handwriting fluency accounting for large amounts of the variance in writing quality and tutor marks for exam answers. The results of the current study indicate that lower level processes constrain the higher level performance of undergraduate students to a significant extent. This limitation needs to be considered when undergraduate exams are designed and inferences drawn from exam performance.

The majority of current university exam procedures require undergraduates to produce written text under pressurised exam conditions. Little consideration has been paid to the ways in which low level transcription skills might impact on exam performance at this level. The current study aimed to examine these issues by considering the relationship between handwriting fluency and exam performance in a cohort of UK second year undergraduate students.

Writing is a complex and difficult form of language production. Most language
production models contain three main processing components (Bourdin, Fayol, & Darciaux, 1996): a conceptual planning component that generates and selects ideas; a linguistic planning component that maps ideas to an appropriate linguistic structure; and an articulation component that executes the plan either phonetically (oral production) or graphemically (written production). These components all draw on the same limited amount of cognitive resources. An increase in the amount demanded by one component will mean fewer cognitive resources are available for the other components. An important prerequisite to articulating complex and coherent written texts is producing legible and fluent handwriting.

Evidence shows that the fluency of handwriting can predict composition quality well into the teenage years. The amount of variance in composition quality accounted for by handwriting fluency declines from 66% at early primary level to 16% at middle secondary level (Berninger, 1999). This decrease in the variance accounted for by handwriting suggests that as mechanical low level skills become fluent they may have less impact on cognitive load. This is supported by data indicating that children from age 11 onwards, and adults, are better able to produce written texts when writing them than when dictating them (Bereiter & Scardamalia, 1987). Handwriting fluency, it is argued, is no longer constraining writing performance. This argument has not gone unchallenged. Graham (1990) and Berninger (1999) have both argued that handwriting will always have some impact on cognitive load. When adults are forced to write in an unfamiliar way, thus increasing the memory load of the transcription process, performance on higher level components drops (Bourdin & Fayol, 1994). Placing extra demands on the apparently fluent output skill affects performance. Equally there is evidence that placing demands on the higher order cognitive processes can affect performance in writing tasks in both adults and children (Olive & Kellog, 2002). Thus the nature of the task (high/low cognitive demand) and handwriting fluency will interact.

The extent to which current undergraduate students should be conceived of as experienced and fluent handwriters needs to be established. Data collected from school children may not provide valid normative comparisons. Schoolchildren handwrite every day, often for considerable periods of time, in their varied school lessons. In an age when undergraduate use of word processors for coursework is increasing and exam assessment slowly but surely decreasing (Glasner, 1999), handwriting practice at university level may be much less than in school and possibly less than in previous university cohorts. Yet there is a direct link between the amount of handwriting practice carried out by individuals and handwriting fluency (Graham, 1992; Jones & Christensen, 1999). This may pose a problem for current undergraduate cohorts when it comes to handwriting exam essays.

In this paper we shall compare the relationship between handwriting fluency and undergraduate writing quality in two writing tasks. The first task was a formative essay done under timed conditions. According to the literature there should be little relationship between this standard writing task and handwriting fluency as the undergraduates should be able to compose and handwrite concurrently. The second task was an essay taken as part of a course examination under the same timed
conditions. Exams have been noted to impose additional cognitive load due to the burden of stress on the participants (Everson, Smodlaka, & Tobias, 1994). Therefore it is more likely, given the more limited cognitive resources available to students in stressful exam situations, that handwriting fluency may show a stronger relationship with performance.

This paper will investigate whether there is a significant relationship between handwriting fluency and writing quality in undergraduate exam performance compared to non-exam performance. It is predicted that the cognitive demands of a formal exam will be high and students’ performance in these contexts will be influenced by their handwriting fluency. In contrast, where such pressure is not evident and sufficient time is available for both planning and transcription, then fluency in handwriting should not impact on performance.

Method

Participants

The participants were 22 psychology undergraduate students at South Bank University in London. They were aged between 19 and 35 and were in the second year of a psychology degree. The participants were all social science students in a psychology single honours program primarily with a science background.

Handwriting Fluency Measure

Berninger, Mizokawa, and Bragg (1991) developed a simple measure of handwriting fluency that involves the participant writing out the letters of the alphabet, in lower case, in order, as quickly as they can, in one minute. Letters are only counted towards a total amount of letters per minute if the letters are in the correct order and legible. A letter is classed as legible if, in the marker’s opinion, it would have been recognisable alone on the page, without cues from other letters to help identify it. This task has been shown to have a very high inter-rater reliability ($r = 0.97$; Berninger et al., 1997). The task has also been used and cited in many large scale handwriting studies on handwriting fluency (see Berninger, 1999 for a review) and has psychometric information available on test development and links to other writing skills.

Writing Measures

Unpressurised writing task. This measure was a formative class test given to the second year undergraduate developmental psychology class. A short pre-seen essay task was completed in a one hour timed session using pen and paper.
Pressurised writing task: actual timed exam. This measure was a pre-seen essay question answered in an exam with a recommended one-hour answer time using pen and paper. The exam was the second year developmental psychology exam and contributed a substantial proportion of the students’ overall module marks that ultimately contributed to their final degree marks. The students had a choice of six questions.

Procedure

Second year developmental psychology students were asked to participate in a study designed to improve written language performance. Permission to access the essays was given when the students signed up for the study. As part of the regular tutorial time students completed the handwriting fluency measure (Berninger et al., 1991). The participants were told that if they reached the end of the alphabet before the time was up then they were to continue by writing out another alphabet until they were told to stop.

The unpressurised essay was completed in a seminar as a practice formative piece of work where tutors would provide feedback. All the participants completed the task in the required time span. The pressurised essay was their final end of module exam answer. The essays produced in both writing tasks were marked as part of the normal course workload and marks were assigned to the essays by the course tutors who were blind to the students’ involvement in the research project.

Coding. Word counts were made for each essay and for the introduction, main body, and conclusion sections. These sections were identified following criteria specified by Westby and Clauser (1999). In addition to this, we analysed the essays for structure using a rubric (Connelly, Dockrell, & Barnett, 2004). A rubric is a common method used to assess children’s writing and can be adapted to assess all levels of writing. It uses a set of rules or benchmarks to judge different levels of performance. The student’s writing is assessed by its conformity to the benchmarks, in terms of a score or percentage measure of conformity. It is a measure of the structure and quality of the text produced by the students.

The rubric used in the current study consisted of 24 questions in four sections—introduction, overall body, within topics, and conclusion. The rubric assessed each student’s skill at sectioning the essay clearly, ordering ideas, linking ideas, showing sufficient support and expansion of ideas, and showing a sufficient sense of audience. The rubric displayed good internal reliability ($\alpha = .91$). The item discrimination was high and it also showed good concurrent validity ($r = .79$ with the TOWL-3 standardised measure of writing; Hammill & Larsen, 1996). The TOWL-3 was used as it is a well researched and reliable standardised measure of writing that has good psychometric properties.

The handwriting measure was double marked by a second investigator. There was 100% agreement in the scoring between the first and second investigators.
Results

The students showed a mean rate of 76.5 letters per minute ($SD = 10.7$) for the handwriting fluency measure. The range of letters per minute produced varied from 50 to 95 letters. According to handwriting fluency norms produced by Graham, Berninger, Weintraub, and Schafer (1998) the mean number of letters per minute produced by our undergraduates was equivalent to 11-year-old children (fifth graders’ mean score of 72.74 letters per minute). Therefore, it would appear that the undergraduates in the sample are demonstrating very slow handwriting and are performing at about the 11–12-year-old level.

Measures of Writing

There were three sources of information about the participant’s handwritten essay skills: tutor mark, word count, and rubric assessment scores. The results of these assessments are presented in Table 1. The students were scoring at the midrange of the upper second-class degree category for the exam essay question, indicating that this is a typical midrange sample of UK university students. The amount of words produced in the unpressurised essay was equivalent to about 13 words per minute. Assuming an average of five letters per word this equates to about 69 letters per minute and fits in with the data from the handwriting fluency measure. However, the pressurised exam essay has an average of 19 words per minute, equating to about 95 letters per minute. This calculation is correct if the students are only spending the recommended one hour on this task. Many of the students after the exam commented to the investigators that they took longer on the exam essay than the recommended one hour period.

The participants’ handwriting fluency results were correlated with essay mark, word count, and rubric assessment scores. The correlations are reproduced in Table 1. It can be seen that the handwriting fluency measure was not associated with performance in the unpressurised class test essay. This is the typical finding associated with the adult writing literature measured in experimental tasks (Bereiter & Scardamalia, 1987). However, there were large and significant correlations with the exam essay measures—30% of the variance was accounted for by a regression of handwriting fluency on tutor mark $[F(1,20) = 8.1, p < .05]$. There were also significant correlations of handwriting fluency with the number of words produced in the exam essay (although this correlation became non-significant after a Bonferroni correction had been applied to the significance level). This may be expected given the time pressure the students are under. It is instructive to see that it is not the length of the introduction that correlates with handwriting fluency; the correlations are more with the body of the essay and particularly the conclusion section. The faster writers are those who have been able to produce a conclusion.

There were also significant correlations with the rubric score. The overall score correlates significantly with handwriting fluency. Handwriting fluency accounted for
Table 1. Correlations of writing measures with handwriting fluency and mean scores of writing measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Correlation with handwriting fluency</th>
<th>Mean score</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwriting fluency</td>
<td>77.5 letters</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Unpressurised class test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutor mark</td>
<td>-0.116</td>
<td>59.3%</td>
<td>9.1</td>
</tr>
<tr>
<td>Overall essay word length</td>
<td>0.136</td>
<td>830.8</td>
<td>252.4</td>
</tr>
<tr>
<td>Rubric overall score</td>
<td>-0.005</td>
<td>59.2%</td>
<td>16.7</td>
</tr>
<tr>
<td>Introduction word length</td>
<td>0.161</td>
<td>108.7</td>
<td>182.4</td>
</tr>
<tr>
<td>Body word length</td>
<td>0.175</td>
<td>712.6</td>
<td>267.6</td>
</tr>
<tr>
<td>Conclusion word length</td>
<td>-0.225</td>
<td>46.2</td>
<td>37.2</td>
</tr>
<tr>
<td>Rubric intro score</td>
<td>0.025</td>
<td>39.1%</td>
<td>25.5</td>
</tr>
<tr>
<td>Rubric body score</td>
<td>0.077</td>
<td>64.8%</td>
<td>20.8</td>
</tr>
<tr>
<td>Rubric within topics score</td>
<td>0.065</td>
<td>61.8%</td>
<td>17.1</td>
</tr>
<tr>
<td>Rubric conclusions score</td>
<td>-0.322</td>
<td>46.9%</td>
<td>32.1</td>
</tr>
<tr>
<td>Pressurised exam essay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutor mark</td>
<td>0.545*</td>
<td>66.6%</td>
<td>5.8</td>
</tr>
<tr>
<td>Overall essay word length</td>
<td>0.432* (1)</td>
<td>1154.6</td>
<td>372.7</td>
</tr>
<tr>
<td>Rubric overall score</td>
<td>0.671**</td>
<td>70.6%</td>
<td>14.1</td>
</tr>
<tr>
<td>Introduction word length</td>
<td>-0.068</td>
<td>107.0</td>
<td>182.4</td>
</tr>
<tr>
<td>Body word length</td>
<td>0.347</td>
<td>1011.1</td>
<td>343.1</td>
</tr>
<tr>
<td>Conclusion word length</td>
<td>0.609**</td>
<td>73.6</td>
<td>40.9</td>
</tr>
<tr>
<td>Rubric intro score</td>
<td>0.382</td>
<td>44.4%</td>
<td>31.0</td>
</tr>
<tr>
<td>Rubric body score</td>
<td>0.639**</td>
<td>78.5%</td>
<td>16.6</td>
</tr>
<tr>
<td>Rubric within topics score</td>
<td>0.646**</td>
<td>71.7%</td>
<td>14.6</td>
</tr>
<tr>
<td>Rubric conclusions score</td>
<td>0.370</td>
<td>69.4%</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Note. * p < .05; ** p < .01; (1) This particular correlation became non-significant after a Bonferroni correction was applied to the results; all other correlations remained significant after the correction was applied.

40% of the variance in the overall rubric score \(F(1,20) = 15.6, p < .01\), indicating the impact of handwriting on the structure and quality of the text produced by the students. The rubric questions rating the body section of the essay and how the essay is structured within topics also correlated significantly with handwriting fluency, indicating that the quality and linkage shown within topics and in the body of the text were of a higher quality when the student had more resources available to think of and produce them. The slower the writer, the less concurrent planning and editing can take place to ensure the body section of the essay is of a high standard.

The introduction section and the conclusion section marks on the rubric do not correlate significantly with handwriting fluency. This mirrors the results for word length in terms of the introduction section but does not for the conclusion section. However, the conclusion section’s lower correlation may be due to one prominent outlier in the conclusion rubric scores. One individual scored zero for the conclusion section but is a reasonably fast writer in terms of the group (80 letters per minute).
Once this individual is removed from the calculation then the correlation reaches 0.49 and is highly significant ($p < .01$). There are no similar outliers for the introduction scores.

**Discussion**

This study aimed to consider the ways in which handwriting fluency impacted on the written performance of undergraduate students. Surprisingly it was found that the current participants’ handwriting fluency was equivalent to those of young people entering secondary education. Performance on this task cannot be interpreted as a ceiling effect, as in published studies with schoolchildren fluency rates rose to over 100 letters a minute for eighth graders (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997).

The current study indicated that this slow speed of handwriting had no effect on performance in an unpressurised situation. However, students’ fluency in writing accounted for a significant proportion of the variance in their final mark for the pressurised exam task. Fluency was not correlated with the exam essay introduction, suggesting that students had sufficient time to produce these, but a significant relationship was evident with the conclusion. The conclusion is one of the fundamental parts of the essay and provides the students with the opportunity to synthesise their response in the exam essay. Students who do not have time to write a conclusion are at an obvious disadvantage. Similar relationships were evident with the planning and organisation measures. For these students, writing fluency is impacting on a range of the critical dimensions of persuasive essay performance.

The students’ handwriting in the current study was not so slow as to prevent the simultaneous activation of handwriting and composition. The lack of any significant correlations between the non-assessed class test essay and handwriting fluency would tend to support this. However, when students were faced with a real life test situation where success was important, then handwriting fluency became an important factor. Exam stress, which has been hypothesised to impair cognitive capacity (Kanfer & Ackerman, 1996), makes fewer cognitive resources available to the higher order processes needed for composition. A capacity theory of writing implies that any activity that can be automatised frees up more working memory resources for other activities. More working memory resource will positively influence the quality of the writing. However, if the student is a slow writer then they will have fewer working memory resources to give to higher order processes such as planning and editing. We have seen that these students were not fully automatised writers as they were writing at the fluency rate of 11-year-old children. Therefore, the writing produced by the undergraduates in this sample may be of an inferior quality, despite their knowledge of the topic being examined, due to the added burden of being slow writers.

Berninger (1999) has demonstrated that handwriting fluency accounted for 41% in the variance of compositional quality in fourth to sixth graders in the United States. Given that our sample were performing at the speed of sixth graders and that
handwriting fluency accounted for 42% of the variance in compositional quality, as measured by the rubric, then we can see that the current results mirror those of Berninger (1999). Since the undergraduates were producing handwriting at the speed of 11-year-old children then the same constraints that handwriting fluency imposes on 11-year-olds writing quality were also imposed on the undergraduates.

The results we found are correlational in nature and do not provide any indication of causation, but they do give scope for further research that is of educational interest. There are a number of other limitations to this small study. First of all, it would be useful to repeat the study with another measure of handwriting fluency, given the surprisingly slow speed of the students. It would also be useful to include measures that tapped into the motivational and anxiety issues surrounding the exam essay. This was not possible in this study but gives scope for future research. Our results, however, do fit in with published work on children with equivalent writing fluency rates that show that it is only when cognitive load is high that handwriting fluency becomes an important predictor of writing quality. This does not bode well for handwritten exams, where it is presumed that the quality of knowledge produced reflects the learning of the student, not simply how fluently they can write.

Acknowledgement

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Typing compared with handwriting for essay examinations at university: letting the students choose

Nora Mogey, Jessie Paterson, John Burk & Michael Purcell

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Typing compared with handwriting for essay examinations at university: letting the students choose

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Students at the University of Edinburgh do almost all their work on computers, but at the end of the semester they are examined by handwritten essays. Intuitively it would be appealing to allow students the choice of handwriting or typing, but this raises a concern that perhaps this might not be ‘fair’ – that the choice a student makes, to write or to type, will affect their mark. The aim of this study was to identify and explore any systematic differences that may be introduced due to offering students the choice to write or type essay examinations. A class of 70 first-year divinity students were given the option of taking a mock examination, and the further option of handwriting or typing their answer. All the examination scripts were then faithfully transcribed into the opposite format so there was a printed copy and a handwritten copy of every script. These were then marked by four markers, such that every marker marked every script exactly once, in one format or the other. No significant differences could be identified due to the format in which the students had written their answer. Factors explored included length of essay, overall score awarded, and some qualitative measures designed to indicate essay quality. In contrast, the variation between the markers was striking.

Keywords: essay; examination; laptop; type; choice

Introduction

I depend on a keyboard to write, and frankly that collection of ill-arranged keys has become an extension of my fingers into which I pour my thoughts. In addition, I depend heavily on spelling and somewhat on grammar checkers to fix my mistakes automatically, so I rarely slow down to correct the small errors. Moreover, I depend on the cut-and-paste facility to make up for my predilection to afterthoughts. Like most folks, I rarely write a paper from beginning to end; rather, I usually start with the ‘results’ and work backwards and forwards as the Muse inspires me. (Penny 2003)

For some years, staff at the University of Edinburgh have expressed concern that students do almost all their work on computers, but at the end of the semester they are examined by handwritten essays. Discussion with the students’ association has been met with a supportive but slightly anxious reaction – it is an interesting idea to explore but is it really fundamentally fair? Equally college and school examination boards have been reluctant to take the decision to move to typed examinations until they are confident that this will not result in a rush of student appeals.

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This research initially aimed to answer some of the questions frequently cited as barriers to offering students the opportunity to type their responses to essay examinations. Questions such as: ‘Is the mark awarded to an examination script influenced by the format of the script (typed or handwritten) rather than its content?’ and ‘Are students who type slowly any more or any less disadvantaged than students who handwrite slowly?’ Data about students reactions and preconceptions to the idea of essay examinations on computer and some initial results from this study have been presented previously (Mogey et al. 2008a, 2008b, 2008c).

This paper completes and expands those results, particularly with respect to variation between markers and variation between questions.

Setting the scene

The idea of using computers to allow students to type responses to essay-style questions is not new (Howell 2003). US law schools routinely run high-stakes essay examinations on student-owned laptops (e.g. New York University, Supreme Court of Missouri, Kentucky Office of Bar Admissions), and the software has proved to be stable and reliable (personal email). Despite this, very few relevant studies have been identified that provide empirical evidence relating to university students under examination conditions. In one of the few higher education examination studies, Augustine-Adams, Hendrix, and Rasband (2001) concluded that, on average, a law student typing an examination could expect to perform slightly better than their colleague who handwrites.

The process of composing an essay using a keyboard is different to using pen and paper. When writing by hand, planning what is to be written is a critical and important element, but use of a word processor makes editing text easy and therefore means the author can afford to spend less time in planning their work. In other sectors there is substantial evidence that students who have written their (non-examination) essays using a computer write to a better standard (MacCann, Eastment, and Pickering 2002; Russell and Plati 2001; Goldberg, Russell, and Cook 2003; Hartley and Tynjala 2001). Several studies have demonstrated both that text composed using a word processor is subject to more revisions than text composed on paper and that students typically type more than they handwrite (Russell and Haney 1997; Russell and Plati 2001; Wolfe et al. 1996; Lee 2002). However, Burke and Cizek (2006) found the opposite and demonstrated that, irrespective of information technology (IT) skills or confidence, sixth graders produced better essays by hand than they did using a word processor.

Overall familiarity with technology also seems to play a role in student performance. Horkay et al. (2006), studying school pupils, found that hands-on IT experience was significantly related to online writing assessment performance – computer familiarity added about 10% to the score achieved. Russell and Haney (1997) demonstrated that where (school) students were accustomed to writing on a computer their responses in tests were much better when they were allowed to type their answers – only 30% of students passed when handwriting, as opposed to 67% when they used a keyboard.

Care should be taken before extrapolating too far from a non-examination context into the stressful high-stakes summative examination setting. Thomas, Paine, and Price (2003), studying Open University computer science students, demonstrated that typically each student submitted 30% less material in the mock examination than they eventually submitted in the final examination. However it is worth noting that
although a student typing can usually write more words, examination essays can sometimes be too long – slightly shorter essays score more highly than very long essays (Whithaus, Harrison, and Midyette 2008).

A further source of variability is the recorded behaviour of markers. Several studies have demonstrated that a type-written essay will be marked more harshly than an identical handwritten text, although the difference in scores is not always large (Russell and Tao 2004a; MacCann, Eastment, and Pickering 2002; Bridgeman and Cooper 1998). The reason for the difference is not known for certain but seems likely to be associated with an expectation that handwritten work is essentially a first draft whereas typed text would normally have been more thoroughly revised.

**Background and preparation**

A very simple tool that was less likely to confound the mark for the academic content of the examination with a measure of the student’s skill in using a particular word processor was the preferred option. From the systems identified it was decided to opt for Exam4 (marketed by Extegrity Inc.).

Exam4 was attractive for many reasons in addition to its solid track record. The software includes a range of security measures: on launch it checks the local computer configuration for possible cheat mechanisms, such as running virtual computers; blocks access to all other materials on the hard drive and network; and makes regular backups of work in progress so that, in the unlikely event of a problem, all is not lost and all stored files are encrypted, thus controlling access to completed examinations.

When launching the software the user follows a channelled, stepwise examination start-up procedure, selecting from a series of simple menus or entering basic personal identification details that together configure all the pertinent administrative settings (e.g., saving) without the need for issuing complicated instructions. Students can choose a large or a small screen font, and whether to have a clock and/or a warning notice when time is running out. Once the examination start-up sequence has been completed, the student clicks a button to begin the examination itself. The software ‘locks the computer down’ so the student is unable to access the Internet, the hard disk or read information from an accessory device such as a USB stick or CD-ROM.

An examination can be administered in different ways using Exam4. It was our intention to minimise the changes from existing practice, so a physical (paper) question paper was still created, secured in staff offices until needed and distributed by hand in the examination venue. Students only use the computer to type their answers, and at the end of the examination these are retained in encrypted format on their hard drives as well as transmitted to a specific nominated computer that can be located essentially anywhere. A separate administrative tool is then used to print all of the examination files in a single batch. Printed scripts are distributed to staff for marking in the traditional manner. Thus the only part of the examination process that changes significantly is that students no longer handwrite their answers.

Three different pilot studies (Mogey and Sarab 2006) had established that although no students experienced difficulty in using the software, there was a general uncertainty (in the minds of both staff and students) about whether this was really fair and equivalent to a handwritten examination. There has been a great deal of caution on the part of examination boards and boards of studies when they have been asked to support the use of laptops for essay examinations.
The main concern expressed by students has been about typing ability and whether the software would crash, while the biggest perceived advantage is the ability to edit text: “it is easy to skip back and forward, rereading and changing areas as new ideas spring to mind. This is a vast improvement. In addition towards the end, handwriting does not deteriorate”. The notion that the whole cognitive process of writing on a computer differs significantly from the process of handwriting an essay has not been raised by the students themselves.

The pilot studies also provided responses to the direct question ‘Are essay exams a good idea?’ About one-third of students responded with broadly negative comments, and about two-thirds with broadly positive comments.

Positive comments included the following:

Yes, as the world is becoming more and more computerised, we must embrace this in all parts of academic life.

Yes, because the nature of exams are changing and revision styles are changing because of computers.

Yes. People are using computers more in the workplace, so it would be beneficial.

Negative comments included:

No, because it would put people on different starting points (e.g., touch typing) Also exam conditions are different, we have always done exams on paper.

No. Computers can crash & break down. This would not be good if we had a time limit. They are not efficient and safe compared to pen and paper.

No. I would write less; it would interrupt my thought process.

This study was designed to provide examination boards, boards of studies, teaching teams and students with some evidence on which to base their judgements about whether using laptop computers for essay examinations should be considered. Of particular interest was whether the use of computers could be offered as a choice – was there any fundamental and systematic difference in the score achieved using a computer rather than pen and paper to compose their essay? At the time of setting up the study, the behaviour of markers and marking variation was (unfortunately) not specifically considered, but the data gathered did allow some post-hoc exploration of these effects.

Methodology

Christian Theology 1 is a class of about 70 first-year students. The students were invited to sit a ‘mock’ examination during timetabled class time, during Week 11 of a 12-week semester. Previously software had been demonstrated and technical assistance was available (although not needed), laptops were available for loan if required. Students were allowed to sit the examination in the format of their choice: typing using a laptop or handwriting onto paper, or they could decide not to sit the mock examination at all.

The mock examination lasted one hour, and was held in the regular class venue but under examination conditions. Students were allowed sight of the examination
questions one week in advance and had a choice of one question out of three (Q1–Q3). Students using laptops were mostly situated towards the front of the room, and all had access to power sockets. Those students handwriting were seated at the back of the room. All students were provided with scrap paper, which was left in the venue.

At the end of the examination, typed submissions were collected on a USB stick prior to decryption and printing. All originals were marked swiftly in order to provide formative feedback to the students well in advance of the real examination. Meanwhile a professional typist was employed to produce faithful typed scripts from the handwritten originals, replicating any spelling and grammatical errors, and similarly the typed originals were distributed amongst ‘volunteers’ who each created a handwritten version. Thus a typed and a handwritten version of each script was generated, each of which was duplicated and then blind marked.

Four marks were generated from each student script, one from each of four markers. Two of the marks were for typed versions and two for handwritten versions. Each marker graded each student essay exactly once, creating a balanced design. All of the markers were experienced at marking first-year divinity essays. The total number of words written during the mock examination by each student and the number of words in any conclusion paragraph(s) were also recorded.

In addition to producing scores for the scripts, markers were asked to rate the scripts on six qualitative dimensions. This information is normally used in the feedback provided to students, but were used in this study to give an indication of the quality of the script. These dimensions are engagement with the topic; knowledge of the subject matter; demonstration of critical thinking skills and abilities; evidence of wider reading, beyond the core recommended texts and articles; structure and presentation of the essay; references and bibliography. In each case items were recorded, on an ordinal scale, as one of: unsatisfactory; OK; good; very good or excellent.

**Results**

Thirty-seven students chose to sit the mock examination (28 female and nine male). Twenty-four typed scripts and 11 handwritten scripts were collected at the end of the mock (with proportionately more females opting to handwrite than to type) and with two additional handwritten scripts from students who were unable to attend at the scheduled time. The group had a slight bias towards females and towards mature students but represented a reasonable spread of academic ability, based on tutorial marks to that point.

Twelve students chose to do Q1, 15 chose Q2 and 10 chose Q3. There was no difference in question choice made by male or by female students, and the spread of marks achieved suggest all three questions had identical difficulty. Students who elected to answer Q3 and to type scored more highly than the students who elected to answer Q3 but to handwrite. Curiously, 11 of the 12 students who chose Q1 also chose to type their responses, the split was more even for the other questions.

Students who typed in the mock examination generally wrote more words than students who opted to handwrite. Using a two-sample t-test of the null hypothesis (H₀: There is no difference in the mean number of words which will be handwritten or typed) results in \( t = -2.15, p = 0.041 \) (25 degrees of freedom), suggesting that this is statistically significant. However the number of words written was not associated with students’ reported typing speed (see Table 1 and Figure 1).
This may indicate that the amount written in an examination is only partially dependent on the speed of writing/typing – one could speculate perhaps that it depends also on fluency of thought.

Thomas has suggested that the conclusion is critical for giving impression of a well constructed essay (Thomas, Paine, and Price 2003). This study found no evidence of correlation between conclusion length and overall score for the essay \( (r = 0.009) \). There was also no correlation between overall length of essay and number of words in conclusion – actually there was a small negative correlation \( (r = -0.017) \). Typed conclusions were in general slightly longer than handwritten conclusions (mean number of words in conclusion: 43 handwritten, 57 for typed), although these data should be interpreted cautiously given the restricted time available for the mock examination and students lack of examination practice with keyboarding essays.

Generally, where originals were typed then scripts scored more highly than where originals were handwritten scripts. For scripts marked in their original formats: mean score awarded handwritten scripts = 52.79, standard deviation (SD) = 7.13 \( (n = 26) \); and mean score awarded typed scripts = 54.90, SD = 9.0 \( (n = 48) \).

However, when looking at the marks awarded to the all scripts (ignoring their original format), then the handwritten scripts generally score slightly higher. For all scripts (including transcriptions, \( n = 74 \)): mean score awarded handwritten scripts = 55.12, SD = 8.25; and mean score awarded typed scripts = 53.19, SD = 8.53.

This gives weak evidence in support of a format effect. (These are 72 handwritten scripts and 72 otherwise identical scripts but in a typed format.)

Without a format effect the mean scores should be identical, the predicted value would be 54.16. So, in line with the research cited earlier, there is some evidence that the handwritten scripts are being marked up slightly and the typed scripts marked down slightly.

Using a general linear model (see Table 2) to analyse the contribution to variability in scores makes it clear that the variability due to differences between the markers is a far more important effect, and the contribution due to differences in the format of the script is not statistically significant. However it is recognised that the fit of the model is weak and leaves much variability unexplained.

Table 1. Number of words written by students handwriting or typing.

<table>
<thead>
<tr>
<th></th>
<th>( n )</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type faster</td>
<td>6</td>
<td>785.5</td>
<td>238.6</td>
</tr>
<tr>
<td>No difference</td>
<td>9</td>
<td>780.3</td>
<td>295.2</td>
</tr>
<tr>
<td>Handwrite faster</td>
<td>12</td>
<td>802.0</td>
<td>127.0</td>
</tr>
</tbody>
</table>

Figure 1. Individual 95 confidence intervals for means based on pooled standard deviations.
Table 2. Analysis of covariance.

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Seq. SS</th>
<th>Adj. SS</th>
<th>Adj. MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format</td>
<td>1</td>
<td>138.17</td>
<td>107.99</td>
<td>107.99</td>
<td>2.00</td>
<td>0.160</td>
</tr>
<tr>
<td>Marker</td>
<td>3</td>
<td>2550.87</td>
<td>2550.87</td>
<td>850.29</td>
<td>15.72</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>143</td>
<td>7732.38</td>
<td>7732.38</td>
<td>54.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>147</td>
<td>10421.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $S = 7.35341$, $R^2 = 25.80\%$, $R^2(\text{adj.}) = 23.73\%$.

Figure 2. (a) Boxplot of score by marker alone. (b) Variation in scores between markers.
of question, marker, scripts and format, were felt to make a full quantitative analysis questionable. The results presented are only intended to suggest likely trends, based on the evidence available.

The distribution of scores for each of the four markers is shown in Figure 2a. It can be seen that, in general, scores awarded by Marker 1 are more clustered than those awarded by other markers; and that in addition to this central tendency, Marker 1 appears to have been unusually harsh on some candidates (indicated by the lowly scored outliers) and Marker 2, and to a lesser extent Marker 3, make much better use of the full range of possible scores. Comparing the four marks awarded to each individual student by the four graders gives marks for any one student with a minimum range of five and an outlying maximum range of 38 (see Figure 2b).

Further when the four marks for each student are placed in rank order, we see that Marker 1 tends to grade lower than their colleagues, and Markers 3 and 4 tend to grade highly (see Table 3).

Drilling down to examine marking at the individual question level, some differences do start to emerge. Figure 3 suggests Marker 1 has marked Q3 differently to Q1 and Q2 – there is a much greater spread of scores with a roughly symmetrical distribution and no outliers. Similarly Marker 4, whose marks tend to show a positive skew, demonstrates a different scoring pattern for Q2 where the marks show a symmetrical distribution.

Table 3. Marker trends when four marks for each student are placed in rank order.

<table>
<thead>
<tr>
<th>Marker</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
<th>Fourth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>3</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>10</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>14</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 3. Boxplot of score by marker then question.
Figure 3. Boxplot of score.

Reusing the same data but presenting it question by question (Figure 4) suggests that no one question was marked in the same way by all markers.

So is there a difference in how the markers approach typed or handwritten scripts? Figure 5 suggests there may be. For example, Markers 1 and 2 appear to have graded typed scripts systematically lower than handwritten scripts. This may of course be due to chance – these markers may have been given scripts in a typed format that were genuinely poorer essays.

The mean of the four scores awarded by the different markers was taken to achieve a comparable score for each script. For each marker it is then possible to calculate the difference between the mean for any student and the score that marker awarded. This

Figure 4. Boxplot of score by question then marker.

Figure 5. Boxplot of score by marker then format.
is illustrated in Figure 6 and shows that Marker 1 tends to score slightly low and Markers 3 and 4 tend to score high in comparison with their peers. Figure 6 also shows this difference for handwritten and typed scripts, and demonstrates that for all four markers there was a small but consistent tendency for typed scripts to be awarded a lower mark than handwritten scripts.

The raw score for an essay ideally gives an indication of its quality, but it is recognised that there are different characteristics and components that contribute to the overall quality and overall score awarded. In this study, and in line with standard practice in the School of Divinity, all the markers were required to grade each essay on six characteristics, already identified in the Methodology section. In each case, items were recorded, on an ordinal scale, as one of: unsatisfactory; OK; good; very good or excellent. However, so many of the papers failed to score references and bibliography that this characteristic has been omitted from the analysis.

Each marker marked every essay so ideally the comments and grades should have been well aligned. However, large and systematic differences in the opinions of the markers were evident as with the overall scores. Marker 1 did not regard any items as excellent and judged a total of 46 as unsatisfactory, while Marker 4 judged none as unsatisfactory and 20 as excellent (remember all markers were marking the same essays). See Table 4. This reinforces marking trends for the overall score demonstrated in Figure 2a.

<table>
<thead>
<tr>
<th>Marker</th>
<th>Unsatisfactory</th>
<th>OK</th>
<th>Good</th>
<th>Very good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46</td>
<td>80</td>
<td>47</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>38</td>
<td>65</td>
<td>41</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>66</td>
<td>45</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>4</td>
<td>78</td>
<td>61</td>
<td>20</td>
</tr>
</tbody>
</table>
The data were explored further (mapping unsatisfactory as zero, OK as one, etc., up to excellent as four, simply for convenience of analysis).

In the five diagrams in Figure 7 (one for each characteristic), each vertical line represents the range awarded by all four markers for the script of one individual student. The set of vertical lines in one graph represents the variation within the class. Poorly rated students have lines towards the base of each chart, highly rated students have lines towards the top of each chart. Short lines indicate good agreement between markers, long lines indicate variation.

Hence it is clear that there is considerable variation – it is not simply a case of markers differing by a single category, there are many examples of total disagreement with one marker rating an item as excellent while another rates it as unsatisfactory.

Critical skills and wider reading arguably show slightly more consistency than the other items, but they are also the two items that received the overall worst scores. It is possible that the consistency effect is increased due to some markers not wishing to mark first-year students too harshly and risk discouraging them. It is possible that some markers avoided using the unsatisfactory category, thus artificially compressing the data.

Overall the engagement characteristic was marginally the most highly graded factor. There was no evidence of a difference between the questions and, as with overall scores, there was evidence of differences between markers in how they rated these quality characteristics.

However, the main interest for this study is whether there is evidence that handwritten scripts are rated differently on these quality characteristics to typed scripts?

In Figure 8 the data have been grouped according to the original format of that script. No huge differences are indicated, although there is some suggestion that essays which were typed generally showed better subject engagement and handwritten essays were less well structured/presented.

The grades assigned to the factors knowledge, reading and critical skills are all more closely associated with the final score for the essay than the factors engagement and structure. Correlations to final scores and correlations between factors are as follows: engagement, 0.47; knowledge, 0.74; critical skills, 0.72; reading, 0.74; and structure, 0.59 (see Table 5).

**Discussion**

**Limitations of this study**

This study has only considered a single group of students from one discipline area, where essay writing may be approached differently from other subjects. However, it is the format of the examination not the discipline that is the key interest, so this is not considered to be too problematic. It is also noted that the students volunteered to take the mock examination, thus forming a self-selected sample. It is unfortunate that because of the voluntary nature of the study some potentially useful data were not available, and in some cases the numbers in the study are on the low side to permit rigorous statistical analysis.

Further, although this study attempted to simulate some of the stresses experienced in an examination hall, they can never really be replicated in a mock examination. The mock examination was held in normal class time and was therefore necessarily shorter than a full examination would be. Students also had only limited revision time and did not really have the chance to be as prepared as they would normally be for an
Figure 7. Boxplots of (a) engagement, (b) knowledge, (c) critical skills.
examination; this was felt to be of particular concern because these were first-year students, and was compensated for by allowing prior sight of the questions. One student reported: “I did it (used the laptop) for the mock because it didn’t matter”. Clearly revision, confidence and pressure must all have some impact on what and how students write. Similarly, because this was a mock and did not ‘count’, students may have taken it less seriously. One marker said “I suspect students didn’t do a lot of revision for these exams … there wasn’t a lot of evidence of secondary reading. The problems of huge irrelevancies cropped up as they usually do with weekly seminar sheets”. However, since examination boards are quite reasonably reluctant to allow experiments in high-stakes examination situations, it is probably necessary to use mock examinations as this study has done, until staff and students feel properly informed about the implications of using laptops for essay examinations. It is established that students have different understandings of what is expected in an essay in order to achieve a high score (Hounsell 2005) and understanding about what is expected in an examination may be different again. It is also recognised that constructing an essay in an examination is
likely to be a different process to constructing an essay for an assignment, even if provided with identical tools.

Similarly the markers would also have been aware that this study was artificial and so it was less vital that their marking was absolutely accurate. The four tutors in this study were all Divinity PhD students (one completed, one sitting viva, one in the final stages of writing up and one mid-way through). All of them had to juggle marking with the tight deadlines the project demanded for turnaround, and this study asked them to mark more papers than would usually have been the case. This may have contributed to the variability observed. Generally, postgraduate students typically tutor for only two years, and it has been found useful to identify one lead tutor with prior experience of the course. Nevertheless, it is observed that tutors generally tend to mark more severely than the course organiser would.

In conversations with staff and students, typing speed is frequently presented as a major concern and cited as a source of inequity. In line with other research, this study has also demonstrated that students who typed have, in general, written more than students who wrote by hand. However, a further issue here is familiarity with how much you should write for an examination answer and what that looks like in handwritten or typed format “I had no concept of how much I had written, with a hand written exam you aim to write about three sides of A4”. This is as much an issue for markers as for candidates – it is possible that a typed response is perceived by the
marker as being too brief and therefore marked down. It would have been interesting to explore marker perceptions in more detail.

Lessons learned
Clearly students type at different speeds and inevitably this does have an impact on how much they are able to write in an examination. If students are given sufficient warning of any requirement or opportunity to type their examinations they need not be unduly penalised. Poor typists can be supported to learn this skill if desired. Students with special needs will continue to be considered individually so no student needs to be unfairly disadvantaged. Connelly, Dockrell, and Barnett (2005) demonstrated that first-year undergraduates had a handwriting fluency similar to that which would be expected in 11-year-old children. They found most students have little requirement to handwrite and their handwriting fluency is therefore limited. Hence, the assumption that all students are equally able to handwrite examinations is fundamentally flawed.

One student elected to borrow a machine because they were concerned the software would ‘trash’ their machine. Although security and reliability issues have been raised frequently, it is almost always by those with only limited knowledge or experience of the software or the procedures proposed, and can be countered by pointing to successful examples of implementation. We have taken the view that because student laptop ownership is known to be above 90% (from Freshers’ survey data), and because some laptop keyboards feel quite different from others that most students will be most comfortable using their own machine. Power will be provided to all desks so battery life should not be a concern, beyond that students are expected to provide a machine in an exam-worthy state, or to request a loan machine.

Thus we have arguments to counter concerns about the technical reliability of the solution, and concerns about variation in typing speed, but a concern about variation due to marker differences remains and whether markers might consciously or subconsciously influenced by the appearance of a script. Previous studies have shown a small but consistent effect when marking handwritten originals and their typed transcripts (Powers et al. 1994; Russell and Tao 2004a). Russell and Tao (2004b) concluded that computer-printed scripts would score on average 1.3 points less than the same words in a handwritten script. Our study agrees that markers may indeed be influenced by format – and that difference might be worth almost two marks to the average student (55.12 – 53.19 = 1.93). Such variability could of course be removed by ensuring all markers were only given scripts in one format, but the cost of transcribing large numbers of scripts almost certainly render this impractical. Russell and Tao (2004b), however, demonstrated that giving the markers typed scripts printed in cursive font, and alerting the markers to the format effect, both had the effect of reducing the difference in the score; both approaches may be practical to implement. Variation between markers is normally controlled by school and college quality assurance processes; there is no reason why marking of digitally generated scripts should alter established procedures and guarantees of fairness.

The original aim of this study was to explore differences between handwritten and typed answers, not to explore consistency, or lack of it, between markers. However, it has become apparent that the variation between markers was much more significant than the variation between fast and slow writers and typists. There is time here only to acknowledge that variation between markers is of course not a new phenomenon.
Bloxham (2007) presents an interesting summary of current marking practices and research in the area. Even the use of clear assessment criteria combined with careful briefing of markers does not eradicate the variability (Hanlon, Jefferson, and Molan 2005). Brown, Bull, and Pendlebury (1997) argue that the lack of consistency for an individual marker is even more critical than variation between markers because of the difficulty in making fair adjustments when a marker’s standard is not constant.

Standard practice for the School of Divinity is for in-course assessment to be marked by tutors, but moderated by the course manager in order to pick up any severities in marking. Tutors in Divinity go through the normal university training scheme. While tutorial sheets (10 x 2%) are marked by tutors for their own tutorial groups, essays (anonymous) are distributed randomly among all the course tutors. Thus coursework from any one student is unlikely to be marked only by a single tutor. Any disparities of marking tend to be picked up at in-course assessment level; marks are returned regularly to the course manager. From the marking spread, it is possible to identify tutors who may be more severe in marking and those who may be more generous, and where necessary marks may be lowered or raised by the course manager to ensure parity. Where a student may be in danger of failing, then the course manager looks at border-line cases and reviews these, both in the elements of in-course assessment and final examination assessment prior to these being sent to the external examiner.

The University of Edinburgh is a traditional, research-led university. Change is generally easier to implement successfully in a series of small steps. Thus from the outset the object has been only to investigate the possibility of allowing students to type rather than to handwrite essay examinations. At the moment there is no intention to move towards either digital or automatic marking of essays. Perhaps once staff become accustomed to having access to digital scripts it will be a small and logical extension to mark them digitally. This could then offer benefits in terms of marking consistency and speed (Sargeant, Wood, and Anderson 2004) and also offer an opportunity to increase the quality of feedback students receive on their examinations.

In tandem with this study, work has been undertaken to equip a large examination hall with sufficient power and network access to make it suitable as a venue for essay examinations on laptops. Desks will be spaced more widely than in paper-based examinations because experiments suggest that at standard examination desk spacing a laptop screen could possibly be read by an adjacent student. Similarly it has been decided to use a slightly larger desk to allow students space for rough paper (or paper for diagrams) and the question paper. In time, further venues can be adapted in line with demand. Clear examination processes and procedures are being developed and it is hoped to give some specialist training and support to invigilators.

**Some wider implications**

This study has caused the project team to reflect more generally about assessment and assessment strategies. Although aware of the need for aligning teaching, learning and assessment, we recognise that some students are mainly strategic learners focused on passing examinations, whereas others are seeking a deep understanding of their chosen subject. Setting examination questions may need more consideration and direction – for example, in Christian Theology 1: Rather than ‘Discuss the ways in which God reveals himself in history’, there may need to be a further instruction: ‘Your answer should indicate a map of your response, substantive engagement with the question, and
a final concluding paragraph of your own’. We need to teach/learn students how to sit examinations and to clarify how they differ from coursework essays.

There are other assumptions made about assessments that should perhaps be challenged. As the Internet and other digital information sources become more accessible, more mobile and more ubiquitous, is it not appropriate to challenge (in some disciplines) the need to remember facts in preference to the ability to synthesise and present a coherent and convincing argument? Similarly, as students expect more choice and a more personalised learning environment, would it be appropriate to think about how assessment can also be personalised and tailored, both in content and in timing.

Conclusions

The study was designed to explore any systematic differences in mark awarded due to the format in which the examination script was created. Only small differences have been found in the mark awarded to an examination script depending on the format of the script (typed or handwritten) but the difference is not significant and is trivial compared with variation between markers. It has been shown that students are able to type more than they can handwrite, but this was not associated with their reported typing speed. Students who wrote more tended to get slightly more marks, but again this was not associated with reported typing speed. No evidence has been found of systematic differences in essay quality due to the format, and data about how students report approaching a handwritten essay versus a typed essay from this study is inconclusive; differences may or may not exist. What is clear is that many students find the possibility of electing to type their essay examinations attractive, indeed some express surprise that this is not standard practice.

The problem of students routinely doing coursework on computer but being assessed by a written essay can be tackled in two main ways – change the type of assessment being used or make sure that the practice and the final assessment use the same medium. Discussion about the merits or demerits of the essay as an assessment tool and what is a correct balance between coursework and examinations are not likely to be concluded quickly, hence it is considered essential to correct the mismatch between how students write coursework and how students write examinations.

- Choice 1: All students in a class will type their examinations. This is not substantially different from the current position where all students (with the exception of some with special requirements perhaps) are forced to handwritten their responses. It is anticipated that the variation in typing speeds will be greater than the variation in handwriting speeds, but we believe this can be addressed relatively simply by ensuring students have enough pre-warn'ing that their examination will be typed – and by providing opportunities to increase individual typing skills. Essentially it would be feasible to assume that typing proficiency is expected of a modern student, just as fluency in reading is currently assumed, even ‘though student reading speeds vary greatly’.

- Choice 2: Offer students the choice of handwriting or typing their examinations. Boards of studies (who are responsible for quality in courses) have been reluctant to consider this suggestion because it means students are not all doing the
same thing – and because of a risk that the choice to write or to type might unfairly or unknowingly influence the grade achieved. This study has sought to examine those concerns and where possible to offer some answers.

We have demonstrated that the variation due to difference in format is negligible compared with variation due to differences between markers, and we therefore conclude that although there is evidence of a format effect that we can nevertheless justify giving students the choice of whether to type or to handwrite their essay examinations.

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Notes

References


