Contents

E-Mentoring the Online Doctoral Student from the Dissertation Prospectus through Dissertation Completion
Ronald Black .......................................................................................................................................... 1

Impeding Students’ Efforts to Cheat in Online Classes
Paula Hearn Moore, J. Derrick Head, & Richard B. Griffin .............................................................. 9

Dual Enrollment Student Achievement in Various Learning Environments
Bethany Arnold, Hal Knight, & Bethany Flora ................................................................................. 25

Engaging TBR Faculty in Online Research Communities and Emerging Technologies
Jasmine Renner ................................................................................................................................... 33

Incorporating an Honor Code into an Information Assurance Program
Jeffrey A. Livermore ............................................................................................................................. 45

Teaching Environmental Ethics: Moral Considerations and Legislative Action
Richard J. McGowan & Hilary G. Buttrick ....................................................................................... 49

Human Machine Learning Symbiosis
Kenneth R. Walsh, Md Tamjidul Haque, & Kim H. Williams ........................................................... 55

The Risks and Opportunities Associated with Weak Arithmetic Skills of Accounting Students
Stephen Kerr ......................................................................................................................................... 63

The Impact of Process vs. Outcome Feedback on Student Performance and Perceptions
Kathy Paulson Gjerde, Margaret Y. Padgett, & Deborah Skinner .................................................... 73

The Effect of Individual Motivation and Cognitive Ability on Student Performance Outcomes in a Distance Education Environment
James W. Logan, Olof H. Lundberg, Lawrence Roth, & Kenneth R. Walsh ....................................... 83
## Board of Reviewers

<table>
<thead>
<tr>
<th>Reviewer</th>
<th>Country</th>
<th>State/Region</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmadi, Ali</td>
<td>United States</td>
<td>KY</td>
<td>Morehead State University</td>
</tr>
<tr>
<td>Aldous, Moir</td>
<td>United States</td>
<td>WI</td>
<td>University of Wisconsin-Milwaukee</td>
</tr>
<tr>
<td>Alkadi, Ghassan</td>
<td>United States</td>
<td>LA</td>
<td>Southeastern Louisiana University</td>
</tr>
<tr>
<td>Allen, Gerald L.</td>
<td>United States</td>
<td>IL</td>
<td>Southern Illinois Workforce Investment Board</td>
</tr>
<tr>
<td>Allison, Jerry</td>
<td>United States</td>
<td>OK</td>
<td>University of Central Oklahoma</td>
</tr>
<tr>
<td>Alman, Brian</td>
<td>United States</td>
<td>WI</td>
<td>University of Wisconsin-Milwaukee</td>
</tr>
<tr>
<td>Anderson, Paul</td>
<td>United States</td>
<td>CA</td>
<td>Asian Pacific University</td>
</tr>
<tr>
<td>Amori, Ismet</td>
<td>United States</td>
<td>TN</td>
<td>Tennessee Technological University</td>
</tr>
<tr>
<td>Amori, M. Meral</td>
<td>United States</td>
<td>TN</td>
<td>Tennessee Technological University</td>
</tr>
<tr>
<td>Aryan, Jeeza B.</td>
<td>United States</td>
<td>TX</td>
<td>The University of Texas at Brownsville</td>
</tr>
<tr>
<td>Anadi, Winston</td>
<td>United States</td>
<td>DE</td>
<td>Delaware State University</td>
</tr>
<tr>
<td>Bain, Lisa Z</td>
<td>United States</td>
<td>RI</td>
<td>Rhode Island College</td>
</tr>
<tr>
<td>Barkdale, W. Kevis</td>
<td>United States</td>
<td>TN</td>
<td>Grand Canyon University</td>
</tr>
<tr>
<td>Barrios, Marcelo Bernardo</td>
<td>Argentina</td>
<td></td>
<td>EDD-Escuela de Direccion de Empresas</td>
</tr>
<tr>
<td>Barda, Michelle E.</td>
<td>United States</td>
<td>SC</td>
<td>Claflin University</td>
</tr>
<tr>
<td>Baghlanjian, James</td>
<td>United States</td>
<td>WA</td>
<td>Central Washington University</td>
</tr>
<tr>
<td>Bellos, Roberto</td>
<td>Canada</td>
<td>Alberta</td>
<td>University of Lethbridge</td>
</tr>
<tr>
<td>Bonnet, Etta</td>
<td>United States</td>
<td>VA</td>
<td>Cambridge College</td>
</tr>
<tr>
<td>Bonnet, Jen A.</td>
<td>United States</td>
<td>WI</td>
<td>University of Wisconsin-Green Bay</td>
</tr>
<tr>
<td>Boquist, Minatra</td>
<td>United States</td>
<td>WA</td>
<td>Gonzaga University</td>
</tr>
<tr>
<td>Berry, Rik</td>
<td>United States</td>
<td>AR</td>
<td>University of Arkansas at Fort Smith</td>
</tr>
<tr>
<td>Benan, Cahan</td>
<td>United States</td>
<td>GA</td>
<td>Appalachian University</td>
</tr>
<tr>
<td>Benskin, Joseph C.</td>
<td>United States</td>
<td>WV</td>
<td>Fairmont State University</td>
</tr>
<tr>
<td>Boswell, Katherine T.</td>
<td>United States</td>
<td>TN</td>
<td>Middle Tennessee State University</td>
</tr>
<tr>
<td>Bridgers, Gary</td>
<td>United States</td>
<td>TX</td>
<td>The University of Texas at San Antonio</td>
</tr>
<tr>
<td>Brown-Jackson, Kari L.</td>
<td>United States</td>
<td></td>
<td>The National Graduate School</td>
</tr>
<tr>
<td>Buchan, Thomas A.</td>
<td>United States</td>
<td>CO</td>
<td>University of Colorado at Boulder</td>
</tr>
<tr>
<td>Buchuck, Edine M.</td>
<td>United States</td>
<td>TN</td>
<td>Walden University</td>
</tr>
<tr>
<td>Burrill, Darrell Neuman</td>
<td>United States</td>
<td>VA</td>
<td>Virginia International University</td>
</tr>
<tr>
<td>Burn, Sharon L.</td>
<td>United States</td>
<td>DE</td>
<td>The National Graduate School</td>
</tr>
<tr>
<td>Bueh, Richard</td>
<td>United States</td>
<td>MI</td>
<td>Lawrence Technological University</td>
</tr>
<tr>
<td>Byrd, Jane</td>
<td>United States</td>
<td>AL</td>
<td>University of Mobile</td>
</tr>
<tr>
<td>Caine, W. Rose</td>
<td>United States</td>
<td>SC</td>
<td>Southern Wesleyan University</td>
</tr>
<tr>
<td>Cano, Criselda M.</td>
<td>United States</td>
<td>GA</td>
<td>Augusta State University</td>
</tr>
<tr>
<td>Cano, Criselda Rodriguez</td>
<td>United States</td>
<td>GA</td>
<td>Georgia College &amp; State University</td>
</tr>
<tr>
<td>Carey, Catherine</td>
<td>United States</td>
<td>KY</td>
<td>Western Kentucky University</td>
</tr>
<tr>
<td>Carlow, Rosemary</td>
<td>United States</td>
<td>KY</td>
<td>Morehead State University</td>
</tr>
<tr>
<td>Case, Mark</td>
<td>United States</td>
<td>KY</td>
<td>Eastern Kentucky University</td>
</tr>
<tr>
<td>Cassell, Margarette</td>
<td>United States</td>
<td>WV</td>
<td>Fairmont State University</td>
</tr>
<tr>
<td>Cassell, Margarette</td>
<td>United States</td>
<td>WV</td>
<td>Fairmont State University</td>
</tr>
<tr>
<td>Reviewer</td>
<td>Country</td>
<td>State/Region</td>
<td>Affiliation</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>Cadwall, Jason C.</td>
<td>United States</td>
<td>TN</td>
<td>American College of Education</td>
</tr>
<tr>
<td>Cox, Ira</td>
<td>United States</td>
<td>NC</td>
<td>Pennsylvania State University</td>
</tr>
<tr>
<td>Chen, Tom</td>
<td>United States</td>
<td>NH</td>
<td>Southern New Hampshire University</td>
</tr>
<tr>
<td>Chang, Chun-Lan</td>
<td>Australia</td>
<td>Queensland</td>
<td>The University of Queensland</td>
</tr>
<tr>
<td>Chen, Ting</td>
<td>Canada</td>
<td>Ontario</td>
<td>University of Toronto</td>
</tr>
<tr>
<td>Chen, Shi</td>
<td>United States</td>
<td>KY</td>
<td>Marshall University</td>
</tr>
<tr>
<td>Charden, SI (Sle)</td>
<td>United States</td>
<td>AZ</td>
<td>University of Phoenix</td>
</tr>
<tr>
<td>Chachou, Lorenzo F.</td>
<td>United States</td>
<td>AR</td>
<td>Arkansas Tech University</td>
</tr>
<tr>
<td>Caillo, Alain</td>
<td>France</td>
<td>CMB MOISSA-Age Monopolelle</td>
<td></td>
</tr>
<tr>
<td>Collins, J. Stephanie</td>
<td>United States</td>
<td>NH</td>
<td>Southern New Hampshire University</td>
</tr>
<tr>
<td>Coelho-Simmons, Dana</td>
<td>United States</td>
<td>KY</td>
<td>Western Kentucky University</td>
</tr>
<tr>
<td>Con, Berit</td>
<td>United States</td>
<td>TN</td>
<td>University of Tennessee at Martin</td>
</tr>
<tr>
<td>Con, Stacy S.</td>
<td>United States</td>
<td>LA</td>
<td>McNeese State University</td>
</tr>
<tr>
<td>Cunliffe, Rob</td>
<td>United States</td>
<td>CA</td>
<td>California State University</td>
</tr>
<tr>
<td>Darwe, Maurice</td>
<td>United States</td>
<td>CO</td>
<td>Texas International University</td>
</tr>
<tr>
<td>Darby, Paige</td>
<td>United States</td>
<td>MD</td>
<td>Marquette University St. Louis</td>
</tr>
<tr>
<td>Damon, Ryan</td>
<td>United States</td>
<td>ID</td>
<td>Idaho State University</td>
</tr>
<tr>
<td>Dusenbery, Dirk</td>
<td>Belgium</td>
<td></td>
<td>Vlerick Leuven Gent Management School</td>
</tr>
<tr>
<td>Dr. Phil</td>
<td>United States</td>
<td>LA</td>
<td>Louisiana Tech University</td>
</tr>
<tr>
<td>Dunkin, Kar</td>
<td>United States</td>
<td>TN</td>
<td>University of Tennessee at Martin</td>
</tr>
<tr>
<td>Dywe, Rocky</td>
<td>Canada</td>
<td>Alberta</td>
<td>Athabasca University</td>
</tr>
<tr>
<td>El-Kaissy, Mohamed</td>
<td>United States</td>
<td>AZ</td>
<td>University of Phoenix</td>
</tr>
<tr>
<td>Epple, Darrie</td>
<td>United States</td>
<td>AL</td>
<td>Frost State</td>
</tr>
<tr>
<td>Enyew, Michael</td>
<td>United States</td>
<td>ML</td>
<td>Atlanta State University</td>
</tr>
<tr>
<td>Enns, Noury</td>
<td>Egypt</td>
<td></td>
<td>Ain Southern University</td>
</tr>
<tr>
<td>Erdin, Brenda</td>
<td>United States</td>
<td>OR</td>
<td>Social Sciences, Public Policy and Health Researcher</td>
</tr>
<tr>
<td>Fallah-Mehrali, Mahsa</td>
<td>Australia</td>
<td></td>
<td>University of Wollongong</td>
</tr>
<tr>
<td>Faure, Catherine</td>
<td>United States</td>
<td>FL</td>
<td>Florida Institute of Technology</td>
</tr>
<tr>
<td>Fay-Jack</td>
<td>United States</td>
<td>KS</td>
<td>Purdue State University</td>
</tr>
<tr>
<td>Fennivand, Tom A.</td>
<td>United States</td>
<td>TN</td>
<td>Middle Tennessee State University</td>
</tr>
<tr>
<td>Fitch, Akira</td>
<td>United States</td>
<td>CO</td>
<td>Colorado State University</td>
</tr>
<tr>
<td>Finlay, Nikki</td>
<td>United States</td>
<td>GA</td>
<td>Clark College and State University</td>
</tr>
<tr>
<td>Flanagan, Patrick</td>
<td>United States</td>
<td>NY</td>
<td>St. John's University</td>
</tr>
<tr>
<td>Fisher, George</td>
<td>Canada</td>
<td>New Brunswick</td>
<td>University of New Brunswick</td>
</tr>
<tr>
<td>Fontaine, Aurélia</td>
<td>Brazil</td>
<td></td>
<td>University of Madeira</td>
</tr>
<tr>
<td>Fontan, Reniz</td>
<td>United States</td>
<td>MS</td>
<td>Delta State University</td>
</tr>
<tr>
<td>Fare, Jane</td>
<td>United States</td>
<td>TX</td>
<td>University of Houston-Victoria</td>
</tr>
<tr>
<td>Fairh, John</td>
<td>United States</td>
<td>NC</td>
<td>Evergreen State University</td>
</tr>
<tr>
<td>Garrison, Chloë</td>
<td>United States</td>
<td>SC</td>
<td>Winthrop University</td>
</tr>
<tr>
<td>Gershom, Michael</td>
<td>United States</td>
<td>SC</td>
<td>Coflex University</td>
</tr>
<tr>
<td>Gans, Denise</td>
<td>United States</td>
<td>CO</td>
<td>D&amp;D Solutions</td>
</tr>
<tr>
<td>Gant, Nancy</td>
<td>United States</td>
<td>AL</td>
<td>University of Mobile</td>
</tr>
<tr>
<td>Gelosdoria, Daniel</td>
<td>United States</td>
<td>NM</td>
<td>Eastern New Mexico University</td>
</tr>
<tr>
<td>Glickman, Lee B.</td>
<td>United States</td>
<td>AZ</td>
<td>University of Phoenix</td>
</tr>
<tr>
<td>Gourley, Peter</td>
<td>United States</td>
<td>PA</td>
<td>Pennsylvania College</td>
</tr>
<tr>
<td>Green, Jim</td>
<td>United States</td>
<td>TX</td>
<td>University of Texas at Brownsville</td>
</tr>
<tr>
<td>Greenberg, Penelope S.</td>
<td>United States</td>
<td>PA</td>
<td>Widener University</td>
</tr>
<tr>
<td>Green, Timothy H.</td>
<td>United States</td>
<td>TN</td>
<td>Middle Tennessee State University</td>
</tr>
<tr>
<td>Reviewer</td>
<td>Country</td>
<td>State/Region</td>
<td>Affiliation</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------</td>
<td>--------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Kent, Tim</td>
<td>United States</td>
<td>SC</td>
<td>College of Charleston</td>
</tr>
<tr>
<td>Kohlhepp, Pam</td>
<td>United States</td>
<td>SC</td>
<td>University of South Carolina</td>
</tr>
<tr>
<td>Kilburn, Ashley P.</td>
<td>United States</td>
<td>TN</td>
<td>University of Texas at Austin</td>
</tr>
<tr>
<td>Kilburn, Brandon</td>
<td>United States</td>
<td>TN</td>
<td>University of Texas at Austin</td>
</tr>
<tr>
<td>Kilgore, Ron</td>
<td>United States</td>
<td>TN</td>
<td>University of Texas at Austin</td>
</tr>
<tr>
<td>King, David</td>
<td>United States</td>
<td>TN</td>
<td>Tennessee State University</td>
</tr>
<tr>
<td>King, Marvin F.</td>
<td>United States</td>
<td>IL</td>
<td>Southern Illinois University University of</td>
</tr>
<tr>
<td>Kim, Bernhard</td>
<td>France</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klages, Annette</td>
<td>Switzerland</td>
<td></td>
<td>St. Gallen University of St. Gallen</td>
</tr>
<tr>
<td>Kohl, Leslie</td>
<td>United States</td>
<td>NJ</td>
<td>Georgetown University</td>
</tr>
<tr>
<td>Korte, Leon</td>
<td>United States</td>
<td>SD</td>
<td>University of South Dakota</td>
</tr>
<tr>
<td>Kranz, Michael L.</td>
<td>United States</td>
<td>TN</td>
<td>Middle Tennessee State University</td>
</tr>
<tr>
<td>Kray, Erika Matthews</td>
<td>United States</td>
<td>AZ</td>
<td>University of Phoenix</td>
</tr>
<tr>
<td>Kufarong, John</td>
<td>United States</td>
<td>AL</td>
<td>Troy University</td>
</tr>
<tr>
<td>Lamb, Kim</td>
<td>United States</td>
<td>OH</td>
<td>St. Bonaventure College</td>
</tr>
<tr>
<td>Lamb, Evelyn</td>
<td>United States</td>
<td>OH</td>
<td>Bowling Green University of Kentucky</td>
</tr>
<tr>
<td>Lao, Jung-Sheng</td>
<td>United States</td>
<td>TN</td>
<td>Middle Tennessee State University</td>
</tr>
<tr>
<td>Lai, Minassio</td>
<td>United States</td>
<td>KY</td>
<td>Western Kentucky University</td>
</tr>
<tr>
<td>Leavitt, Jennifer</td>
<td>United States</td>
<td>MT</td>
<td>Montana State University-Billings</td>
</tr>
<tr>
<td>Leavitt, Joe</td>
<td>United States</td>
<td>OH</td>
<td>Miami University</td>
</tr>
<tr>
<td>Leap, Christopher R.</td>
<td>United States</td>
<td>NC</td>
<td>Elon University</td>
</tr>
<tr>
<td>Lim, Chi-Lu</td>
<td>United States</td>
<td>MO</td>
<td>Northeast Missouri State University</td>
</tr>
<tr>
<td>Lin, Yong</td>
<td>United States</td>
<td>TX</td>
<td>University of Houston-Downtown</td>
</tr>
<tr>
<td>Lindgren, Peter</td>
<td>Switzerland</td>
<td></td>
<td>University of St. Gallen</td>
</tr>
<tr>
<td>Long, James</td>
<td>United States</td>
<td>MS</td>
<td>Delta State University</td>
</tr>
<tr>
<td>Loehnig, Greg</td>
<td>United States</td>
<td>FL</td>
<td>Pensacola Christian College</td>
</tr>
<tr>
<td>Jean-Paul</td>
<td>United States</td>
<td>MD</td>
<td>Howard State University</td>
</tr>
<tr>
<td>Magan, Gerald</td>
<td>United States</td>
<td>TN</td>
<td>Tennessee State University</td>
</tr>
<tr>
<td>Mace, David D.M.</td>
<td>New Zealand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathews, Rachel</td>
<td>United States</td>
<td>SC</td>
<td>Lander University</td>
</tr>
<tr>
<td>Mangan, Nicholas B.</td>
<td>United States</td>
<td>AL</td>
<td>University of Tampa</td>
</tr>
<tr>
<td>Mayo, Conchita B.</td>
<td>United States</td>
<td>DE</td>
<td>Delaware State University</td>
</tr>
<tr>
<td>McDougall, Darlene M.</td>
<td>United States</td>
<td></td>
<td></td>
</tr>
<tr>
<td>McGowan, Richard</td>
<td>United States</td>
<td>TN</td>
<td>Middle Tennessee State University</td>
</tr>
<tr>
<td>McKie, Donald S.</td>
<td>United Arab Emirates</td>
<td></td>
<td>American University of Sharjah</td>
</tr>
<tr>
<td>McKinnon, Brian</td>
<td>United States</td>
<td>CA</td>
<td>California State University</td>
</tr>
<tr>
<td>McKinnon, Bruce</td>
<td>United States</td>
<td>LA</td>
<td>Nicholls State University</td>
</tr>
<tr>
<td>McNiece, Bruce</td>
<td>United States</td>
<td>MS</td>
<td>University of Southern Mississippi</td>
</tr>
<tr>
<td>McNulty, Keven</td>
<td>United States</td>
<td>NM</td>
<td>New Mexico State University</td>
</tr>
<tr>
<td>Medina, Carmen F.</td>
<td>Puerto Rico</td>
<td>PR</td>
<td>Universidad de Puerto Rico, Macapaz</td>
</tr>
<tr>
<td>Melo, Jeffrey A.</td>
<td>United States</td>
<td>FL</td>
<td>Barry University</td>
</tr>
<tr>
<td>Melo, Josefa</td>
<td>United States</td>
<td>CT</td>
<td>University of Edmonton</td>
</tr>
<tr>
<td>Mesher, Timothy P.</td>
<td>United States</td>
<td>WI</td>
<td>University of Wisconsin-Green Bay</td>
</tr>
<tr>
<td>Mitchell, Jamie</td>
<td>United States</td>
<td>TN</td>
<td>Memphis State University</td>
</tr>
<tr>
<td>Miller, Mildred</td>
<td>United States</td>
<td>NY</td>
<td>Manhattanville University</td>
</tr>
<tr>
<td>Millner, Kelle</td>
<td>United States</td>
<td>TN</td>
<td>The University of Memphis</td>
</tr>
<tr>
<td>M_logic, Douglas R.</td>
<td>United States</td>
<td>GA</td>
<td>Kennesaw State University</td>
</tr>
<tr>
<td>Moser, Bradley</td>
<td>United States</td>
<td>AL</td>
<td>University of West Alabama</td>
</tr>
<tr>
<td>Reviewer</td>
<td>Country</td>
<td>State/Region</td>
<td>Affiliation</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------</td>
<td>--------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Schaeffer, Donna M.</td>
<td>United States</td>
<td>VA</td>
<td>Marymount University</td>
</tr>
<tr>
<td>Schchlat, Greg</td>
<td>United States</td>
<td>NH</td>
<td>Air Force Institute of Technology</td>
</tr>
<tr>
<td>Schindler, Terry</td>
<td>United States</td>
<td>EN</td>
<td>University of Indianapolis</td>
</tr>
<tr>
<td>Schmidt, Beverly</td>
<td>United States</td>
<td>GA</td>
<td>Augusta State University</td>
</tr>
<tr>
<td>Schuehle, Barbara</td>
<td>United States</td>
<td>LA</td>
<td>Southeastern Louisiana University</td>
</tr>
<tr>
<td>Selby, Patricia</td>
<td>United States</td>
<td>KY</td>
<td>Bellarmine University</td>
</tr>
<tr>
<td>Service, Robert W.</td>
<td>United States</td>
<td>AL</td>
<td>Samford University</td>
</tr>
<tr>
<td>Shai, Chris</td>
<td>United States</td>
<td>TX</td>
<td>Midwestern State University</td>
</tr>
<tr>
<td>Shapley, Shirley</td>
<td>United States</td>
<td>EN</td>
<td>Texas University</td>
</tr>
<tr>
<td>Short, Melanie L.</td>
<td>United States</td>
<td>AL</td>
<td>University of Alabama at Birmingham</td>
</tr>
<tr>
<td>Shug, Philip</td>
<td>United States</td>
<td>GA</td>
<td>Augusta State University</td>
</tr>
<tr>
<td>Simpson, Ethel</td>
<td>United States</td>
<td>OK</td>
<td>Southwestern Oklahoma State University</td>
</tr>
<tr>
<td>Sinha, Naveen Kumar</td>
<td>United States</td>
<td>AZ</td>
<td>Northern Arizona University</td>
</tr>
<tr>
<td>Smead, George</td>
<td>United States</td>
<td>FL</td>
<td>Florida Atlantic University</td>
</tr>
<tr>
<td>Smith, Allen E.</td>
<td>United States</td>
<td>MS</td>
<td>Jackson State University</td>
</tr>
<tr>
<td>Smith, J.K.</td>
<td>United States</td>
<td>MS</td>
<td>East Carolina University</td>
</tr>
<tr>
<td>Smith, Nelda</td>
<td>United States</td>
<td>MS</td>
<td>Georgia College</td>
</tr>
<tr>
<td>Smith, W. Robert</td>
<td>United States</td>
<td>MS</td>
<td>Universities of Southern Mississippi</td>
</tr>
<tr>
<td>Smibert, Kathleen L.</td>
<td>United States</td>
<td>MD</td>
<td>University of Maryland University College</td>
</tr>
<tr>
<td>Sodhi, Meht, Anur H.</td>
<td>Canada</td>
<td>Ontario</td>
<td>University of Toronto</td>
</tr>
<tr>
<td>Stadler, Una V.</td>
<td>United States</td>
<td>SC</td>
<td>LandMark University</td>
</tr>
<tr>
<td>St. Pierre, Armand</td>
<td>Canada</td>
<td>Alberta</td>
<td>Athabasca University</td>
</tr>
<tr>
<td>Stock, Lorie</td>
<td>United States</td>
<td>MT</td>
<td>Montana State University-Bozeman</td>
</tr>
<tr>
<td>Stone, Lyn</td>
<td>United States</td>
<td>NY</td>
<td>Stony Brook College</td>
</tr>
<tr>
<td>Stone, Karen</td>
<td>United States</td>
<td>NH</td>
<td>Southern New Hampshire University</td>
</tr>
<tr>
<td>Stone, Krista</td>
<td>United States</td>
<td>VA</td>
<td>Marymount University</td>
</tr>
<tr>
<td>Stone, Randy</td>
<td>United States</td>
<td>GA</td>
<td>Georgia State University</td>
</tr>
<tr>
<td>Stone, Paul C.</td>
<td>United States</td>
<td>TN</td>
<td>Cumberland University</td>
</tr>
<tr>
<td>Swedholm, Beverly A.</td>
<td>United States</td>
<td>TN</td>
<td>Cumberland University</td>
</tr>
<tr>
<td>Talbot, Laura</td>
<td>United States</td>
<td>AL</td>
<td>University of Alabama at Birmingham</td>
</tr>
<tr>
<td>Taigum, Joan</td>
<td>United States</td>
<td>TX</td>
<td>The University of Texas Pan American</td>
</tr>
<tr>
<td>Tangura, Udo</td>
<td>United States</td>
<td>AR</td>
<td>Fox International LLC</td>
</tr>
<tr>
<td>Terrell, Robert</td>
<td>United States</td>
<td>TN</td>
<td>Carson-Newman College</td>
</tr>
<tr>
<td>Terry, Kathleen T.</td>
<td>United States</td>
<td>FL</td>
<td>East Carolina University</td>
</tr>
<tr>
<td>Theodore, John D.</td>
<td>United States</td>
<td>FL</td>
<td>Western University</td>
</tr>
<tr>
<td>Thompson, Sherryl</td>
<td>United States</td>
<td>KY</td>
<td>Kentucky State University</td>
</tr>
<tr>
<td>Thrommerson, Bruce</td>
<td>United States</td>
<td>TN</td>
<td>Tennessee Technological University</td>
</tr>
<tr>
<td>Tramell, Jeffrey</td>
<td>United States</td>
<td>LA</td>
<td>McNeese State University</td>
</tr>
<tr>
<td>Tracy, Daniel L.</td>
<td>United States</td>
<td>SD</td>
<td>University of South Dakota</td>
</tr>
<tr>
<td>Trang, Hoang Thi</td>
<td>United States</td>
<td>TN</td>
<td>Middle Tennessee State University</td>
</tr>
<tr>
<td>Trimboli, Janice P.</td>
<td>United States</td>
<td>WI</td>
<td>Marquette University</td>
</tr>
<tr>
<td>Traunke, Sheila Marie</td>
<td>United States</td>
<td>EN</td>
<td>Indiana University Northwest</td>
</tr>
<tr>
<td>Udinkenga, A. Basile</td>
<td>United States</td>
<td>MS</td>
<td>Aiken State University</td>
</tr>
<tr>
<td>Udinkenga, Benny</td>
<td>United States</td>
<td>MS</td>
<td>Aiken State University</td>
</tr>
<tr>
<td>Udupi, Nagesh</td>
<td>United States</td>
<td>TX</td>
<td>Texas A&amp;M International University</td>
</tr>
<tr>
<td>Udall, Julie</td>
<td>United States</td>
<td>RI</td>
<td>Rhode Island College</td>
</tr>
<tr>
<td>Uhre, Matthew &quot;Matt&quot;</td>
<td>United States</td>
<td>NC</td>
<td>Elon University</td>
</tr>
<tr>
<td>van der Klooster, Marie Louise</td>
<td>Australia</td>
<td>Victoria</td>
<td>Deakin University</td>
</tr>
</tbody>
</table>
The JW Press Family of Academic Journals

Journal of Learning in Higher Education (JLHE)
ISSN: 1936-346X (print)

Each university and accrediting body says that teaching is at the forefront of their mission. Yet the attention given to discipline-oriented research speaks otherwise. Devoted to establishing a platform for showcasing learning-centered articles, JLHE encourages the submission of manuscripts from all disciplines. The top learning-centered articles presented at ABW conferences each year will be automatically published in the next issue of JLHE. JLHE is listed in Cabell’s Directory of Publishing Opportunities in Educational Psychology and Administration, indexed by EBSCO, and under consideration for indexing by Scopus.

Individuals interested in submitting manuscripts directly to JLHE should review information at http://jwpress.com/JLHE/JLHE.htm.

Journal of Academic Administration in Higher Education (JAAHE)
ISSN: 1936-3478 (print)

JAAHE is a journal devoted to establishing a platform for showcasing articles related to academic administration in higher education. JAAHE encourages the submission of manuscripts from all disciplines. The best articles presented at ABW conferences each year, that deal with the subject of administration of academic units, will be automatically published in the next issue of JAAHE. JAAHE is listed in Cabell’s Directory of Publishing Opportunities in Educational Psychology and Administration, indexed by EBSCO, and under consideration for indexing by Scopus.

Individuals interested in submitting manuscripts directly to JAAHE should review information on their site at http://jwpress.com/JAAHE/JAAHE.htm.

International Journal of the Academic Business World (IJABW)
ISSN 1942-6089 (print)
ISSN 1942-6097 (online)

IJABW is a new journal devoted to providing a venue for the distribution, discussion, and documentation of the art and science of business. A cornerstone of the philosophy that drives IJABW, is that we all can learn from the research, practices, and techniques found in disciplines other than our own. The Information Systems researcher can share with and learn from a researcher in the Finance Department or even the Psychology Department.

We actively seek the submission of manuscripts pertaining to any of the traditional areas of business (accounting, economics, finance, information systems, management, marketing, etc.) as well as any of the related disciplines. While we eagerly accept submissions in any of these disciplines, we give extra consideration to manuscripts that cross discipline boundaries or document the transfer of research findings from academic to business practice. International Journal of the Academic Business World is listed in Cabell’s Directory of Publishing Opportunities in Business, indexed by EBSCO, and under consideration for indexing by Scopus.

Individuals interested in submitting manuscripts directly to IJABW should review information on their site at http://jwpress.com/IJABW/IJABW.htm
E-Mentoring the Online Doctoral Student from the Dissertation Prospectus through Dissertation Completion

Ronald Black, Ed.D.
Walden University

ABSTRACT

Faculty who mentor online doctoral candidates face many of the same challenges and opportunities as those mentoring doctoral candidates in traditional, face-to-face modalities. The main difference is that E-Mentoring is based on interacting in the online space rather than interacting face-to-face, which may present challenges for both the candidate and the mentor. The concept of mentoring, which originated from Greek mythology, defined a close relationship between the mentor and the student. In Ancient India, the word Guru from the Sanskrit language stood to symbolize a caring mentor and expert teacher. Structured E-Mentor programs are formalized programs which provide training, coaching, advice, and structure to increase engagement through the online dissertation phase of doctoral education. Doctoral Mentoring relationships are an intrinsically a deeply human process. Mentoring involves the nurturing of a novice or a less experienced person (protégé) by a seasoned and experienced person acting as the mentor in providing guidance, support, and dissemination of required knowledge for a given area of expertise.

Doctoral mentors play a large role in guiding the doctoral candidate through the dissertation process from identifying their topic through conducting the research study. E-Mentoring doctoral candidates in online doctoral programs entails many of the same opportunities and challenges as serving candidates in programs that are offered in a traditional, face-to-face modality. The difference is E-Mentor interaction takes place 100% of the time from anywhere. The E-Mentor chair/candidate relationship begins as soon as the doctoral candidate completes doctoral content courses and begins the dissertation process. This article focuses on E-Mentor the online doctoral student throughout the dissertation process and the techniques that chairs and committee members can frame, and guide their candidates as they travel through their doctoral dissertation journey.

Introduction

What is Mentoring?

The concept of mentoring has been around for thousands of years, coming to us from Homer’s Odyssey. Mentor was the teacher of Telemachus, the son of Odysseus. But Mentor was more than a teacher. He was all things to all people-half-god and half-human, half-male and half-female. Mentor represented the union of both goal and path. As the Mentor represented the yin and the yang of life, so also mentors must pull and push their mentees. Mentoring requires strength in two different but complementary behaviors. First, mentors must lead by guiding interaction with their mentees. Mentors invest themselves in their mentees and uplift them. Secondly, Mentors must support mentees. Mentors push their mentees to become their best by encouraging development in areas of expressed need in their inventory (Peterson, 1993).

Evolving from a historical perspective, the concept and process of mentoring have been and is a vital tool for development of human potential (Hernandez, 2001). Mentoring is utilized in practically all fields of human endeavor: sports, higher education, organizational management, youth development, and the doctoral dissertation process. There are two types of mentoring: Natural mentoring occurs through normal relationships of “friendship, collegiality, teaching, coaching, and counseling. In contrast, planned mentoring occurs through structured programs in which mentors and participants are selected and matched through formal processes” (Hayashi & O’Donnell, n.d., p. 1).

Kram (1983) describes the phases of the mentoring relationship that provides an influence on protégés. Kram’s phases include:

- an initiation phase, during which the time the relationship is started;
A cultivation phase, during which time the range of functions provided expands to a maximum; a separation phase, during which time the established nature is substantially altered in the organizational context and/or by psychosocial changes within one or both individuals; and a redefinition phase, during which time the relationship evolves a new form that is significantly different from the past, or the relationship ends entirely. (Kram, 1983, p. 614).

**E-Mentoring Evolves**

The demand for Internet-based teaching and learning programs continues to grow as more and more online programs are being offered, especially at the graduate level. A significant transformation in higher education has evolved as the adult student attempts to remain competitive in a rapidly changing world. The transformation of teaching and learning and the creation of learning communities has opened the door for the expansion of the E-Mentor and the graduate doctoral learner. Internet-based virtual learning has created new ways of mentoring the doctoral learner in which exchanges between the student and Chair become significant and critical to dissertation success. E-Mentoring has evolved since the beginning of the Internet. Different techniques may be used by E-Mentors according to the situation and the mindset of the doctoral candidate, and the techniques used in modern organizations can be found in ancient education systems, from the Socratic technique of harvesting to the accompanying method of learning used in the apprenticeship of medieval cathedral builders during the Middle Ages (Au- brey & Cohen (1995)).

There are many definitions of E-Mentoring depending on the context; Single, and Muller defines E-Mentor as:

A relationship that is established between a more senior individual (mentee) and a lesser skilled or experienced individual (protégé), primarily using electronic communications, that is intended to develop and give the skills, knowledge, confidence, and cultural understanding of the protégé to help him or her succeed, while also assisting in the development of the mentor. (Single & Muller, 2001, p. 188).

There are other names for E-Mentoring such as telementing, cybermentoring, and virtual mentoring. The Internet capitalizes on the strength of the E-Mentor to provide effective feedback strategies throughout the process. Online mentoring is occasionally compared unfavorably with face to face mentoring. Online mentoring limits the ability to pick up on visual or social clues, makes immediate feedback difficult and can often be seen as impersonal (Black, 2012). However, E-Mentoring can make participants more willing to offer honest feedback. E-Mentors often use video tools such as FaceTime, Google Hangout, Skype, and video chat through Facebook.

Blum and Musthead (2005) have strived to address vital issues associated with mentoring online doctoral students in their e-book. Comparing the mountain: Framework for successful chair advising of online dissertation students. The purpose of this book is to give online distance education faculty who are dissertation advisors an explicit framework for enabling distance education doctoral students to complete a dissertation without ever coming face-to-face. Online doctoral programs are growing rapidly, and distance educators and administrators are seeking relevant educational paradigms and instructional strategies for their degree programs. The authors share their experiences working with doctoral students in a virtual environment, and the paper will highlight a small portion of the insights on mentoring strategies from the e-book.

Students pursuing the doctorate face the same challenges as the long distance marathon runner. Training for the dissertation process is not unlike training for a marathon. It requires intense preparation, dedication, and skill. In many ways, conducting doctoral research and writing the dissertation is like running a marathon, enduring hills and valleys, most of it’s difficulties, and Soviet blocks along the way. It is a long and weary race but in the end will lead to the final race in the doctoral journey, defending and publishing the dissertation (Black, 2012).

As noted in The Dissertation Marathon (2012) the main contrast between running a marathon and writing a dissertation is that they both require an extreme amount of energy. In both situations, the marathon runner and dissertation writer can’t go all out at the beginning because they might not have the strength to make it through at the end. Marathon runners and dissertation writers must take every step carefully and slowly because every step, no matter how slow, will bring the finish line closer. Like a marathon, dissertation writing requires perseverance. This is why it is essential to condition the body and mind to endure. Working on the dissertation a little at a time conditions the body, mind, and experience may be used to facilitate the dissertation-driven selection process increases the speed in which matches are created and reduces the amount of administrative time required to manage the program (Goff, 1995). The quality of matches increases as well with self-match programs (Allen, T.D., Eby, L.T., Lentz, E., 2006) because the greater the involvement of the doctoral candidate in the selection of their E-Mentor, the better the mentorship. There are a variety of online mentoring technology programs available to the university that can be utilized to facilitate this E-Mentor-Doctoral Candidate matching process.

Selecting an E-Mentor is one of the most important decisions that a doctoral candidate will make during their doctoral journey. It may look like an easy and straightforward task, but there are often complications and issues that may come up during the process. Like dating and marriage, the key to selecting an E-Mentor is to be honest and straightforward. When selecting an E-Mentor and dissertation committee, the most important thing that everyone must understand is that this is your dissertation, not theirs. Of course, like a marriage, disagreements and changes may come up, but both the candidate and E-Mentor must understand the most important person on the dissertation team is the candidate (Black, 2012). This relationship may be thought of as a marriage, where trust and communication become the main goal of the relationship. The E-Mentor guides the dissertation, helping the candidate to the finish line.

A key development in E-Mentoring, the online doctoral candidate, is the large pool of qualified faculty today. Today’s mentor brings invigorating experiences and perspectives to the doctoral dissertation process, but they also face many challenges. These challenges have necessitated a sophisticated change to the role of the E-Mentor, heightening the vital role of the E-Mentor to prepare the next generation of scholars beyond the dissertation. Today’s dissertation Chair is often interconnected with the title E-Mentor or E-Mentor. Consider this multi-faceted definition of mentor/chair:

1. Faculty must exhibit genuineness
2. Faculty must be knowledgeable
3. Faculty must create a climate of trust
4. Faculty must create a climate of connectedness
5. Faculty must be willing to exhibit, demonstrate, and model personal and professional ethics (Fe- lice, 2005).

In the online teaching and learning world, the E-Mentoring doctoral dissertation chair is challenged by these dynamics to ensure the doctoral candidates success. E-Mentoring doctoral candidates throughout their dissertation journey without traditional face-to-face interaction is not an easy task. Online teaching and learning tools do not replace the barriers of distance education because the E-Mentor is not physically attached to the student for easy student consultation and teamwork at critical timelines throughout the dissertation. The dissertation process for many doctoral candidates appears similar to a mountain looming in the distance, inaccessible, magnificent, but impossible to scale (Blum & Musthead, 2005). Online doctoral students face additional challenges overcoming the barriers of distance education (Blum, 1999). Working in a distance education virtual medium requires more explicit objective setting than face-to-face teams (Helms and Raiszadeh, 2002).

**E-Mentoring Through the Dissertation Process**

The doctoral degree is the highest advanced degree in most fields of study. While the type of doctoral degree and the topic of the doctoral dissertation may differ, all
doctoral candidates conduct a research study and write a dissertation to complete their doctoral program. Conducting research and writing a dissertation is not easy, that is why a strong E-Mentoring/Doctoral Candidate relationship is key. Through the guidance, motivation, and specific feedback, the doctoral candidate will be successful. E-Mentors stress to the doctoral candidate to always have a positive mental attitude and keep an eye on their goal to become a Dr.

E-mentors do not have an online explicit list to help online students succeed through the dissertation process despite argument that "professors can learn advising skills by following some systematic advising processes" (Davis, 2004, para 2). It is up to the E-Mentor and the doctoral candidate to form a roadmap to complete all the milestones in the dissertation journey. This roadmap sets the stage to travel through the dissertation process with a focus on completing the doctoral candidate’s dissertation. Sample roadmap instructions may look like this:

Complete the top portion of this project plan with your committee information. Then, review the activities and responsibilities below. These are the activities that must be accomplished to complete your dissertation, along with who is responsible for each activity. Insert realistic due dates for each activity, based on your personal schedule. Remember, you need to complete all activities and win the dean’s approval within five years of enrolling in the program. Return this completed form to your Mentor for review, comments, and revisions. When you and your mentor have completed this project plan – contract, both should sign it.

Now that the roadmap is complete and agreed to by the E-Mentor and doctoral candidate the fun begins…

The Dissertation Prospectus

The early stages of the E-Mentor/Doctoral candidate’s journey together focus on completing the doctoral dissertation prospectus. The prospectus, or the concept document, at some universities refer to it, begins the process of definition and clarification of a research project. When complete, the prospectus should identify the problems the proposed research study is designed to address, the purpose, problem, hypotheses or propositions, design, and method. The prospectus or concept document is an exploration of:

The Researchable Problem Statement describing the general area the research will focus on.

The Nature Of The Study, and Research Questions. This discussion extends into an exploration of the deep congruence or coherence which exists in the past research between the question under study and the foundational conceptual and/or theoretical literature. Part of this discussion should identify important issues, perspectives, and controversies in the field.

The development of the concept or prospectus document is one of the more critical aspects to launching the dissertation process. Both the concept and prospectus offer slightly different rationales for prospective development. Gathering clarity about the expectations specific to the University is paramount importance for a new doctoral candidate. Simply stated, the purpose statement is a statement of intention. The prospectus is made up of three components: the problem statement, the research question, and the plan for the literature review. In order to complete an effective literature review including the specifics needed, considerable clarity about intent and direction will be required. A discussion of these specifics between each doctoral candidate and their E-Mentor will aid in accomplishing this important and challenging work.

Doctoral candidates and the E-Mentor will work together to complete the prospectus. The doctoral candidate should aim to have an approved Prospectus within a specified period established by their university. Throughout the process the E-Mentor will provide feedback on working with professors and in prospectus development. Once the prospectus is approved by the E-Mentor the doctoral candidate’s committee will review and evaluate the Prospectus. Once again, each university establishes guidelines for completing and evaluating the prospectus.

The Dissertation Proposal

Now that the prospectus is complete and approved the E-Mentor guides the doctoral candidate into the dissertation proposal process. The first step is to agree on an original and researchable dissertation study problem aligning it to the dissertation topic that was approved by the E-Mentor. Coming up with the problem requires considerable interaction between the doctoral candidate and E-Mentor. Both agree that the problem statement is the most critical element of the candidate’s doctoral dissertation. According to Simon (2011) the problem statement is the heart of a doctoral dissertation and where you need to begin. The problem statement explains the rationale for the research, validates its importance, determines the research design, and ensures reliability. After reading the problem statement, the reader will know why you are doing this study and be convinced of its importance. In their article, Strategies To Win: Six-Steps For Creating Problem Statement In Doctoral Research (2005) Dyr, Kimberly Blum and Amy Press from the University of Phoenix, School of Advanced Studies stress:

Writing a problem statement can be challenging and time consuming for both the candidate and E-Mentor but because the problem statement drives the purpose of the study, the choice of research design, and the resulting conclusions, agreeing on an effective problem statement is critical to the success of the doctoral candidates’ dissertation (Burnier, 2014).

Once the problem statement is set, the candidate is now ready to focus on the purpose of the study. The purpose statement is the study intent, which is the objective the study is designed to achieve. The process of developing the purpose statement provides an opportunity for the doctoral candidate and E-Mentor to reflect on the overall scope and focus of the dissertation project and anticipate issues that may arise. The purpose statement must be reflective of and aligned with the problem statement. The purpose statement defines the reason for the research or the research goals. The purpose statement begins by identifying the research methodology and design followed by how the variables will be analyzed. The purpose statement is succinct and to the point directly aligned with the problem. It is key that the E-Mentor ensures that the purpose statement aligns directly to the dissertation topic and problem statement.

Once the problem and purpose statements meet the E-Mentor will begin to focus the research questions and hypotheses. A well-stated research question drives the investigation and implementation of the research method. Essentially, writing this document means that the results of the study will be used to answer and should be phrased in a way that will produce observable and measurable answers. Research questions guide the inquiry of the study as they borrowing the problem statement. They define the questions that the results of the study will be used to answer and should be phrased in a way that will produce observable and measurable answers. Typically, a problem statement will answer one or two research questions associated with it. In quantitative studies, these research questions are most often descriptive, correlational, or experimental. In qualitative studies, the research questions are generally broad in nature. To be effective, a research question must be manageable and contain appropriate restriction, qualification, and delineation. A clearly defined research question essentially enables the driver to win the race. Students writing a problem statement should implement a similar strategy. Students should take time to consider what constitutes a viable problem before writing the problem statement. Doctoral learners should slow down, consider the problem to explore and devise a strategic plan. If students invest this time initially they will experience less difficulty in completing the remaining parts of the proposal. (Blum, K. & Pressia, A. (2005).

Creating problem statements can be challenging and time consuming for both the candidate and E-Mentor but because the problem statement drives the purpose of the study, the choice of research design, and the resulting conclusions, agreeing on an effective problem statement is critical to the success of the doctoral candidates’ dissertation (Burnier, 2014).

Now the foundation of the doctoral student's dissertation has been established the doctoral candidate and E-Mentor begin to discuss and interact on the re-
work with the candidate providing guidance and feedback, chapter 3 includes a discussion of the processes for study goals. Following a discussion of the study population, the appropriateness of the method, the design, and how includes a discussion of the research methodology for the and 2, the candidate may now move on at a steady pace the E-Mentor reviews each synthesis of the candidates’ literature review seeks to describe, summarize, evaluate, critical/analytic, or methodological in nature. Second a The types of scholarship may be empirical, theoretical, and does not report new primary scholarship itself. The view serves an important purpose in the dissertation. It and approves Chapter 1 the doctoral candidate may move Now that the E-Mentor has approved chapter 1 and 2, the candidate many move on at a steady pace focusing on how the study will be conducted. Chapter 3 includes a discussion of the research methodology for the study. The chapter begins with a detailed discussion of the appropriateness of the method, the design, and how the chosen method and design will help accomplish the at a high level a discussion of the study population, chapter 5 includes a discussion of the processes for collecting and analyzing data. The chapter concludes with a discussion of instrumentation, instrumentation reliability, and issues associated with the internal and external validity of the study. Chapter 3 often brings the doctoral candidate considerable confusion. The E-Mentor will work with the candidate providing guidance and feedback back on each element of chapter with both the candidate an E-Mentor agreeing on each element.

With the dissertation proposal complete, the candi- date is at the Half-Way Point. The next step is to add the front matter and back matter and submit to the disserta- tion review. Front matter may include:
- Title page
- Copyright page
- Signature Page
- Abstract (Heading only for proposal, complete for dissertation)
- Dedication (Heading only for proposal, complete for dissertation)
- Acknowledgements (Heading only for proposal, complete for dissertation)
- Table of Contents (with dot leaders, and page numbers)
- List of Tables (if more than 1 table included)
- List of Figures (if more than 1 figure is included)

Back matter is optional but almost always is used when additional material is needed to support the disser- tation. At this point the E-Mentor and doctoral candidate may take a breath and take a short break as the candidate’s dissertation committee completes their evaluation. The candidate’s dissertation committee will provide feedback on issues in the proposal. The E-Mentor will work with the doctoral candidate and respond to the changes recom- mended by the committee. Once the entire dissertation committee approves the dissertation proposal, the student can then move on to completing and gaining approval of their proposal by the Institutional Review Board to in- sure that the study is ethical and will not violate any of the subject’s or university’s rights. With both dissertation committee and IRB approval the doctoral candidate may proceed at a rapid pace toward completing their disserta- tion journey.

The Final Dissertation

Pacing is key at this stage of the dissertation process (Black, 2012). In most cases the E-Mentor is not involved with the doctoral candidate’s data collection, but will need to insure there is open communication throughout data collection so that the E-Mentor may advise on data analysis. Now that the doctoral candidate has completed data collection and analysis the next steps are for the E- Mentor to establish the guidelines for writing chapters 4 and 5. Chapter 4 is fairly easy to write since it basically reports the results of the investigation of the thesis questions. The purpose of Chapter 4 is to report, in appropriate detail, the results produced by the completion of the systematic and careful application of the analytical research techniques employed. No statement should be made in the chapter that is not directly supported by the results of the data analysis.

In a brief introduction, the researcher will state the key features of and reasons for the data collection and data analysis techniques employed. In the body of the chap- ter, the writer reports the results and findings generated by the analyses of data without editorial comment. This chapter includes solely the analysis of data, the testing of hypotheses, and/or the careful dissection of research ques- tions, introducing no interpretation of findings. The re- sults of testing each statistical hypothesis must be clearly presented and without editorial comment. Significance of results and findings must be stated clearly, with appropri- ate qualifications and constraints. Tables and graphs can be used and are illustrative of the verbal presentation of data. Graphical representations do not take the place of a narrative, but they clarify the verbal presentation. The chapter ends with a summary of the key points covered in the chapter and transitions smoothly to chapter 5. Once Chapter 4 is complete the E-Mentor will evaluate the Chapter and provide feedback to be sure Chapter 4 meets the doctoral dissertation template.

As the E-Mentor approves Chapter 4 the doctoral candidate may now move closer to the finish line. Chapter 5 concludes the research study, providing insightful con- clusions into the implications of the inquiry for various constituents and the recommendations, supported and justified, emerging from the analyses and findings. This chapter includes the candidate’s conclusions and recom- mendations. Following an introduction to the chapter the conclusions are presented based on the literature review and the analysis of data. The candidate will introduce dis- cussions that highlight the importance, significance, and meaning of the inquiry to constituents such as managers, employers, employees, researchers, communities, govern- ment agencies, business leaders, and others.

The candidate should clearly indicate how the con- clusions are significant, substantive, and related to the body of knowledge. This section should also describe the extent to which scholars and/or practitioners will be able to incorporate the study into their behavior. The candidate should answer the questions: So what? and Who cares?

At this point that doctoral candidate and E-mentor will discuss and establish recommendations based on the results of the study. Once agreement is established the doctoral candidate can write the recommendations of this study and how the results of the study should be addressed in a positive way focusing on constituencies and the broad- er society. The ethical dimensions of the research are dis- cussed and suggestions for further research are described and supported. The candidate will end the dissertation by summarizing chapter 5 in a brief paragraph.

Front matter is now updated by adding the abstract, dedication, acknowledgements and updating the table of contents. Back matter is now updated in support of the finding and conclusions. The dissertation is now sent to the dissertation committee for final approval.

Approaching the doctoral candidate’s dissertation journey finish line the doctoral candidate meets the dis- sertation defense. Most universities require a formal de- fense of the dissertation before the E-Mentor and com- mittee sign a candidate’s dissertation. In order to defend his or her dissertation successfully, the candidate must demonstrate competence in describing, discussing, and supporting all aspects of the study to the committee and, potentially, to a broad academic audience. The oral de- fense is conducted very differently at many institutions. Some are in person, some via Internet video, and others via teleconference. The candidate is responsible for presenting the methods and findings of the dissertation study, typically in a Microsoft PowerPoint slideshow or some other graphical format. Depending on the method used, advanced copies of the defense materials should be provided to the dissertation committee. The candidate should be prepared to respond to all committee questions concerning the dissertation during and following the pre- sentation. Candidates must demonstrate a comprehensive understanding of their study and the context in which it exists in order to complete the defense successfully. Fail- ure to demonstrate this level of understanding may result in additional work required by the E-Mentor, potentially extending the time required to complete the dissertation. A successful defense will end with a signed dissertation and moving on to graduation. It is now time for the E- Mentor and doctoral candidate to celebrate achieving this substantial milestone in the doctoral journey.

Finishing the Doctoral Journey

As the E-Mentor and doctoral candidate reach the top of the dissertation mountain, both may now take a sigh of re- lief. The doctoral candidate can now remove the title “can- didate” indicating that their studies are complete. The candidate now Dr. Crossing the doctoral dissertation finish line, smiles indicate suc- cess. This is a time for celebration, virtual hugs, and ex- changing pictures. For the doctoral graduate the trophy includes the doctoral diploma, doctoral regalia and the doctoral hood. With the E-Mentor, faculty and staff sit- ting and cheering in the audience at commencement the President of the university confers the doctorate degree. As the new Dr. crosses the stage, the E-Mentor will be there to “hood” the new graduate with a colorful doctoral hood representing completion of the doctorate. An aca- demic sash is the doctoral trophy, worn draped around the neck and over the shoulders, displayed down the back. The hood’s length signifies the doctoral degree level; with the institution’s colors in the lining and a velvet trim in a standardized color that signifies the scholar’s field.
On to Rewards

As the new Dr. descends from the mountain peak, it is time to say “so long” but not “good-bye” to the E-Mentor. At this point the E-Mentor and new Dr. may face a sense of loss, but this is normal. The doctoral journey is an overpowering presence that consumes time and attention every step of the way. There is no greater gift for an E-Mentor than seeing his mentee graduate and move on to extended professional opportunities but the relationship has not ended. E-Mentor and doctoral graduates continue collaboration beyond graduation. Collaborating on research, writing articles, and co-presenting at conferences adds not only to the graduate’s career but adds additional satisfaction for the E-Mentor. It is a good feeling to see your graduate prosper and move ahead in their career. It is now time for the E-Mentor to begin the next doctoral journey with a new doctoral candidate reflecting on their recent doctoral relationship... The doctoral journey is now over and the E-Mentor and new Dr. may now bask in their accomplishments.

References


Burner, K. D. From Candidate to Colleague: Mentoring Online Doctoral Students. Journal of Online Doctoral Education, (1, 1) 101-111.


Impeding Students’ Efforts to Cheat in Online Classes

Paula Hearn Moore
Associate Professor of Accounting
College of Business and Global Affairs
The University of Tennessee at Martin
Martin, Tennessee

J. Derrick Head
Director of Online Studies
The University of Tennessee at Martin
Martin, Tennessee

Richard B. Griffin
Professor of Accounting
College of Business and Global Affairs
The University of Tennessee at Martin
Martin, Tennessee

ABSTRACT

This paper identifies several methods a student could use to cheat while enrolled in an online course. Problems encountered in conducting an online course and in administering an online exam involve: (1) identifying the test taker, (2) preventing the theft of the exam, (3) combating the unauthorized use of textbooks and/or notes, (4) preparing an online exam and exam setup, (5) realizing a student may have access to a test bank, (6) preventing the use of cell phones, hand-held calculators, and/or Bluetooth devices, (7) limiting access to other individuals during the exam time, (8) ensuring a student is using a computer with adequate uploading and downloading capabilities, (9) identifying intentional computer crashes, and (10) noting the different methods of proctoring exams. The authors are full-time educators but are not primarily online teachers; however, they regularly teach one or more courses either in-load or as an over-load. This paper draws on the authors’ experiences and efforts to teach online at both the lower and upper division undergraduate levels, as well as, the graduate level with efforts to give a student a comparable experience to a live classroom. The authors utilize Blackboard as their university’s uniform course platform and refer to Blackboard’s available options to inhibit cheating which share common selections with most online course platforms. An attempt is being made with this paper to help other instructors benefit from the authors’ mistakes and successes.

Preventing the Theft of the Exam

Exam theft is an instructor’s concern whether the test is administered face-to-face or online (Miller, 2012). When one question is compromised, the integrity of the exam is affected; however, when the entire exam is compromised, all of the instructor’s efforts to create a meaningful assessment tool are damaged (Lanier, 2006). Even when exams are monitored online, copies of the entire exam can be made accidentally or on purpose. If an instructor desires to protect an exam from being copied in whole or in part, the instructor should be aware that Microsoft Word and similar programs will automatically make a copy of the exam on the student’s computer when the document is opened. Illustration 1 shows a “screen capture” of a computer directory made automatically by a computer when a document is opened.

In the left pane of Illustration 1, the path to the temporary folder is shown as “Desktop\Richard Griffin (name of the computer user on this machine)\AppData\Local\Temp”, and the contents of the “Temp” directory are shown on the right side of the illustration. Richard Griffin, an online instructor had been grading resumes prepared using Microsoft Word on May 5th. Notice the first file on the left has a May 11th date. On the left side of the right pane, one can also observe that the fourth file is a copy of the syllabus the instructor had opened from the course web site earlier in the day. Documents are automatically saved by the computer in this directory without affirmative action taken by the user. This directory may also be reached by looking on the computer’s operating drive – C:\Users\rgriffin\Richard Griffin’s user name on this computer\AppData\Local\Temp. If an instructor was monitoring
Preparing Online Exams and Exam Setup

If properly performed, the preparation of the exam and the platform on which it is to be administered can help reduce the sharing of exam content information. At least some research exists to indicate that the environment (online or face-to-face) in which a student takes an exam does not impact his likelihood to cheat (Hollister, 2009). While the majority of students will behave in an ethical manner during an online course including the testing in the course, the authors have experienced the impact of cheating by at least one student in each online course taught; therefore, the Hollister research has not proven true. The authors attempt to make an online course as similar to a live classroom as possible; therefore, an online exam often includes true/false questions, multiple-choice questions, essay questions, and numerical problems as the exam for a live classroom would include (Watson, 2015). A multiple-choice question from an accounting online exam is shown in Illustration 2 as an example of how not to setup an exam question.

Looking at the question and the five (5) answers above, one can see that there are no numerals or letters before the answers. In the online course, creating a question that algorithmically changes the numbers for each student or draws a different but similar scenario for each question can be helpful but, like many aspects of online teaching, can be very labor intensive at the beginning.

By presenting the question with a numeral or letter reference to the left of each answer, Student X would more likely answer “B” to the request by Student Y for the correct answer. The second step is to randomize the answers (online or face-to-face) in which a student takes an exam does not impact his likelihood to cheat (Hollister, 2009).
Impeding Students’ Efforts to Cheat in Online Classes

Paula Hearn Moore, J. Derrick Head, & Richard B. Griffin

not change the response in Illustration 2, but the response could be different in Illustration 3 resulting in the incorrect answer being given for Student Y’s exam.

Blackboard (and other course platforms) allows the instructor to select a variety of options in administering the exams for the entire class. Illustration 4 shows the typical platform options available to instructors within Blackboard’s Multiple Choice Question platform.

**ILLUSTRATION 4**

**MULTIPLE CHOICE QUESTION PLATFORM OPTIONS**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer Numbering</td>
<td>Upper Case Letters (A, B, C)</td>
</tr>
<tr>
<td>Answer Orientation</td>
<td>Vertical</td>
</tr>
<tr>
<td>Allow Partial Credit</td>
<td>n/a</td>
</tr>
<tr>
<td>Show Answers in Random Order</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Good reasons may exist for allowing this option but the authors chose “no” which will not allow the student the option of opening the text with a new window for the reason demonstrated in Illustration 6.

**ILLUSTRATION 5**

**TEST INFORMATION OPTIONS FOR ADMINISTERING ONLINE EXAMS**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open test in new window</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

If allowed, a student using a pc computer could hold down the “Alt” key and simultaneously the “Tab” key and be able to switch to another screen. Of course, the student could also take this action unless the instructor uses some means to prevent its occurrence such as a locked browser. Blackboard also allows “Test Availability” options to be selected by an instructor as seen in Illustration 7 where the wording used by Blackboard is shown.

The third option presented in Illustration 7 allows the instructor to allow a student “Multiple Attempts” to take the exam. An instructor may want all students to take the exam only once but may be concerned about addressing a student’s late night computer crash that may occur while taking the exam. The authors strongly recommend that the instructor leave the “Multiple Attempts” box as unchecked unless an instructor truly intends to allow a student to improve his grade on the exam by taking full advantage of all available attempts. The authors recommend that an instructor allow only one attempt at an exam (i.e., not check the “Multiple Attempts” box) and inform the students that any computer difficulties should be immediately reported to the instructor so that the difficulty can be properly documented and appropriately addressed. If, after examining the situation, the instructor is convinced that a genuine computer technical difficulty occurred with no involvement by the student, the instructor can erase the attempt and allow the student to restart the exam from an appropriate point (see additional discussion in a subsequent section below). This approach allows for a greater degree of accountability by the student and a greater amount of oversight by the instructor.

The fifth option presented in Illustration 7’s “Test Availability” section allows for “Force Completion.” An instructor who checks the “Force Completion” box would force the completion of the exam by a student during one sitting. In other words, the student would not be allowed to begin the exam, answer a portion of the exam questions, exit the exam, and return to the exam to finish the unanswered portions at a later point in time.

**ILLUSTRATION 6**

**SECURITY ISSUE FOR OPENING TEST IN NEW WINDOW WHEN ADMINISTERING ONLINE EXAMS**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Information</td>
<td>n/a</td>
</tr>
<tr>
<td>Test information on</td>
<td>n/a</td>
</tr>
<tr>
<td>Test information on</td>
<td>n/a</td>
</tr>
<tr>
<td>Test information on</td>
<td>n/a</td>
</tr>
<tr>
<td>Test information on</td>
<td>n/a</td>
</tr>
</tbody>
</table>

The final option presented in Illustration 7 allows the instructor to set a password for the exam. The authors recommend the establishment of a password for the exam even if the exam is to be administered with the use of an online proctoring service. Passwords are case sensitive; however, Blackboard does not require the use of a number or symbol as part of the password.

Platforms Options shown in Illustration 8 are concerned with how an exam is presented to a student.

Options for how an exam is to be presented to the student are available. The first option is selecting whether to allow a student to observe the entire exam all at once or whether to allow the student to view one question at a time. The authors recommend selecting the question at a time. The authors’ experience in this approach has resulted in fewer computer crashes than making the whole exam viewable at the same time. Whether this result is because the exam will be saved each time the student goes from one question to the next or because the student suddenly realizes that more studying should have been done, the authors are unsure. If the “one question at a time” option is chosen, the student needs to decide if the student will be able to return to a question that has been skipped or previously answered (backtracking). The authors generally prohibit backtracking. Again, fewer student computer crashes occur in the authors’ experiences. Choosing to present one
question at a time with no backtracking also enhances the authenticity of the exam if a student does experience a technical difficulty. In that case, Blackboard allows the instructor to view the student's time spent per question in order to determine at what question the student should return in order to complete the exam without question overlap. The instructor should be prepared to manually grade a test having these types of difficulties or issues. The procedure for accessing this information will be presented later in the paper.

An instructor also must decide how much information about the test results will be available to the student and at what point in time that information will become available. Illustration 9 shows the options available in Blackboard regarding this topic. On the left side of Illustration 9, Blackboard gives an option on "When" the results are available. Within that box, the options are "After Submission," "One-time View," "On Specific Date," "After Due Date," and "After Availability End Date." After the instructor has chosen the "when" option in the first drop down box, he must then select the type of information to release with the choices being: Score per Question, All Answers, Correct Answer, Submitted Answer, Feedback, and Show Incorrect Questions. The authors encourage an instructor who prepares a purely objective style exam to select only the score per question option box because the authors have found that regardless of the box checked, the student can view his grade as soon as his exam has been graded.

In order to eliminate a student's ability to view his exam grade until the time preferred by the instructor and thus eliminating a student's desire to question the result of his individual performance on the exam until the instructor can review the overall exam results, the authors insert an "Essay Question" on each exam. The wording of the essay question is shown in Illustration 10 and can allow for a double benefit. The first benefit derived from the above question is the gained ability to control the release of the entire exam score to the student because any essay question (even the one shown in Illustration 10 in which the student is not required to answer) requires the instructor to grade the question manually before the overall exam score can be determined. The second benefit derived from the above question is the ease over which the instructor can allow a curve over the entire exam for all students as the title of the question would hint. The initial number of points available for this question is set at zero. After all exam are submitted and the overall performance of the class is reviewed, an instructor who desires to allow a curve on the exam may do so easily by altering the points available for this "curve" question to the desired curve for the exam. When the instructor is ready to reveal grades, the master exam originally prepared by the instructor is edited. The instructor goes to the "Curve" essay question and clicks the "0" to the left of Points for the question in Illustration 10. When the "0" is clicked, the "Points 0 (Extra Credit)" in the upper left side of Illustration 10 expands to view in the upper left side of Illustration 11. When the instructor inserts a value in the box entitled "Update Points" and clicks "Submit," the instructor is alerted by Blackboard if all completed exams linked to this question should be updated. If the instructor answers positively, three tasks are achieved: (a) the score entered for the question on the master exam is saved, (b) the same number of points indicated for the question on the master exam is also entered automatically on each student's exam, and (c) each student's total exam score is automatically calculated and posted in the platform grade book.

Realizing a Student May Have Test Bank

Most instructors realize that students have access to a test bank for most textbooks. A recent search on eBay for "test bank" returned 797 listings as shown in Illustration 12.
More options to acquire a test bank could be found by clicking on “Related” within Illustration 12 such as: test item file, instructor solutions manual, nursing banks, teacher resource book, and other suggestions. If an instructor uses a test bank for purposes of official course evaluations, that instructor should alter the testbank questions in order to safeguard the integrity of the exam as a true measure of a student’s knowledge of the material presented instead of a measure of a student’s ability to acquire the test bank. The authors encourage instructors to use the test bank questions as templates in order to rewrite the question into a new creation not subject to an easy electronic search for a correct answer.

As can readily be seen, the entire question is not shown, only part of the first sentence of the question. If the test is timed, a student desiring to make inappropriate use his acquired electronic test bank file needs to have an idea what chapter the question is from and then make a quick scan the first five or six words of the question to match it to the exam being taken. The same is true of “Multiple Choice” questions as shown in the sample in Illustration 14. Illustration 14 presents a more worrisome example of how a student may cheat when the question posed on the exam is one involving a particular fact pattern for analysis. For example, the last question listed in Illustration 14 begins "Wallah Company agreed to accept $5,0000 in cash along with an $8,000, 90-day...”。 To find the answer to the question, a student only needs an independent internet connection and new window with Google access as seen in Illustration 15. By clicking on the second search result shown in Illustration 15, the student will be taken to a website that charges a fee for the correct answer; however, the third search result will take a student to a website shown in Illustration 16.

As you can see from the screen shot above, this website discloses the entire question, all answer choices, and the correct answer all of which are provided free of charge. Another safety precaution taken by the authors when using the textbook’s test bank is the decision not to group the True/False or Multiple Choice questions by chapter unless the exam only covers one chapter. Additionally, the authors alter the beginning language of each question which will make each question harder to identify. In some cases, the authors have reworded the question only in subtle ways so as to change the correct answer choice but have left the former correct answer as a possible choice. This method will cause a student who is using inappropriate test bank material under time pressure to choose the answer labeled by the test bank as being correct when, in fact, that answer is now an incorrect choice for the slightly altered test question.

A student with access to an electronic test bank will benefit from answers to objective and as well as subjective questions. Illustration 17 shows a screen shot of a sample set of questions that are essay and fill in the blank. The first question seen in the above illustration is an essay question. A student with access to this electronic test bank could easily click on that first question and see the additional information shown in Illustration 18.

In order to impede the efforts of the student to gain an unfair advantage by using the test bank, the authors would rephrase the question as shown below:

Dickens Incorporated ages its accounts receivable every July 31 in order to ascertain the amount of its bad debts adjustment. At the current fiscal year’s end, management estimates that $16,900 of the accounts receivable balance would be uncollectible. The Allowance for Doubtful Accounts has a debit balance of $3,200 before any year-end adjustments for bad debts. Prepare the adjusting entry that Dickens Incorporated should make on July 31, of the current fiscal year, to estimate bad debts expense.

The rewording above focuses on the name of the company, the date of the adjustment, and the ordering of certain phrases. These small changes can significantly reduce the usefulness of the textbook. For additional safeguards, the authors could alter one or more of the numbers contained in the question.
in the problem so that the answer would be also change. The best yet the most time consuming solution to the problem of a test bank being readily available to a student who desires it is for the instructor to write original questions. Also, one of the authors received permission from a textbook company whose books are used in the department to use questions from a competing textbook that has not been adopted by the department.
until the student reached Question #45. As seen in Illustration 21, which is a log of the next attempt there were 49 questions on the exam; however, Illustration 20 showed only 44 question indicating questions 45 through 49 had not been viewed by the student.

One possible explanation of the problem experienced by the student depicted in the last two illustrations is that the student's computer lacked adequate upload and download capabilities. This lack of capability can be exacerbated when an instructor allows all exam questions to be presented to a student at the same time. Depending on the size of the file or additional graphics or videos that may be embedded, a student with an older or a less expensive computer may experience a great amount of trouble in taking the exam.

Other concerns faced by the authors regarding the administering of online exams are (a) the length of time that elapsed between the computer crash and the student's initial attempt to notify the instructor, (b) the method by which the instructor was contacted (i.e., a late night email from the student timed to allow the rest of the evening to pass before the instructor could likely reply to the student), (c) the length of time that elapsed between the instructor's reply about the crash to the student's receiving the information (i.e., a student who delays checking email hoping to gain additional study time for the exam), (d) the number of questions viewed (or captured by screen shots taken) by the student who experiences a computer crash, (e) the true identity of the individual who is taking the exam, (f) the student's ability to discuss a question with another person either using live conversation or electronic communication), and (g) the student's ability to use unauthorized textbooks, notes, devices (including handheld calculators with memory options) or other materials. The answer to most if not all the previous questions posed is the use of a proctor. The authors have had experience with several methods of proctoring.

Different Proctoring Methods

The ideal testing environment involves a face-to-face meeting of the enrolled student the course instructor. This ideal environment is possible in an online class but is not usually practical because of the likely distance that exists between the student and the instructor and because of the time commitments of each party. When feasible, the

authors have given students the choice of taking the exam online or coming to campus and taking the exam with an on-campus section of the course being offered. Some faculty members allow students to take an exam at a satellite campus office or to find their own proctors. These testing options raise questions about maintaining the integrity of the exam and/or the proctor and about the logistics of providing and retrieving the exam in a timely manner (Young, 2013).

The authors began using online proctoring for an online course in an effort to eliminate or reduce the instances of cheating on an online exam (Harmon, 2008). Several companies offer proctoring services. The following list is not exhaustive but are one the authors have actually used, considered, or are considering. Their list consists of Respondus LockDown Browser, Remote Proctor [RP Now], Proctor U, ExamAnytime, Kryterion, Proctor Free, Tegrity, and B. Virtual, Inc. The first one tried and still used in some cases is Respondus LockDown Browser. This option is free to the students and supposedly prevents the student from visiting computer sites or using other computer programs while taking an exam; however, the instructors have been sent screen captures which are supposedly not possible from students.

Respondus Monitor has been added to this service which integrates webcam technology, but the authors have not tried this feature at this point in time.
One available option is the use of Skype or FaceTime by the instructor for each student taking the exam. This option requires a large time commitment by the instructor and would not be feasible in a large class or a class that scheduled multiple exams. Nevertheless, they are useful monitoring methods on rare occasions.

In order to achieve results similar to the face-to-face examination setting in a traditional classroom without the large time commitment for the instructor, the instructors examined the options available with online companies providing some type of monitoring service. The online companies provide the service with either the college paying for the exam cost or the students paying for each exam. After an initial trial period with one unnamed service used by the authors’ university, the authors and other instructors at the authors’ university who desire a proctored exam now require the online students to pay for the proctoring of each exam taken during that course. As long as an exam’s time frame is clearly stated in the course syllabus, the student is incentivized to make smarter choices about scheduling his time to take an exam with the proctoring service.

The authors have first-hand experience with the use of two different companies offering online exam proctoring services. Both companies took similar steps to ensure the integrity of the student’s testing environment and the integrity of the actual exam taken. As a general overview of the proctoring system, the process begins with the instructor logging into the proctoring service’s website and creating the settings for administering a new exam including the window during which the exam must be taken by students. The instructor then notifies his students that an exam window has been established. The student logs into the proctoring service, locates the appropriate exam schedule for his course, and selects a period of time that falls within the instructor’s established exam window. In the authors’ experience, the proctoring service charges each student a flat fee based on the length of the exam and the requirement that the student set his exam time at least 72 hours in advance. The closer in time to the exam a student wants to register, the higher his exam proctoring fee will be. A student is able to take an exam with no prior registration; however, that student will pay a higher fee for the proctoring service.

When the time arrives to take the exam, the student signs into the proctoring service website being sure to have handy access to his government issued photo identification, a good internet connection, a web cam, a microphone, and any notes or materials he is allowed to access during the exam. The monitoring service will determine the identity of the student by comparing the student’s government issued identification card or document with the person shown on the web cam who is attempting to take the exam. A picture of each is taken by the webcam for future comparison should a question arise at a later date. Those pictures are also available for the faculty to view after the exam is taken. The proctoring service will then verify the upload and download speed of the student’s internet connection to ensure sufficient capacity exists for taking the exam. The student is then required to use his web cam to provide the proctor a 360-degree view of the room where the exam will be taken including the ceiling above the computer, the floor below the computer, the left and right sides of the desk, and the area behind the computer. When the student’s testing environment has been verified as being free from obvious signs of unauthorized individuals and material, the proctoring service will ask the student to access the exam site and will take control of the student’s computer in order to enter the exam’s password which has been provided to the proctoring service but has not been provided to the student.

Two main differences between the prior and the current proctoring services were noticed by the authors. The first difference relates to the type of proctoring performed by each service. The prior proctoring service used the student’s web cam to film the student taking the exam. That same service also used the student’s computer to capture key strokes and screen shots every few seconds with no one monitoring the exam while it was given but with several employees reviewing data after the completion of the exam. That information was also made available for the instructor to review. The current proctoring service used by the authors’ university uses a designated proctor to monitor the exam. The exam itself is not videoed. Instead, the proctor uses the student’s web cam to take pictures at regular intervals to document the exam environment. If a student experiences a computer crash during the exam, the proctor stays in contact with the student and attempts to contact the instructor to explain the problem encountered. The instructor is given an opportunity to offer suggestions (if any) or to allow additional leeway in restarting a section of the exam. In the event an ethical issue or a other point of concern surfaces during the administration of the exam, the proctor service notifies the instructor at times previously selected by the instructor to receive that information which can include an immediate notification if so desired by the instructor.

The second difference is the steps taken to verify the identity of the student who is attempting to take the exam. While both services compared government issued photo identification cards to the student taking the exam, the current service takes an additional step in asking some basic questions of the student to which answers should be readily available. For example, one of the authors was recently contacted by the current proctoring service and informed that while the identification picture and the person presenting that identification card appeared to be the same person, the proctor had reason to believe the person attempting to take the exam was not the student enrolled in the course. This belief was based on the student’s inability to answer some basic questions about himself to which the student should have known the answers. The final result of the incident was resolved in favor of the student, but the university administrators were impressed with the extra level of attention the proctoring service provided in verifying the student’s identity.

The current service has been used for two years and has relieved anxiety on behalf of faculty that wish to provide an online opportunity but at the same time make it close to a classroom testing experience. While the university is satisfied with the current service, it has considered other proctoring services for the purpose of determining additional safeguards that can be added to increase the integrity and consistency of students’ testing environments. The authors and other instructors at their university are still seeking technology methods to prevent the creation of an electronic copy of an exam administered online. The authors hope to share ideas on a successful outcome to this issue in the near future.

References

This page intentionally blank.
The purpose of this study was to examine whether variations in student achievement in college courses exist between high school students who took the courses as dual enrollment (DE) courses and academically comparable high school students (AIMS scholars) who took the courses upon matriculation to college. Additionally, the researcher explored whether differences exist in DE course grade for students by course environment (online, face-to-face at a high school, or face-to-face at a college.) The researcher used final course grades as determinants of student achievement. The study focused on DE student and AIMS scholar grades in English 111, Biology 101, Math 163, and History 101 courses that were taken between the 2009-2010 and 2013-2014 school years at a community college in Southwest Virginia. The population consisted of 429 AIMS scholars and 2,015 DE students. For this study 3,639 DE student grades and 706 AIMS student grades were used in calculations. The dependent variables in this study were final course grades; the independent variables were DE participation and course delivery environment. Welch’s t tests were used to examine the variations in final grades for DE and non-DE students; ANOVA procedures were used to examine variations in final course grades for DE courses based on delivery environment.

Due to recent legislation more students have an opportunity to take DE courses; however, the extent to which DE is successful in preparing students for college can vary based on locale and access to a participating postsecondary institution (Edwards, Hughes, & Columbia University, 2011). This varying access has resulted in multiple methods of DE delivery that span various classroom environments. The U.S. Department of Education (2007) has demonstrated that such varying methods of course delivery are a nationwide norm. Because of this variation, researchers have raised questions about the effectiveness of varying methods of DE course delivery (Howley, Howley, Howley, & Duncan, 2013).

Despite research regarding the benefits of DE programs in general, there are few existing studies that disaggregate
DE student success according to DE course setting. Or- 
man (2013) suggested that “disaggregating students by 
delivery modality” would provide a richer analysis of DE 
programs (p. 70).
The purpose of this comparative study is to examine if 
variations in student achievement exist between dual en-
rollment (DE) English, biology, history, and mathematics 
courses environments and between dual enrollment stu-
dents’ grades and the grades of academically comparable 
peers. For the purpose of this study academic achievement 
is defined as final grade in class. Introductory English, 
biology, mathematics, and history courses were chosen for 
this study because they are often offered as DE options 
and because they are included in many general education curricula.

Background
Because of the popularity of DE programs in recent de-
cades, states have begun to provide policies that govern 
such high school and college interactions. As of 2012, 
46 states had policies that governed DE, and 12 of those 
states had mandatory participation from postsecondary 
institutions (Hofmann & Volech, 2012). Although states 
have mandated participation, DE program delivery envi-
ronment differs with instructor availability and region. 
Because of this, factors such as course delivery environ-
ment is left to the participating high school and college 
partnerships.

Program Benefits for Students
There are many academic advantages of DE that increase 
the likelihood of matriculation after high school. Fincher-
Ford (1997) demonstrated that early objectives of these 
programs included transitioning seamlessly from high 
school to college, earning college credits before entering 
higher education, and “shorten[ing] the time required for 
high school students to complete an undergraduate de-
gree” (p. xii).

Accelerated learning programs such as DE were intended to 
provide the opportunity for students to be introduced to 
academic rigor so that they have an increased chance of 
transferring college beyond the high school setting, lack of col-
lege readiness accounts for many college students’ initial 
academic failings; however, DE courses promote college 
readiness in multiple content areas including both tech-
nical education and transfer-level courses (Ganzett, 2014; 
Martin, 2013). Another key advantage of DE programs is 
that students who have taken these courses are more likely 
to continue their education beyond high school (Colum-
bia University, 2012). Ozmun (2013) found that because 
DE students are more familiar with college norms, stu-
dents who take DE courses may be more likely to “persist 
beyond their first semester or first year of college” (p. 62).

Additionally, researchers have found that upon matricu-
lation to a college or university, students who have taken 
DE courses perform better academically than students 
who had no previous DE experience (Jones, 2014).

Dual Enrollment in the 
Online Environment
Online delivery of DE courses occurs much less frequent-
ly than delivery on a high school or college campus (Black-
board Institute, 2010). Though Melländer (2012) con-
tended that “students who attend superior high schools 
do not expect to take classes on the web” (p. 68), he also 
demonstrated that postsecondary academic institutions 
(including the Maryland and Minnesota university sys-
tems) required their students to take a certain percentage 
of courses that were delivered via an “alternative learning” 
method (p. 67).

Dual Enrollment in the 
High School Environment
Although original concurrent enrollment partnerships 
were designed to take place on the high school campus 
(“About NACEP,” n.d.), college administrators and fac-
ulty express concern “about their ability to ensure the 
quality of the courses taught in high schools by high 
school faculty” (Kinnick, 2012, p. 40). Additionally, 
many college instructors felt that the dialogue with high 
school instructors was dominated by focus on paperwork 
and deadlines rather than course content (Howley et al., 
2013). However, unlike traditional DE settings, studies have 
found that DE students thrive when DE courses are taken at 
least one semester. For instance, the Community College 
Research Center (CCRC) found that students in Florida, New York City, 
and California who took DE courses on a college campus 
were 9% more likely to enroll in college, 6% more likely to 
pursue a bachelor’s degree, and 5% more likely to attain a 
bachelor’s degree than students who took DE courses on 
a high school campus (Columbia University, 2012, p. 5). 
CCRC also reported that there were no distinguishable 
benefits for students who had taken DE courses on a high 
school campus versus those students who had not taken 
DE at all.

Conclusion
Research has demonstrated that participation in an effec-
tive DE program increases the likelihood that students 
will be emotionally and academically prepared for the 
rigor of either a 2-year college or 4-year university. While 
there is conflicting evidence regarding the extent of the 
academic benefits of DE, the generally accepted conclusion 
among schools and policymakers is that DE is an effec-
tive method of bridging the gap between high school and 
college.

Methodology
The purpose of this comparative study was to examine 
whether variations in student achievement in college 
courses differ between high school students with dual en-
rollment (DE) credit and academically comparable high 
school students with no DE credit. Additionally, the 
researcher explored whether differences exist in course 
grade for DE students by course environment (online, 
face-to-face at a high school, or face-to-face at a college).

Design
Within this study the grades of non-DE students were 
compared with the grades of DE students respective to each 
content area. Additionally, the grades of DE students 
were compared based on DE course environment (online, 
face-to-face at a high school, and face-to-face at a college).

Data Analysis
Data analysis began with descriptive statistics that provide 
an overview of the population by demonstrating the per-
centage of the population that had not taken DE courses
of the 17 approved high school courses” (“AIMS Higher 
Scholarships,” 2014, para. 3). There is no GPA cutoff or 
requirement for DE participation (Virginia’s plan for, 2008). 
For this reason AIMS scholars and DE students are academically comparable.

The following research questions were used to guide this 
study:
1. Is there a significant difference in English 111 fi-
nal grade for students who took English 111 as a 
dual enrollment course and AIMS scholars who 
entered college with no English 111 dual enroll-
ment credit? 
2. Is there a significant difference in dual enrollment 
English 111 final grade for students who took dual 
enrollment English 111 online, face-to-face at a 
high school, or face-to-face at a college? 
3. Is there a significant difference in Biology 101 fi-
nal grade for students who took Biology 101 as a 
dual enrollment course and AIMS scholars who 
entered college with no Biology 101 dual enroll-
ment credit? 
4. Is there a significant difference in dual enrollment 
Biology 101 final grade for students who took dual 
enrollment Biology 101 online, face-to-face at a 
high school, or face-to-face at a college? 
5. Is there a significant difference in Math 163 final 
grade for students who took Math 163 as a 
dual enrollment course and AIMS scholars who 
entered college with no Math 163 dual enrollment 
credit? 
6. Is there a significant difference in dual enrollment 
Math 163 final grade for students who took dual 
enrollment Math 163 online, face-to-face at a 
high school, or face-to-face at a college? 
7. Is there a significant difference in History 101 fi-
nal grade for students who took History 101 as a 
dual enrollment course and AIMS scholars who 
entered college with no History 101 dual enroll-
ment credit? 
8. Is there a significant difference in dual enrollment 
History 101 final grade for students who took dual 
enrollment History 101 online, face-to-face at a 
high school, or face-to-face at a college?

Dual Enrollment Student Achievement in Various Learning Environments

Bethany Arnold, Hal Knight, & Bethany Flora

Spring 2017 (Volume 13 Issue 1)

Journal of Learning in Higher Education

26

27
as well as those that had taken biology, history, English, and mathematics as DE courses. DE data were further separated by course environment (online, F2F at a high school, and F2F at a college) for DE Biology 101, History 101, English 111, and Math 163. After descriptive analyses, the researchers examined research questions in terms of collected data. Student letter grades were treated as interval data, which is typical in educational research in order to run statistical procedures and gather means (Kaplan, 2011). Data indicating a grade of “Incomplete” or “Withdrawal” were not included in calculations.

Research questions 1, 3, 5, 7, and 8 were analyzed using an independent sample t-test. The t-test is also a statistical procedure that has a well-established history in research (Pelham, 2012). When the results of these procedures yielded significant results, the researcher continued analytically by “estimating the size of the underlying effect” (Witte & Witte, p. 285). Although the nature of research question 8 was appropriate for Analysis of Variance (ANOVA), the sample size for the group of History 101 DE students who had taken the course on campus was quite small (n=5). Because this population distribution was nonnormal, omission of this group yielded more trustworthy results. Research questions 2, 4, and 6 were analyzed using Analysis of Variance (ANOVA), ANOVA “tests whether differences exist among population means categorized by only one factor or independent variable” (Witte & Witte, p. 338). For instances in which the ANOVA revealed significant differences, the researcher continued analyzing by “estimating the size of the underlying effect” (Witte & Witte, p. 287). All statistical analyses were completed by testing against the mean using the Games-Howell procedure, which works well with unequal sample sizes (Games & Howell, 1976). Where needed, effect size was calculated in order to gauge the “difference between population means” (Witte & Witte, p. 287). All statistical analyses were completed using an alpha level of 0.05, which is widely accepted in the field of educational research (Leachey, 2005).

Findings

The study was focused on DE student and AIMS scholars in grades in English 111, Biology 101, Math 163, and History 101 courses that were taken between the 2009-2010 and 2013-2014 school years at a community college in Southwest Virginia. The population consisted of 429 AIMS scholars and 2,015 DE students. For this study 3,639 DE student grades and 786 AIMS student grades were used in calculations. The research questions outlined earlier were used to guide this study. The distribution of subjects between AIMS and DE by course is presented in Table 1. (Unequal sample sizes were taken into account during calculations.)

The dual enrollment population was also divided based on course delivery environment. Four of the eight research questions required such disaggregation. The breakdown of DE course delivery environment is provided in Table 2.

Results: Research Questions 1, 3, 5, and 7

Research questions 1, 3, 5, and 7 focused on the difference in final course grades for DE and AIMS students in four content areas, English, biology, mathematics, and history. All t-tests yielded significant results, demonstrating that DE students performed higher (based on final course grade) than non-DE students. The results of these research questions aligned with the results with many other studies that have documented the success of DE programs (Ganzert, 2014; Jones, 2014; Karp, 2012; Martin, 2013). The difference between DE and AIMS student grades was more evident in History 101, with a mean final course grade of 1.25 in final letter grades for DE and AIMS students. (One point is representative of one letter grade). Although this content area had the highest mean difference in final course grade, there were also meaningful differences in English, biology, and history that were 0.89, 0.83, and 0.86 respectively.

It is possible that the students who took these courses as DE courses had additional support systems in place that made the course less challenging than their non-DE counterparts (Farrell and Siefert, 2007) as well as Karp (2012) reported the importance of emotional scaffolding and the feelings of academic safety that accompany DE programs. Because a comparison group of AIMS scholars was used in this study, it is not accurate to say that these DE students were simply better students than the AIMS group. Instead, factors such as student support services and academic rigor may be better indicators of this variation in student success.

Research: Research Question 2

Research question 2 focused on the mean difference between final course grade in DE English 111 based on course delivery environment: online, F2F at a high school, or F2F at a college. An ANOVA yielded significant results, and post hoc procedures (via the Games-Howell procedure) outlined significant differences between the online AIMS group and between the high school group and the college group. There was no significant difference in DE Math 163 final course grade between high school and online DE Math groups. These results are fairly similar, in terms of areas of variation, to the English 111 groups. It is evident in both analyses that students who took the courses on a college campus performed significantly lower than the students who took the course online or at a high school. The students who took DE Math 163 online had a mean final course grade of 3.07; those who took the course at a high school had a mean final course grade of 3.16, and those who took the course at a college had a mean final course grade of 2.20.

Results: Research Question 8

Because the sample size for students who had taken DE History 101 on the college campus was so small (n=5) a Welch’s t-test was completed to examine the differences between final course grade for students who had taken the course online and at a high school. The results of this test were statistically significant; students who took the course online had higher final course grades than students who had taken the course on a high school campus. DE students who took the course high school had a mean final course grade of 3.60, whereas students who took the course online had a mean final course grade of 3.89. These specific findings conflict with many perceptions of the online course environment reported by educational researchers such as El Mansour and Mupinga (2007) and Bergstrander and Savage (2013). Students are often unfamiliar with online course platforms, due dates, and
decreased instructor interaction, and they often feel disconnected from the course and their grades suffer. Two main issues could account for these differences. Students now are more familiar with technology because they have interacted with it both personally and within educational settings. For this reason a more self-paced, low-interaction course could serve both acceleration and enrichment for advanced students. Additionally, there could be an issue in terms of rigor in one of the educational settings. Because, for this content area, there was little difference in student success in online and F2F courses, it is evident that these online courses could present a cost-effective alternative to F2F courses at a high school if they are as rigorous and provide the same amount of college preparation (in the long term) as F2F courses.

Conclusions

Recommendations for Practice

Because DE programs are associated with increased student success, it is imperative that colleges continue to grow, fund, and support them. Not only do such programs result in increased Full Time Equivalency (FTE) for colleges, but they also provide necessary scaffolding and preparation for collegiate studies. For this reason, the following recommendations are based on the results of this study's findings.

In English 111 and Math 163, students who had taken the courses F2F at a high school campus performed better than students who had taken the courses on a college campus. For this reason DE courses delivered on a high school campus should be evaluated accordantly to college standards, including course observations. Although DE course syllabi are evaluated according to college standards, further review of environment would strengthen programs across the board.

Secondly, the online courses examined within this study did not yield significantly lower final course grades. For this reason, colleges and high schools should work to provide more of these online courses and also to monitor them in a way that colleges can continue to ensure their effectiveness. Because more students can often be put in an online class than in a F2F one (because of seating restrictions), these online courses can be a convenient, cost-effective solution to staffing issues.

Recommendations for Further Research

Although results of this study demonstrated that DE is effective and that student success for English, mathematics, and history (but not biology) based on DE data, there were significant differences in final course grades for English 111, Math 163, and History 101 based on DE data. The results of this study demonstrated that DE is effective insofar as it results in higher course grades as compared to comparable non-DE students. Although there were significant differences in final course grades for English 111, Math 163, and History 101 based on DE course delivery environment, this type of analysis should be further carried out by colleges that offer DE courses within various environments at least on a biennial (every 2 years) basis.

Ensuring that DE programs do shift with the nature of instruction and technology is not only a way to make sure that DE programs remain effective, but that they are also effective in in carrying out the goal of promoting student success. Dual enrollment is an area that remains rich as an area for research; it is only through a study of the nuances of these programs that colleges can best serve their students and communities.

In conclusion, the results of this study demonstrated that DE is effective insofar as it results in higher course grades as compared to comparable non-DE students. Although there were significant differences in final course grades for English 111, Math 163, and History 101 based on DE data, the results of this study's findings are commensurate across a 2 years basis.

References


Engaging TBR Faculty in Online Research Communities and Emerging Technologies

Jasmine Renner
2016 Fulbright Specialist Scholar
Professor, Department of Educational Leadership and Policy Analysis
Clemmer Collge of Education
East Tennessee State University
Johnson City, Tennessee

ABSTRACT
The growing impact of online research communities and emerging technologies is creating a significant paradigm shift and consequently changing the current research landscape of higher education. The rise of online research communities exemplifies a shift from traditional research engagements, to online research communities using “Web 2.0,” in which communities of researchers are the basic unit of research engagement. As institutional practices become increasingly digitized, the role of faculty, scholars, and professionals are constantly reshaped and re-negotiated. The rise and use of emerging technologies in the field of research, has the potential to significantly impact the individual researcher, their institutions and ultimately the State. The project Critical Conversations Research Network is a part of a broader initiative undertaken by the Tennessee Board of Regents Office of Academic Affairs. TBR’s Critical Conversations for Jobs and the Economy is designed to complement Gov. Bill Haslam’s “Drive to 55” initiative, which aims to bring the percentage of Tennesseans with college degrees to 55 percent by the year 2025. (Haslam, 2013). The initiative undertaken by TBR’s Office of Academic Affairs consists of: (a) Conversational interviewing of selected scholars and researchers across TBR institutions through video recordings of important and critical research topics that affect policy implications in the state of Tennessee, (b) an interdisciplinary journal called Critical Conversations Interdisciplinary Journal (CCIJ) dedicated to promoting dialogue on topics of importance among scholars across disciplines at TBR institutions. The journal provides a platform for critical conversations through which all disciplines can inform practice and practice can inform all disciplines, providing guidance for future public policy decisions and (c) the proposed Critical Conversations Research Network which is the focus of this paper. The goal of the Tennessee Board of Regents Critical Conversations Research Network (“TBR’s-CCRN”) is to connect TBR’s faculty, researchers and scholars in collaboration, dialogue and engagement, about pertinent research initiatives undertaken by individuals and institutions across the state. A secondary purpose is to highlight the practical implications of research for economic and workforce development and to assist policymakers to engage in data-driven and informed decision-making.

Introduction
Online research communities (ORC) and emerging technologies (ET) have become a growing phenomenon with many and varied implications for academic use in higher education. Online research communities are a part of an emerging and developing area in research, that employs the use of cutting-edge technologies and engagement tools. The idea of an online community is not a new one. On mobile devices and in the fast paced digitized world, social interactions no longer have to be based on proximity; instead social interactions can literally occur with anyone anywhere. (Harmon, 2005). Online research communities have become a part of that dynamic network of access by anyone at any time. Online research communities can be defined as groups of individuals with common interests who engage in a variety of meaningful research interactions, network and engagement in an online or virtual environment. These interactions can have a major impact on strategy and operations on an individual, institutional, state and in some instances on a global level.

According to Wenger, an online community consists of three basic elements: i) first, the notion of joint enterprise, that participants shared and identify as common goals; ii) second, participants mutually engage, co-create, learn and undertake significant activities together; and iii) third, participants have a shared repertoire, a set of communal
Engaging TBR Faculty in Online Research Communities and Emerging Technologies

There are inevitably issues that can be addressed such as industry and independent professionals. (Baym, 2007). Baym (2007) suggests that online groups are taking new spaces. (Paragas, & Dela Cruz, 2014). Interaction and engagement via the Internet or virtual games, blogs and virtual worlds. In sum, online research lists or discussion boards. (Brandtzæg & Heim, 2008). Facebook allows users to create profiles and consequently allows those user-operated profiles to interact with each other. It also allows the expression of interests and the discovery of interests between users and allows users to build and maintain connections and invite others to join a community. In contrast, Twitter is a social media interface that enables users to share a limited amount of user-generated content, quickly and easily, to an extensive number of other users. (Gesser, 2013). Several research have investigated how scholars and researchers are using emerging technologies such as social media to enhance user engagement and the kinds of activities that emerging technologies might reflect. (Nolan, 2013, Siefert, 2013, Seaman & Tinto-Cane, 2013, Gesser, 2013).

Several research have investigated how scholars and researchers are using emerging technologies such as social media tools to foster their visual interaction. Such tools allow those user-operated profiles to interact with each other. It also allows the expression of interests and the discovery of interests between users and allows users to build and maintain connections and invite others to join a community. In contrast, Twitter is a social media interface that enables users to share a limited amount of user-generated content, quickly and easily, to an extensive number of other users. (Gesser, 2013).

Several research have investigated how scholars and researchers are using emerging technologies such as social media tools to foster their visual interaction. Such tools allow those user-operated profiles to interact with each other. It also allows the expression of interests and the discovery of interests between users and allows users to build and maintain connections and invite others to join a community. In contrast, Twitter is a social media interface that enables users to share a limited amount of user-generated content, quickly and easily, to an extensive number of other users. (Gesser, 2013).

Several research have investigated how scholars and researchers are using emerging technologies such as social media tools to foster their visual interaction. Such tools allow those user-operated profiles to interact with each other. It also allows the expression of interests and the discovery of interests between users and allows users to build and maintain connections and invite others to join a community. In contrast, Twitter is a social media interface that enables users to share a limited amount of user-generated content, quickly and easily, to an extensive number of other users. (Gesser, 2013).
4. Demonstrate the practical implications of research for economic and workforce development and to help policymakers make decisions.

5. Address empirical questions that will increase the understanding of fundamental educational, scientific, technological and social issues that will yield significant improvements in policy and practice.

6. Showcase the practical implications of research for economic and workforce development and to help policymakers make decisions.

7. Supports interdisciplinary research approaches and initiatives on topics related primarily to Health sciences, Education, STEM, Social sciences, Humanities, Business, and the Arts.

Project Concept

Professor Mike Thelwall in his contribution to the Research Trends Newsletter 2014 on "A Brief History of Altmetrics" noted:

"No one can read everything. We rely on filters to make sense of scholarly literature, but the most traditional filters are being swamped. The growth of new online scholarly tools allows us to make new filters. These altmetrics reflect the broad, rapid impact of scholarship in this burgeoning ecosystem. We call for more tools and research based on altmetrics." (Thelwall, 2014). Traditional research is at crossroads for institutions of higher education and educational boards statewide and nationally. Figure 1 below vividly demonstrates and outlines some aspects of transition and change that is occurring in the field of research.

Market research companies have used online polls for several years to collect quantitative data but the development of online research community tools such as discussion forums, blogs or social networks to collect data are a more recent but rapidly expanding phenomena (Harmon, 2005). With the introduction of online research communities and the infusion and integration of emerging technologies, opportunities abound to move the current state of research across TBR institutions to a more dynamic synergistic and inclusiveness making adequate and effective use of emerging technologies.

TBR’s prototype CCRN design concept focuses on the development, utilization and diffusion of emerging technologies into new application areas such as online research networks. TBR’s prototype CCRN concept is based on the opportunity model that facilitates the transition from the current status quo of traditional research methods to a new dynamic platform of engagement and collective research capital. TBR’s prototype CCRN was developed utilizing the NING software and a concept map adopted from the Fullbright Minds Social Entrepreneurship online research community. With over 2 million communities created to date, NING is the world’s largest SaaS platform for deploying vibrant social communities and web sites. Founded by Marc Andreessen and Gina Bianchini in 2004, NING was acquired by Mode Media Corporation (formerly Glam Media, Inc.) in December 2011 to bring together NING’s world-class social-native technology to help consumers and brands create and engage with passionate social communities across all digital mediums. (Ning, 2014). NING's unique online communities features and tools includes publishing tools, community features, social integration, smartphone and tablet-ready platforms, custom design and URL and privacy moderation controls. (Ning, 2014).

In the concept development phase, I chose to use Salmons’s 5 Stage Model for e-moderation as a mechanism for conceptualizing the process of the design as it allows me to consider the role of participants and moderators in the proposed prototype research network (Salmon, 2004). Whilst this model was developed with learning communities in mind, it has since been used in a number of other ways to structure online communication processes (Lynch, Heinze, and Scott, 2009) and offers practical advice on the use of online communication (Chowcat, 2005; Moule, 2007). Figure 2 below, illustrates Salmons’s (2004) 5-Stage Model for e-moderation.

This model of online community building and facilitation describes a five-stage process mapping the different stages of engaging participants using online communication technology. In the figure demonstrating the model, the level of engagement is indicated by the interactivity column (far right hand side) and the darkness of the color. Engagement starts from stage 1 “Access and motivation” and progresses up to stage 5 “Development.” Each of the stages is subdivided into two triangles representing the roles of the e-moderator and the technical support staff. These roles vary at each stage.

The first stage of the 5 Stage Model is concerned with accessing the system, when participants are issued with access information by the technical support and welcomed into the system. In the second stage, “Engagement”, participants are expected to engage with the system and “Get Involved.” They are encouraged to participate and contribute to the online community.

The third stage, “Development”, focuses on the development of the online community and the creation of new knowledge. Participants are expected to collaborate and work together to develop new ideas and solutions.

The fourth stage, “Implementation”, involves the implementation and deployment of the new knowledge. Participants are expected to apply the new knowledge to real-world problems and situations.

Finally, the fifth stage, “Evaluation”, involves the evaluation of the effectiveness of the online community and the new knowledge. Participants are expected to evaluate the outcomes and make adjustments as necessary.

Figure 2

Adapted from Salmons’s 5 Stage Model for e-moderation (© Copyright 2004, All Rights Reserved. Permission obtained from author for reproduction and use for educational purposes.)
by the e-moderator. The second stage focuses on online socialization of the participants in the community; they are encouraged to familiarize themselves with the environment and socialize with others. The information exchange stage puts more emphasis on interaction and engages participants with the materials. The final two stages are where the participants should already be familiar with their environment and thus be able to proceed with knowledge construction and development.

TBR’s Critical Conversation Research Network—Nodes

Organization—The prototype CCRN will utilize and mirror Vice Chancellor Tristen Denley designation and categorization of macro-majors utilized across TBR’s institutions. This allows for effective management of research capital and information and provides a deliberate strategic and systematic filter for organizing research information across fields for TBR institutions in the State of Tennessee. The list below provides a cursory categorization of macro-majors as designated by Vice Chancellor Tristen Denley.

The prototype nodes in the research network mirror the macro-majors categorization above and will serve as an organizational and practical tool for channeling the various kinds of research and scholarly activities that will be generated in the network. Scholars, researchers and faculty will be encouraged to participate, network and engage in the various sub-thematic collaborative groups to harness, leverage and disseminate important and pertinent research that informs policy and data informed decision-making.

Project Focus

The proposed TBR-CCRN will be the first within the Tennessee Board of Regents system. TBR’s CCRN participants will comprise of scholars, faculty, researchers from across TBR institutions in the State of Tennessee. The project focused on designing a “prototype research network” that connects researchers and scholars across TBR institutions in meaningful research engagements. Activities that will be undertaken by the proposed TBR’s CCRN are:

Online Research Engagement

Relationships are the life blood of meaningful online communities and interaction. Participants of online communities often share information about themselves, find out what their peers are doing, think about topics of exchange, disseminate vital information and resources and messages. TBR’s prototype CCRN will facilitate the engagement of TBR researchers, scholars and faculty in online research communities and virtual groups and circles to collaborate, network, disseminate and co-create new information from an inter and multi-disciplinary perspectives. This online research experience will augment already established relationships, while providing spaces for individuals who are separated by physical distance or other barriers to connect with each other. A study conducted by the University of Massachusetts Dartmouth found that 100% of surveyed universities and colleges use social media for some purpose. Faculty cited the inclusion of videos and blogs as among the most common applications of social media for instruction. Another survey by the Bobson research group and Pearson revealed that 70.3% of faculty use social media in their personal lives and 55% use these networks in professional contexts. (NMC Horizon Report, 2014 p. 9).

Dissemination of Pertinent Research Products and Findings—Broader Platform in “real-time”

Research paradigms are shifting to include more online communities and emerging technological tools. Scholars, researchers and faculty spend some of their professional development time on the internet, exchanging new information, networking with peers and colleagues, learning new facts and most importantly disseminating information of their research through submission to peer reviewed journals and publishers. TBR’s prototype CCRN will inject a “game changer” into this model by promoting the art of dissemination of pertinent research findings in “real time.” In addition the opportunity for 24/7 access to important information, data and findings is revolutionary. Online research communities amplify the potential for rich collaboration and instant access and dissemination of important and pertinent research findings.

Informing Data-Driven Decision-Making

Data has been measured, collected and analyzed in the consumer sector since the early 1990s to inform companies about customer behaviors and preferences. There is a growing interest in using new sources of data for personalizing the research experience and for performance measurement. As scholars and researchers participate in online activities, they leave an increasingly clear trail of analytics data that can be mined for insights. Learning analytics experiments and demonstration projects are currently examining ways to use data to modify learning strategies and processes. A recent trend in research has sought to employ analytics to improve teaching and learning. As students and faculty generate more data, there is a growing interest in developing tools and algorithms for revealing patterns inherent in those data and then applying them to the improvement of instructional systems. This in turn will have the practical effect of informing data-driven decision making on pertinent issues of practical, policy and political implications in the State of Tennessee.

Emerging Technologies—The Multiplier Effect

Today’s web users are prolific creators of content. For educational institutions, social media enables two-way dialogues between students, prospective students, educators and the institution that are less formal than with other media. As social networks continue to flourish, educators are using them to as professional communities of practice as learning communities and as a platform to share insights and research findings. Social media is changing the way people interact, present ideas and information and judge the quality of content and contributions. Educators, student, alumni and the general public routinely use social media to share news about scientific and other developments. The impact of these changes in scholarly communication is significant. TBR’s prototype CCRN seeks to effectively utilize emerging technologies such as social media tools to harness collective research information gathering, and dissemination and facilitate accessibility to that information in “real time.” Understanding how social media can be leveraged for pertinent research findings is a skill increasingly expected of our researchers and scholars.

Social Media Tools and TBR’s-CCRN

Figure 3 below provides a visual screen shot of a prototype proposed social media tools and groups that can be utilized in the network. Please note the images depicted are purely for academic demonstration purposes with final

Jasmine Renner

Spring 2017 (Volume 13 Issue 1)
images to be determined and approved by the required TB authority during the actual development phase of the network.

Project Impact
The anticipated impact of TBR’s CCRN is categorized into three domains namely: the Individual, Institutional and State Level. I utilized a Funnel Analysis to depict the various potential impact the proposed CCRN may have on three distinct levels namely the Individual, Institutional and State Level.

What is a Funnel Analysis?
Funnel analysis involves using a series of events that lead towards a defined goal from for example from user engagement in a mobile app to a sale in an eCommerce platform. A funnel is a well-defined flow on your website such as (the checkout process, registration, and lead generation) where users take a series of actions before reaching some sort of goal. The funnel analyses are an effective way to calculate conversion rates on specific user behaviors. (cite)

The first step in a funnel analysis is to find where these funnels occur. To analyze where funnels occur, there is a need to analyze two components. 1) the current conversion rates of a particular page, the conversion rate is what percentage of users who hit the registration page are registering. 2) the current drop-off rates. At every stage in the funnel, there is an inherent potential to lose some people. But the funnels gauge and record impact of the proposed site. For example if your front page is entirely focused on getting people to try the demo, research has shown that you will likely lose at least half of your visitors before they make it to the next step. Funnel analysis therefore helps designers to envisage impact of the proposed site (quantitatively) and to approach potential problems or challenges from the point of view of a user.

Figuring out funnels from a proposed online research network is one of the most important things that can be done to increase a quantitative understanding of the proposed network and website.

Find on the facing page, a visualization of how the funnel analysis process will impact TBR’s – CCRN in four different dimensions.

Conclusion
Success in the field of “research” requires an understanding that a number of significant principles of engagement have changed. In a hyper connected world, information flows much faster and more freely. Institutions of learning as a result are subjected to a growing level of collective intelligence and value creation from outside the university’s walls brought about by the increased collaboration of faculty, administrators and students in what is now a much larger ecosystem of data. This has led to current research models that replace traditional models where individual production of research capital is giving way to more online and in certain respects, collective peer production. Community based networks are becoming more prevalent than management hierarchies; where free real time global data flows are replacing traditional data collection. Therefore the generation of valuable research capital will be made possible by the generation of scholarly works created through the collaboration of researchers and scholars in the networked economy.

Online research communities are a part and parcel of this growing and potent networked economy. Online communities are powered by social power structures such as open source, crowdsourcing, specialized and thematic communities, that are proving to be more effective and efficient. William Gibson in his keynote address at the O’Reilly Emerging Technology Conference; The Shape of Things to Come said: “The future is here, it’s just not widely distributed. The shape of things to come is already implicit in a thousand small clues. Then, in a sudden shift of mindset, it becomes obvious to everyone.” (Gibson, 2008).

References


APPENDIX 2
TBR’s- CCRN- LANDING PAGE. PASSWORD PROTECTED

APPENDIX 3
TBR’s- CCRN- LOGIN PAGE. PASSWORD PROTECTED

APPENDIX 4
TBR’s- CCRN- ANNOUNCEMENT PAGE
Appendix 5
TBR's- CCRN- FAQ Page

Appendix 6
TBR's- CCRN- Discussion Page

Appendix 7
TBR's- CCRN- Resources Page
Incorporating an Honor Code into an Information Assurance Program

Jeffrey A. Livermore  
Lecturer, University of Michigan-Flint  
Flint, Michigan

ABSTRACT

Plagiarism and cheating is on the increase around the world. Academic misconduct hurts the student committing the offense, other students who know about the offense, the faculty, and the academic reputation of the school where the misconduct occurs [1]. One of the steps that a school can take to fight academic misconduct is to incorporate an honor code and its' values into their programs. The faculty teaching in ABC College's (pseudonym) Information Assurance program initiated a college-wide implementation of a simple honor code. This article presents best practices from a variety of schools, and hopefully begins a dialog on what can be done to eliminate or minimize academic misconduct from the Information Assurance educational system.

Introduction to the problem

Academic misconduct in all forms is increasing in higher education. Cheating is becoming more common in universities and Information Assurance programs are not immune from this plague of academic misconduct. Cheating consumes faculty time and can damage a school's academic reputation and destroy student morale.

A department chair/faculty member at ABC College (pseudonym) added up the number of hours spent addressing a single instance of academic misconduct. An IA student was found plagiarizing in a class. The student’s work in his other three classes was examined and it was determined that plagiarism had been committed in the other three classes. The college’s academic discipline process was followed and the student was expelled. The college's academic discipline process was followed and the student was expelled. The student appealed the expulsion and was reinstated into all classes until the appeal process was exhausted. After all appeals were filed and meetings held the student’s expulsion was upheld. At the end of the process, all four faculty members, the Director of the Information Assurance department, the director of Online Learning, the Vice President of Academic Affairs, the Associate Director of International Students, and the Chief Academic Officer had spent time in meetings with each other or the student. The cost to the college was easily several hundred man-hours and tens of thousands dollars.

To minimize or prevent this waste of resources, a faculty member recognized that the college needed to have an honor code. Discussions with colleagues within the IA department and college officers revealed their support of an honor code. The first problem encountered was the realization that any honor code adopted had to be adopted by the entire college. This expansion of scope required a lot of changes to the original plans and paradigms. The project instantly became much larger and much more difficult with many more stakeholders than originally thought.

The faculty member was willing to advocate for an honor code to help the college with accreditation. The college has been designated as a Center of Academic Excellence in Information Assurance education by the National Security Agency. One of the requirements to maintain this accreditation is to practice sound security policies internally and implementing an honor code would demonstrate the college’s commitment to academic integrity.

Honor Codes in Education

An academic honor code encourages ethical behavior, and requires students to commit to the values of honesty and personal integrity [1]. Honor codes place responsibility on the students and their fellow students to maintain academic standards and to provide a level academic playing field for all students. For example, the U.S. Military Academy’s honor code clearly states, “A cadet will not lie, cheat, steal, or tolerate those who do” [2]. Students at the Academy are given a copy of the code on a laminated card that they are asked to carry with them at all times [3]. This card serves as a reminder which is necessary because in a study, 40% of university students felt that they should whistle-blow on their fellow students but only 13% said they would actually do it [4]. Turner and Beemsterboer [1] propose that an honor code must contain the following elements:
Incorporating an Honor Code into an Information Assurance Program

Jeffrey A. Livermore

1. A statement of the values upheld by the code and school
2. A list of the academic violations and the categories of unacceptable behavior
3. A list of the potential consequences and punishments for violations
4. A description of the group that will be investigating and making any decisions based on the outcomes of the investigation
5. A description of the investigation and decision-making processes
6. A statement promising confidentiality of the investigative process and the outcomes of the investigation and decision-making processes
7. A statement promising that records will be kept of the process
8. A statement promising a decision within a stated period of time
9. An appeals process for students to appeal their punishment

The problem of academic misconduct is not limited to students. Faculty members commit plagiarism from their own work and the work of others [5]. Schools and academic journals have often downplayed plagiarism by faculty to avoid embarrassment and damage to their reputation and brand image [5; 6]. It is important that faculty serve as role models for academic integrity to their students and the learning environment [7].

Online Pedagogy

Academic misconduct in online programs may be higher than in on-ground programs as people cheat more when they feel disconnected from their faculty [8]. Many IA programs are completely online and allow students to do everything from application to graduation without ever setting foot on a campus. Online pedagogy must take the nature of the online environment into consideration. Implementing an honor code into an Information Assurance program that is totally online and at a school that offers several online degree programs and approximately half of its course sections online must take that into consideration in developing an honor code implementation plan.

The Approval Process at ABC College

Once the decision was made to pursue implementing an honor code, the faculty member made a presentation to the department chairs and program directors. The presentation included a memo that outlined a proposed implementation plan and a copy of a mocked up poster for the honor code that every full-time faculty member would sign. The response to the honor code and the poster was favorable at this level. The proposed honor code was modeled after the West Point honor code and kept as simple as possible. The wording of the proposed honor code was “A ABC student will not lie, cheat, steal, or tolerate those who do.”

The next step was to present the proposed honor code and implementation plan at the next academic department meeting. The academic department meetings are attended by all full-time faculty members and representatives from the Assessment Office, the Office of Online Learning, Scheduling, and Administrative Support. The initial response was again favorable as many of the faculty felt that we needed to do something to address the problem. A committee of three faculty members was formed to develop an implementation proposal for the honor code. The committee developed an initial project plan, budget, marketing plan, and collected feedback from a variety of people in the academic community. The three member committee came back to the next meeting of the academic department and requested that the faculty vote to approve the honor code.

The faculty voted against adopting the initial honor code because of the phrase “or tolerate those who do” at the end of the honor code. Several senior faculty members felt that it would be too difficult and expensive to enforce that clause of the honor code. Not having an honor code was preferable to having a non-enforced honor code. The rejection only delayed the process by about four months while the advocate drafted a revised honor code that would avoid the problematic phrase.

The honor code wording was revised to “The ABC academic community will maintain the highest ethical standards in our quest for academic excellence. We will not lie, cheat, steal, or claim credit for the ideas and work of others. We commit to respecting the intellectual property of others and will always acknowledge the authorship of intellectual property in all forms.” This wording was approved by the full faculty and the project moved forward.

The revised honor code was sent to the college office for approval. The officers were pleased with the honor code and approval was received from every officer within two weeks of sending them the honor code.

The Implementation Process at ABC College

The college moved quickly to implement the honor code. The Chief Academic Officer pointed out that the Higher Learning Commission likes to see an honor code but they need to see it publicized across the school at every opportunity. The champion for the honor code made arrangements to get this publicity done in as short amount of time as possible.

The first step was getting the new honor code incorporated into all of the syllabi at the school. The Director of Online Learning made the necessary steps to include the honor code in all of syllabi in the online course tool. Hard copies of the honor code were distributed at a faculty development event to the faculty and copies were also provided to all faculty members to hand out to their students at the start of the fall semester. The faculty members were asked to put the honor code in all future syllabi that they developed.

The honor code was incorporated into the school Website within a month of launching the honor code. Care was taken to make certain the honor code was placed in the appropriate pages on the Website. The implementation went much faster and smoother than initially expected. The school’s administration, faculty, and staff seemed eager to place the honor code into use and the project received immediate cooperation at every turn. The implementation timetable is summarized in Table 1.

Some of the proposed implementation ideas were not accepted. For example, the college opted not to issue a press release about the adoption. The college also opted not to place the honor code on the back of the student identification cards. The college has always printed the mission statement on the back of the cards and adding the honor code would have placed a lot of text on the card and forced the use of a small font that would make reading either the code or the mission statement difficult.

<table>
<thead>
<tr>
<th>Task</th>
<th>Completion Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission of the first version of the honor code to the chairs and program directors</td>
<td>March</td>
</tr>
<tr>
<td>Committee formed to draft an implementation plan</td>
<td>March</td>
</tr>
<tr>
<td>Submission of the first version of the honor code to the full time faculty members</td>
<td>March</td>
</tr>
<tr>
<td>Revising the honor code to a version that was acceptable to the faculty</td>
<td>August</td>
</tr>
<tr>
<td>Submission of the second version to the full time faculty members</td>
<td>September</td>
</tr>
<tr>
<td>Officer approval of the second version of the honor code</td>
<td>September</td>
</tr>
<tr>
<td>Inclusion in the catalog</td>
<td>September</td>
</tr>
<tr>
<td>Inclusion in every online syllabus</td>
<td>September</td>
</tr>
<tr>
<td>Printed copies of the honor code given to faculty for distribution to all on-ground students</td>
<td>September</td>
</tr>
<tr>
<td>Copies of the honor code distributed to all faculty at faculty development day for inclusion in future syllabi</td>
<td>September</td>
</tr>
<tr>
<td>Inclusion in the school Website</td>
<td>October</td>
</tr>
</tbody>
</table>

Incorporating an Honor Code into an Information Assurance Program

Jeffrey A. Livermore

Students coming into a school with an honor code must be informed of the honor code and be aware of the potential consequences. The admissions department worked on ways to incorporate the honor code into the new student orientation and enrollment materials. The students, faculty, and staff accepted that the honor code would be enforced and would remain in effect.

Conclusions

Stopping academic misconduct is not a simple task. There is no silver bullet or single solution. Implementing an honor code is one part of a larger solution. ABC College feels that the honor code was a necessary and effective step in slowing academic misconduct. Applying the honor code to faculty, staff, and students set a high standard for the conduct of everyone in the coming years.

What worked at ABC College may not work in your educational community. Different schools have different cultures, policies and faculty values. School culture played a large role in the ABC implementation and will no doubt play a large role at other schools. Each school must decide whether using an honor code to draw a line in the sand is what they want to do.

Table 1 IMPLEMENTATION TIMELINE

Jeffrey A. Livermore
References


Introduction

As one of the first business ethics textbook states, by way of observation, “Custom, convention and the accepted courtesies of a society are not the foundation of ethics even though they provide valuable hints as to what men think...Law enshrines many of the ethical judgments of a society, but it is not coextensive with ethics” (Garrett, 1966, p. 1). Therefore, “changes in the law tend to reflect changes in what a society takes to be right and wrong...” (Shaw, 2008, p. 11).

We think Garrett and Shaw are correct; thus, we work to have our students understand that ethics differs from legal codes but that ethics drives the law. These two points can effectively be shown with regard to environmental ethics. We offer a model that can help students see the relationship between law and ethics. First, we briefly explore the development of environmental ethics and highlight the broader ethical considerations related to the environment. Then, we trace the legal history that followed philosophical analysis.

Environmental Ethics: Rights, Justice, Utility, And Care

Environmental concerns have been with us since the 1960s, originating in large measure from two important publications. When Rachel Carson’s Silent Spring appeared in 1962, people were introduced to biological degradation and ecological analysis. As well, the book had emotional impact—who wants to lose bluebirds, a symbol of happiness?

Later in the decade, Garrett Hardin’s famous essay, “The Tragedy of the Commons,” provided more grist to the ecological mill. His 1968 article, appearing in the widely circulated journal, Science, alerted the world that unless patterns of behavior changed, “Ruin is the destination toward which all men rush” (1244).

Within a short while, ethicists and legislators alike developed responses. Google scholar loosely catalogs 2,730 books and articles between 1900 and 1959 under “books and articles on environmental ethics.” Between 1960 and 1969, 2,340 are listed; between 1970 and 1979, 8,280 are...
listed, and between 1980 and 1989, that number doubled, with 16,200 items listed. Business ethics textbooks mirrored the interest in environmental ethics. Thomas Garret's ground-breaking textbook, Business Ethics (1966), had no listing in its index for “environmental ethics.” On the other hand, Manuel Velasquez's equally ground-breaking, 1982 business ethics textbook, Business Ethics: Concepts and Cases, had a whole chapter dedicated to environmental ethics. Legislators were not far behind, as we will see later.

While ethicists are today parsing out finer, narrower problems, the original work by ethicists used basic ethical concepts to establish the backbone of environmental ethics. Textbooks in applied ethics, including business ethics textbooks, such as Shaw's (2008) and Velasquez's (2011), focus on some combination of the ethical considerations of rights, justice, utility, and care, and focus on the two problems Hardin (1968) identified: resource depletion and pollution. Thus, our students learn that environmental ethics is the application of rights, justice, utility, and care to the twin problems of pollution and resource depletion. Hardin (1968) suggested that people act as though resources were unlimited, free goods whose use came without cost. The result is wasteful consumption and environmental degradation. He also observed that people did not and do not take responsibility for the environment because they think that “I am only polluting a little bit when I drive my car. Don’t blame me.” This form of thought, the relative contribution rationalization (RCR), is meant to remove responsibility from a person to change his or her lifestyle in order to accommodate the natural world.

If a person were to embrace the RCR, what sort of ethical arguments might be offered to justify changing that irresponsible attitude? Or, phrasing the question differently, how can protection of the environment and environmental quality be taught? Let us consider a few of the arguments used to support environmental laws and policies.

The consideration of environmental rights, articulated by Blackstone (1973), would protect individuals from the in-jurious effects of environmental pollution. In its simplest form, the argument using negative rights states that pollution violates a person's right to health. Pollution injures people and the right to health protects people from unwanted and injurious intrusions.

However, pollution already exists. There are toxic waste sites and Superfund cleanup sites. Damage to the environment has already occurred, with the consequent, probable, and certain future harm to nearby areas. Young people have not created the toxic sites, yet those children have a right to a healthy environment. Clear and safe environmental rights. Hence, the current, older population must take action to protect the rights of young people. In other words, children are positive right holders and the older population are the duty bearers for removing the harmful toxins.

The argument about positive rights extends itself to considerations of environmental justice. Young people have not lived long enough to affect the environment negatively. They have not consumed very many resources, nor have they lived long enough to pollute the earth. Nonetheless, the burden of pollution and resource depletion will fall on them, either by way of harming them or by way of assuming the responsibility for restoring the environment. In short, young people have a right to a healthy environment. This is a violation of capitalist justice, where benefits are distributed roughly proportionally to the burdens assumed and contributions made to society.

The capitalist notion of justice appears to be violated when the undeserved burdens of environmental degradation are placed on young people. The same notion of justice can be applied to businesses which pollute. If all the costs of production, including environmental costs, are not reflected in the price of some good, then the producer is receiving undeserved benefits while the population at large receives undeserved burdens. For instance, the burden of air pollution could be borne by those who are warned not to leave the house during an ozone alert. While the polluting company or companies enjoy the benefits of selling their products, those with breathing difficulties suffer the hardship of confinement indoors.

Other arguments can be drawn from the notion of care and strong environmentalists have done precisely that. People like Peter Singer (1975) and Tom Reagan (1985) have argued that animals have moral status. Some argue that every life, human or non-human has some status equal to that of human beings and anyone who disregards that equality is guilty of speciesism (Singer, 1975). Others treat moral status on a sliding scale or a continuum and while ranking animals high on the scale. The ethic of animal rights argues that animals do deserve the respect associated with rights. For instance, while a dog has less moral status than a human being, and can expect less respect in terms of rights, a dog ought not be kicked and beaten. Even a moderately favorable position on animal rights is sufficient to generate concern for the environment.

Finally—and despite a lack of literature on the notion—aesthetic rights may exist. A cursory glance at the marijuana smokers points to a right of any given person to use marijuana as they choose. The marijuana smoker is free to the polluter. Legal commentators also recognize this right. As Hardin (1971) observed, “all technical progress contains unforeseeable effects” (1962, p. 419). The more efficient production is consistent with the utilitarian principle. The law’s solution to the problem, however, has developed in ways that are prodigiously in industrial production and in the production of power, and they suffer the adverse consequences of pollution and abuse” (p. 1-9). It is unsurprising, then, that regulation has stepped in and “the law to fill this void, representing an application of Hardin’s solution to environmental problems: “mutual coercion mutually agreed upon” (Hardin, 1968, p. 12-17).

The law’s solution to the problem, however, has developed slowly. Federal regulation of pollution is a relatively recent what unexplored right. The spectacular sights of Yellowstone and the Grand Canyon, so this line of thought holds, must be preserved in perpetuity for the enjoyment of future generations, who have a right to see such sights. In addition, allowing visitors to commercially exploit national parks inspires the populace to better citizenry. Doremus (1999) suggested that the creation of the national park system reflected a thinking of the public, a fondness for the health, contemplation and pure reflection, which in turn would regenerate spirits dulled by the constant labor of the ordinary citizen’s life.” (p. 441-442).

This last justification for environmental ethics, namely, aesthetic rights, has ethics and law entwined. The law has grown to embrace the environment, but the law itself fails to pay to what Jacques Ellul observed: “all technical progress contains unforeseeable effects” (1962, p. 419). The upshot of Ellul’s observation is that the rights of nature have no guarantee if ever policy is adopted or item produced, it should solve three problems because it will create two. Such may be the case with legislation regarding the environment. The law, driven by ethics and relying on a conceptual foundation drawn from applied philosophy, has to deal with the real world, such as free market arrangements, and its uncertainties.

An emphasis on ethics clarifies the goals and scope of environmental law and policy. Flournoy (2003) urges a more robust examination of the interplay between environmental ethics and law if we hope to achieve sound environmental policy: “If neither the public nor the decisionmakers articulated the ethical issues involved, we cannot ultimately know whether our laws and policies are consistent with our ethics” (p. 116).

Environmental Ethics and The Law

As Hardin (1968) observed, a reliance on market forces alone is insufficient to combat pollution and depletion of common resources like air and water. The market creates few incentives to conserve resources that are essentially free to the polluter. Legal commentators also recognize this problem. Grad (2014) states, “Air and water are regulated by the same sort of laws, and yet, paradoxically, they are produced prodigiously in industrial production and in the production of power, and they suffer the adverse consequences of pollution and abuse” (p. 1-9). It is unsurprising, then, that regulation has stepped in and “the law to fill this void, representing an application of Hardin’s solution to environmental problems: “mutual coercion mutually agreed upon” (Hardin, 1968, p. 12-17).
phenomenon—the Environmental Protection Agency ("EPA") was born in 1970 (Buck, 2006, p. 25). Historically, disputes about pollution were handled through the common law tort of nuisance. If a plaintiff can show that he or she has sustained property damage or personal injury as a result of pollution, the plaintiff can recover compensatory damages or, in some instances, obtain injunctive relief. However, tort law is insufficient to address environmental harms that are diffuse and affect a large number of people—the standing doctrine makes it difficult for private individuals to pursue environmental damages suffered by the community at large. In addition, in the tort context, courts may be reluctant to grant injunctions to stop pollution if it appears that the benefits the polluter provides to the community are greater than the harm borne by the individual. Moreover, nuisance cases can be difficult to prove because the plaintiff has to overcome the hurdle of causation. Harm may be caused by a combination of pollution sources, which makes it difficult to determine which entity should bear financial responsibility for damages (Farber, 2014, p. 99).

Perhaps the biggest shortcomings associated with nuisance law is that it is largely reactive—it does not prevent pollution from happening; it simply provides compensation when those industries use pollution control mechanisms, and "punishing" industries through special taxes when those industries create more than their fair share of pollutants (Farber, 2014, p. 96). Finally, regulators can create market pollution permits, which allow the state to set pollution standards while businesses are relatively free to allocate those permits according to market forces: "the government can tradeable permits that firms can sell to each other. By limiting the total number of permits, the government ‘caps’ emissions, but the distribution of pollution rights between various emitters is left to the market rather than being decided by the government" (Farber, 2014, p. 97).

Specifically, the mechanisms for combating pollution and resource depletion are embodied in several pieces of legislation. Modern environmental regulation began in the 1970s with the enactment of the Clean Air Act and the creation of the EPA (Percival, 1997, p. 164). Under the Clean Air Act, the EPA is responsible for establishing national ambient air quality standards that the states are responsible for developing plans to meet those standards. The goal of these standards is to ensure that air quality does not pose a significant threat to public health (Farber, 2014, p. 96). Following the Clean Air Act, a variety of environmental legislation have been traditionally diffused among members of the community at large, or borne by later generations who had no role in creating the harm. Laws attempt to shift the burdens to the entity that is in the best position to prevent the harm—industries creating the waste.

While regulation can help mitigate the effects of pollution and resource depletion, it is largely a stopgap measure, and it cannot clean up all of our environmental problems. The best solution may lie in Hardin’s (1968) suggestion that we should change our behavior by thinking differently about the morality of pollution and resource depletion. People who observe that we have examined only the moral dimensions of our relationship with the environment in the past, and we should continue to do so because "[c]onvictions, values and individual actions are the foundation for our environmental problems."


References


HUMAN MACHINE LEARNING SYMBIOSIS

Kenneth R. Walsh
Associate Professor
Department of Management and Marketing
College of Business, University of New Orleans
New Orleans, Louisiana

Md Tamjidul Hoque
Assistant Professor
Department of Computer Science
College of Sciences, University of New Orleans
New Orleans, Louisiana

Kim H. Williams
Director and Associate Professor
Lester E. Kabacoff School of Hotel, Restaurant and Tourism Administration
College of Business, University of New Orleans
New Orleans, Louisiana

ABSTRACT

Human Machine Learning Symbiosis is a cooperative system where both the human learner and the machine learner learn from each other to create an effective and efficient learning environment adapted to the needs of the human learner. Such a system can be used in online learning modules so that the modules adapt to each learner’s learning state both in terms of knowledge and motivation. This paper describes the benefits of such a system and a proposed design that integrates human learning in both the cognitive and affective domains with machine learning which adapts to both.

Introduction

Learning can be viewed as the transformation from a current state of knowledge and abilities to an improved state of knowledge and abilities. Humans learn through a wide variety of artifacts such as computers, books, real-world interaction and teachers taking them from a given state to another. Effective learning artifacts help take the learner from where they are to a new state, however, each human exists at a unique state of knowledge and abilities.

Human teachers are exceptional tools for learners because of their ability to adapt to the state of the learner. A tutor helping a single learner can be effective often because they can take the time to understand the individual learner and what would help them progress. The teacher in a classroom of similar learners can engage the learners in a learning exercise that helps them all. However, learners in the same class may be similar, but are not the same and the teacher adapts adjusting the experience or addressing learners individually. In larger classes, the teacher has more of a challenge adapting to individual learners. Complicating the process is the human learner must expend effort to learn which requires motivation. The human teacher is adept at providing motivational input to learners along with the content itself. However, teachers come at a cost of the teacher themselves and their infrastructure. In a society with many potential learners, the potential for teaching costs can be extraordinary.

In many online learning environments, computer learning tools are used to augment or replace the teacher in order to increase the availability or decrease the cost of the learning experience. However, as the tool becomes available to more learners, its design assumptions about the current state of the learner may become further off the mark making the tool less effective. Further, as the learner learns he or she may outgrow the tool or fall behind the tool. Attempts to make adaptive tool, where based on learner responses, the tool can present more advanced information to those who have mastered certain levels and present remedial material to learners who are not progressing widens the range of learners that can be served. The cost now shifts to the teacher’s ability to redesign tools with the many paths that learners may need. Since these designs can be applied to many learners, they can be used.
at a lower cost per learner that the human teacher alone. However, the coarse grained adaptability may make learning less efficient to the individual learners when compared to direct teacher interaction. Further, such systems are usually seen as motivating the student.

Machine learning is a method of computer problem solving whereby the explicit structure of the problem is not coded by the programmer, but rather is discovered by the computer. This can be a computer intensive process, but with falling computer prices the economics more and more justify letting the computer explore the solution space over a human programmer explicitly testing the combinations.

Embedding machine learning in online learning modules has the potential for modules to adapt to greater degrees and more individually to learner’s unique characteristics than traditional structured learning modules. Further, their lower cost can increase the availability of such techniques to a wider audience. Developing a learning machine that is symbiotic with the human learner is at the heart of many learning systems. Machine learning is a method of computer problem solving whereby the explicit structure of the problem is not provided by the programmer, but rather is discovered by the computer. This can be a computer intensive process, but with falling computer prices the economics more and more justify letting the computer explore the solution space over a human programmer explicitly testing the combinations.

Previous Research

Human Learning

Human learning involves the acquisition of new knowledge and skills through effort put forth by the learner. The effectiveness of learning activities is evaluated by both the current state of knowledge and skills of the learner and the learner’s motivation to put forth effort to change it. Student performance and retention are greatly affected by learning while increasing availability and decreasing costs.

Cognitive Learning

The spottage between learning activities has been shown to change the effectiveness of learning activities. For example, students “cramming” for a test may show a short-term effectiveness, but the memory loss may decay quickly thereafter. In general, dividing study time over multiple sessions increases its effectiveness (Carpenter et al., 2012). The implication for a machine learning system is that using only the learning activities and outcomes as inputs would be insufficient. When in and what order the learner participates in the activities determines the effectiveness of the learning system and needs to be included as inputs to a machine learning model so that the machine learning system can find the best timing and combination of activities.

How learning activities are interleaved can dramatically change their impact on the learner (Roehrer, 2012). For example, most learning environments will have more than one activity around a learning objective. A learning design where several learning activities around one concept are completed sequentially, before moving on to another concept may not be as effective as learning activities between the two concepts. Concepts that are similar can easily be confused and can be difficult to differentiate between and such an interleaved learning approach can help the learner understand the differences. The implication for a machine learning system is that input on past student performance should be known temporally so that ordering effects can be learned by the system. The interleaving that has been studied has focused on experimental design where concepts within a subject area have been interleaved. For example, Kornell and Bjork (2008) found that interleaving helped students learn how to differentiate painting from artists with similar styles. Little has been done asking the broader question of how different subjects should be interleaved and how the timing of learning activities across subjects should be conducted. A machine learning approach that uses input across subjects or academic classes could yield useful information on the broader question of interleaving activities. Roehrer (2012) notes that the research on interleaving has been limited to short term learning activities and simple patterns of interleaving. A machine learning approach has the ability to consider a wider range of data and may be able to find larger time scale patterns of interleaving. Further, in a real world setting, patterns of interleaving may be the whim of student habits and, therefore, data available to machine learning systems may be biased based on social norms, culture, and current practice.

Effect of Affect

The affective state of the learner changes their ability to use, focus upon, and learn from learning systems. Affective state at any one time may be more or less conducive to learning and may change dramatically for one time period to the next. To what extent affective state in the learner is not prepared for may dishearten the learner and reduce their confidence in successfully mastering material. On the other hand successfully completing a challenging exercise can boost confidence for future activities.

During deep learning experiences, that is when learning about something novel and difficult, learners are put in a state of disequilibrium whereby what they understand does not match well with the new material being presented. The state of disequilibrium leads to the negative affective state of “confusion, frustration, boredom, curiosity, and anxiety” (p. 4) and may be a necessary part of learning (Roehrer and D’Mello 2012). Positive feelings are not felt by learners unless they have moved back into a state of equilibrium relative to the learning material and have overcome a hurdle or succeeded in an objective (Grasser and D’Mello 2011). Grasser and D’Mello interpret the eureka concept is intended to be a major breakthrough in learning that the learner is not prepared for may dishearten the learner and reduce their confidence in successfully mastering material. On the other hand successfully completing a challenging exercise can boost confidence for future activities.

During deep learning experiences, that is when learning about something novel and difficult, learners are put in a state of disequilibrium whereby what they understand does not match well with the new material being presented. The state of disequilibrium leads to the negative affective state of “confusion, frustration, boredom, curiosity, and anxiety” (p. 4) and may be a necessary part of learning (Roehrer and D’Mello 2012). Positive feelings are not felt by learners unless they have moved back into a state of equilibrium relative to the learning material and have overcome a hurdle or succeeded in an objective (Grasser and D’Mello 2011). Grasser and D’Mello interpret the eureka concept is intended to be a major breakthrough in learning.

The balancing of equilibrium through learning activity and affectiveness is mediated by feedback mechanism. To the extent that feedback is given, it can encourage the learner to exert more effort to complete a more difficult exercise. Feedback can also reinforce the success so that the learner experiences the expected positive affect. Oranja et al. (2005) researching a planner Graesser et al. (2008) found confusion to be a similar construct to disequilibrium as a prerequisite for learning. For example, Graesser et al. (2008) found that randomized learning procedures improved performance in the learner when giving hints designed to make the learner think further and would reduce confusion when the tutor gave specific facts. Grasser et al also found that positive feedback from the automated tutor when a learner grasped a concept increased the students effect in the learner. Their research was exploratory but the results seem promising and worthy of further research. They also note the concept is intended to be a major breakthrough in learning although it was measured here as a relatively small breakthrough and, therefore, the study may have been underpowered to detect the effect the condition had on the students. Nevertheless, strong correlation between comments from the automated tutoring system and the learners affect were measured.

Bosch and D’Mello (in press) studied an automated tutoring system that used a computer programing and found the affective states of confusion and frustration followed learning errors and those states were lessened when the system gave them guidance. Shute et al (2015) studied the video game Physics Playground, rather than a more academic physics education and found frustration lead to higher performance in the game and ultimately to higher post test scores in the game as well. DiMello et al. (2016) suggest that confusion, when introduced properly and when resolved properly, can have a beneficial effect on learning.

A learner’s level of disequilibrium or frustration in the moment of an education experience influences outcomes; however, general student traits that are more persistent over time also influence a learner’s ability to engage in a learning activity. Gall et al. (2014) developed the Academic Diligence Task as a measure of self-control in an academic setting. The task requires a mental predictive validity for objectively measured GPA, standardized math and reading achievement test scores, standardized math and reading achievement test scores,
high school graduation, and college enrollment, over and beyond demographics and intelligence” (p. 2).

Gamification is the process of using game-like elements such as points, badges, challenges, and levels of difficulty to encourage people to act and boost customer participation. Its significance has become increasingly important in the corporate sector, and it is forecasted to be a substantial portion of social media marketing budgets in the future (Finslay and Alberts 2011). Gamification has come to involve studying and identifying natural human tendencies and employing game-like mechanisms to give customers a sense that they are having fun while working toward a rewards-based goal. An example of gamification would include Nike Plus, an online community that motivates individuals to exercise more by enabling players to earn points and set goals. Gamification lessons are another way to use mechanisms that could be used by a machine learning system as a feedback tool.

In a business context, the potential value of gamification is an increased level of customer engagement. Customer engagement facilitates repeated interactions that strengthen the emotional, psychological and physical investment a customer has in a product offering or brand (Brodie et al. 2012). This research proposes that the same principles of gamification and customer engagement used in industry can be applied to the classroom setting, particularly with respect to student engagement. Student engagement has been used to depict students having completed certain prerequisites in time. Its significance has become increasingly important to encourage people to act and boost customer participation and involvement are cognitive, affective, social and behavioral responses from consumers, effective gamification efforts must be successful at engendering these same reactions. Vivek et al. (2012) suggested that participation and involvement are key requisites to CE. Cognizant in participation and involvement are cognitive, affective, social and behavioral components. Thus, this research suggests that both participation and components to successful gamification initiatives. Further, it proposes that gamification tools can not only be affective at engaging consumers in the business environment, but such tools can also be effective at creating student engagement in the classroom. The study that follows investigates the efficacy of two instructional methods in creating student engagement, one in which gamification techniques were employed and the other in which a traditional lecture format was enlisted. The details regarding the design of the study, along with its findings, are discussed next.

Online Learning

Bowers et al. (2012) found that machine-guided instruction used in a hybrid course could be used with one hour of weekly face-to-face instruction and achieve equal learning outcomes to a traditional course employing three hours of weekly face-to-face instruction. Bowen’s example shows an increase in learning efficiency within the context of students having completed certain prerequisites in a relative homogenous educational environment and still relies on the support of the human teacher, although at a reduced level. These results beg the question how can such learning opportunities become more effective and less costly.

Toward a Symbiotic Model of Human and Machine Learning

Proposed Machine Learning based Learning Tools

Our proposed Interactive and Intelligent Education Delivery System (IIEDS) is a software-tool, through which a full course can be delivered to a student in an interactive and intelligent manner.

Teachers’ Perspective

A teacher or an instructor will be able to transfer his/her teaching material in IIEDS’s required format. Once the input is given, then in the absence of the teacher, IIEDS will guide and engage a student learn and help solve an exercise effectively.

Modules of IIEDS

The IIEDS will have two (02) modules: (a) Lecture Delivery Module (LDM) and (b) Exercise Module (EM). These methods are described below.

Lecture Delivery Module (LDM)

To deliver, lecture-slides will be readout by the software for the students. Student should be able to pause, repeat, and fast-forward as well as be able to click the highlighted terms and jargon to check the related information for further details, as needed – which could be supplied beforehand or, can be supplied from Internet (links and readings) to be explored by the interested students. The module will record the behavior of the student, suggest further reading and information and will ask questions to raise intuition of the student. Student may skip or answer. For correct answers, student will be encouraged and will be asked next (deeper) questions. For wrong answers, the theory behind the question will be readout again. If it is still wrong, the link of related information from Internet could be provided. For having repeated wrong attempts, the instructor should be notified by the system. All these behaviors will be recorded including the solution provided by the instructor to overcome the failing situation. This will form the foundation of reinforcement learning (Dogan and Olmez, 2015; Kadib and Littman, 1996) (Sutton and Barto 2016), (Szepesvari 2013) implemented via machine learning techniques (Rashid et al., 2015; Iqbal and Hoque, 2015) for both HEDS and the students.

Exercise Module (EM)

This EM module will be invoked or, independently started at the end of each section of the lecture. Here, questions and solutions will be delivered in the order from easy to hard or, as predicted by the software based on the experience (generated from the Machine Learning technique ran in the background) – the behavior of the students such as how fast he is answering what level of questions, correctness and how he is slowing down, etc. will be recorded. Necessary steps will be taken by the instructor to place additional information to bridge the gap if connecting steps are missing for a student to go to the next level of challenging questions. EM will also include tests and quizzes.

Architecture of the IIEDS: The engine of the IIEDS will be built based on Machine Learning (ML) techniques and will incorporate the following features:

- Based on the collection of the behavioral entries and response-features such as various mouse-clicks and responses, amount of time to get to a particular level, lesson delivery pattern and timing: inter-leaved or non-interleaved delivery of the similar topics (as discussed in the Cognitive Learning section of this article), and success and failure rate per questions per level etc. will be recorded and use as features in the proposed ML approach.

- Based on the computed (using Extra-Tree classifier (Geurts and Wehenkel, 2006) and/or TensorFlow (Abadi, et al., 2015) effective feature-sets will be determined. The feature-selection step will not only help the next steps of ML but also will help us identify the key features involved in the student’s learning.

- Based on the (effective) feature-set, a classifier will be built which will classify student’s current performance level per lesson – we may define 10 different levels of performance score or grades, for example. An efficient classifier such as support-vector-machine (SVM) (Hsu, Chang et al. 2010) or, deep artificial-neural-net (ANN) based TensorFlow could be applied for multi-class classification to rank the performing student accordingly.

- The IIEDS itself will be a reinforced learner with a goal: what information needs to provide and when, how to provide better pathways to a student to help the student become the top ranker based on game-theoretical approach (Tomlin, Lygeros, and Sutatsky, 2000) as well as reinforcement learning based approaches. Top-ranking target can be defined by setting the goal to score ≥ 90%, for example.

Training of IIEDS

To train IIEDS, it will simply need to be used by students – the more it is used, the more it will obtain the experience and will be able to provide effective as well as need-based-variable pathways or suggestions to the students based on their individual feature-parameter values.
Utilization of the IIEDS Tool

IIEDS can be used in both synchronous and asynchronous modes. It will be interesting to see what different experience IIEDS can get from the synchronous versus asynchronous users—which can also help justify better mode. Train IIEDS using synchronous users to generate and capture intelligent moves and then allow asynchronous user to use the mature IIEDS, for example, and this can turn into an effective learning approach.

Expectation from IIEDS

IIEDS is a learner, and being a learner IIEDS will capture effective and intelligent moves by the users—thus, IIEDS will be an excellent tool to store the collective efforts which can keep growing richer by the usage—and in return, IIEDS can deliver most suitable pathways for a student based on the student’s need determined by the performance and feature parameter values. Eventually, IIEDS can be regarded as a personal teacher, standing by the student to provide encouragement as well as assistance as needed.

Enhancement of the Intelligence of IIEDS

The IIEDS can be made more powerful by enhancing its intelligent and capacity to scale. Primarily, IIEDS will collect several optimal sequences of actions via reinforcement learning that helped students achieve higher score. The dataset will be invaluable in generating more creative pathways from the samples. Utilizing short schema (Hoque, Curry et al. 2007) or, short action-steps from the collected successful action-sequences, novel and interesting pathways can be generated fast and intelligently using our effective evolutionary algorithm (Hoque and Iqbal 2015). These pathways can then be cross-validated using IIEDS again.

As the feature-space of IIEDS is expected to be very high, naturally scalability can be a concern while enhancing the intelligence of IIEDS. Fortunately, we have already developed novel approach, named SGRGA (Iqbal and Hoque 2016), to handle such scalability issues within our evolutionary approach. The idea will be transformed for this IIEDS application. Thus, this overall recurrent approach can make the IIEDS grow its intelligence effectively.

A Build and Learn Methodology

Understanding levels of affect in real time and adapting appropriately has the potential to greatly improve the efficiency of system on outcomes (Nunamaker, 1991). The methodology is important to this study both because we will be creating new never tried environments and because the fast pace of technology change can be taken advantage of in iterations of the test cycle.

Efficiency Outcome Measures

One measure of efficiency is course design efficiency which is the cost of course design with the value. A number of related measures can be developed as a comparison between traditional course design approaches, faculty intensive online course design, and Connected Thinking Lab design approaches. The Connected Thinking Lab design approach pairs a course designer with a faculty member in the design of multimedia content, student assessment, and collaborative exercises. If done well, faculty will make better use of their time contributing as subject matter experts as course designers efficiently craft artifacts. The hope would be that time and cost saved of the faculty member is greater than that of the course designer.

Equation 1 shows the time efficiency of course design using traditional methods vs Connected Think Lab methods. Equation 2 shows the efficiency of cost design using traditional methods vs Connected Think Lab methods. This model measures the efficiency of methods in two ways. First, the study will compare design times of new methods to traditional methods. Secondly, it will compare how new methods design efficiency changes over time to capture the likely learning curve effective of application of redefined design processes. Measures that can contribute to efficiency calculation include:

- Faculty design hours in a traditional course (FDH)
- Faculty design hours in Connect Thinking Lab course (FDHct)
- Course designer design hours in Connected Thinking Lab course (DDH)
- Course (C)
- Faculty cost (FC)
- Course designer cost (DC)

On the other hand, the efficiency of the student balancing school, work, and family is important as well. A challenge with traditional teaching formats for students is the time commitment of meeting at a particular time and place for class. Students must therefore consider both cost of tuition ad time. Time can be divided into the two categories, time spent on synchronous activities and time spent on asynchronous activities. Time spent on synchronous activities can be divided into time spent on same place synchronous activities and different place synchronous activities. Synchronous same place time is often the most expensive time for students because they must forgo time at work or with family and must travel to the location. Synchronous distance classes reduce travel cost, but still have opportunity costs while asynchronous activities allow students to schedule learning activities around work and family commitments.

Student Costs:
- Tuition (T)
- Student time in asynchronous learning activities (STA)
- Student time in synchronous distant learning activities (STSD)
- Student time in synchronous face-to-face learning activities (STSF)

Where the magnitude of the costs can be ordered base on the early discussion as:

Classroom modules then will be redesigned to either include:

- Course (C)
- Faculty cost (FC)
- Course designer cost (DC)

Reference


Conclusion

“New ideas about ways to facilitate learning—and about who is most capable of learning—can powerfully affect the quality of people’s lives” (NRC, 2000, p. 5). Achieving human computer symbiosis has the potential to drastically change availability and efficiency of advanced education. The machine learning approach allows for the consideration of many more variables simultaneously in the both the design of learning systems and the design of research on such systems. Since human learning is influenced by a wide range of competing factors, this approach may find new interactions between factors leading to richer learning environments. Furthering science in human computer symbiosis will require multi-disciplinary approaches to better understand the human learning process and how artifacts such as machine learning impact the human learner. In the whole system to work in concert, theories from the cognitive sciences, education, and computer sciences need to be integrated and evaluated concurrently.

References


Dogan, B. and Y. Olmez, A novel state space representation for the solution of 2D-HP proteinfolding problem using...


ABSTRACT

This paper explored the authors' concerns about students enrolled in their introductory accounting course. Anecdotal evidence suggested that students struggle with basic arithmetic concepts that underlie basic business transactions even though their math placement and ACT scores are high. A survey of 125 students in a first accounting course was conducted in the spring of 2010 to assess the basic arithmetical skills. The results indicated that the ACT scores and math placement tests do not reveal weakness in basic arithmetic. We find that faculty and students will experience frustration due to the impaired arithmetic ability. By taking for granted that students possess basic skills in arithmetic faculty will exclude exercises from the curriculum that will build the kind of arithmetic abilities students need to think on their feet about basic business transactions. We conclude by arguing that making curricular accommodations to cope with the deficit in arithmetic is not in the student's best interest. A competitive advantage for students can be created by addressing the deficit head on rather than adjusting the curriculum to work around the problem.

1 The authors wish to thank Skip Burhans for his contributions to an earlier version of this paper. The authors are also grateful for the feedback provided by member of the Bradley University CBER forum (DATE) and the Mid-West Regional AAA Conference (DATE).

Introduction

This paper was prompted by a shared complaint and frustration with the apparent inability of undergraduate students to do basic arithmetic. Class sessions are interrupted because students cannot follow the arithmetic that underlies basic business transactions. Faculty would like to assume that students possess basic arithmetic abilities and then become frustrated when the students fall short of this desire. That frustration leads the faculty involved away from responding to the environment they encounter with an intention to create opportunities for the students to gain a competitive advantage through skill development. So this paper explores the issue of student's struggling with basic arithmetic concepts.

The impact of the seemingly reasonable assumption about arithmetic is quite serious. It has even reached a level of concern that comments have appeared in the Accounting Review. Kaplan (2011, page 380) noted the following shocking outcome:

“I learned earlier this year that a major bank employs 500 accountants to mark its entire global portfolio of securities to fair value each day. The chief accounting officer told me that they cannot hired graduated from U.S. accounting departments for this task. The students so not know sufficient economics, mathematics, and statistics to perform the fair value calculations. This deficit is a direct result of accounting scholars not doing research on fair value measurement and therefore not being able to teach our students how to perform such calculations.”

Aside from the Banker’s exaggeration we are not willing to assume the cause of the problems are with research. We
The Risks and Opportunities Associated with Weak Arithmetic Skills of Accounting Students

train students in a long list of contemporary issues that is growing faster than the available contact hours. We cannot pretend to give effective education in financial reporting in the absence of fundamental prerequisites. A professional environment includes weak arithmetic in the full range of business transactions and processes. This territory, assumed to be within the student’s grasp, is now therefore an issue.

So, now the professional environment includes weak ability to perform basic arithmetic. Increasingly incorrect or inappropriate decisions flow from the lack of appreciation of basic arithmetic relationships. (Moore, 2009) Put another way the language of arithmetic has been lost. Since arithmetic ability is taken for granted it is not necessary to include it in the tests that students must pass to be allowed to go out and do applied learning on a national scale. The USA’s participating students have slipped from a position of global leadership to rankings of 25th in terms of mathematics and 24th in terms of science.

The American College Testing program (ACT)

The American College Testing program (ACT) was founded in 1959 by E. F. Lindquist and is a not-for-profit organization headquartered in Iowa. At that time the first of the Baby Boom generation was approaching college age and higher education institutions were planning significant increases in their enrolment numbers. The existing Scholastic Aptitude Test (SAT) had been in use since 1926 and was designed to measure a student’s overall aptitude for learning. The ACT was developed on a different philosophical model and has always intended to measure a student’s ability to do first year college-level work based on what they have learned in a typical high school business curriculum.

The authors’ anecdotal experience indicates that the basic arithmetic competencies of business students are relatively low, when arithmetic competencies primarily represent the four basic functions. At the same time, the average ACT mathematics profile for these same students remains relatively strong. Are we becoming grumpy old men or is there another less disturbing explanation? The purpose of this paper is to determine if the anecdotal evidence can be supported with more objective measures. The arithmetic skills of students present a significant teaching constraint. We cannot pretend to give effective education in financial reporting in the absence of fundamental prerequisites.

Specifically, the authors briefly explore answering these two questions:

1. Can students learn, to some reasonably satisfying degree, in a first course in accounting, with the apparent development of basic arithmetic skills (i.e., addition, subtraction, multiplication, and division), critical thinking, and analytical reasoning skills?
2. What does the math section of the widely used ACT purport to measure and what does it appear not to measure?

The Program of International Student Assessment (PISA) is conducted by the Organization for Economic Co-operation and Development (OECD). PISA is an annual assessment of problem solving skills of applied learning on a national scale. The USA’s participating students have slipped from a position of global leadership to rankings of 25th in terms of mathematics and 24th in terms of science. The report noted:

“Several other facts paint a worrisome picture. First, the longer American children are in school, the worse they perform compared to their international peers. In recent cross-country comparisons of fourth grade reading, math, and science US students scored in the top quarter or the top half of advanced nations. By age 15 these ranking drop to the bottom half. American students are furthest behind just as they are about to enter higher education or the workforce.”

McKinsey, pg. 8, 2009

The current situation changes the intellectual place where university accounting educators first meet accounting students in an introductory or principles of accounting course. It is their responsibility to take their students from that place of first encounter to one of global competitiveness. In his recent book, Academically Adrift: Limited Learning on College Campuses, Arum and Roksa (2011) noted that university business majors average 955 hours of study per week. Since this is not enough to recover from their relatively poor high-school preparation in reading comprehension, writing and, in particular, basic arithmetic skills, the impact of their reduced skill sets and competencies must affect the scope of their university curriculum.

All business students, regardless of their specific major, will benefit from good numerical literacy. The daily process of critical thinking and analytical reasoning is essential for academic and subsequent business success. Successful students must think on their feet and be clever and entrepreneurial enough to detect opportunities for growth and profit. Some entrepreneurial aspects should be embedded into almost every part of the undergraduate business curriculum. There are limited opportunities for an individual faculty member to remediate for prior academic (elementary, secondary or collegiate) weaknesses, so we surmise that accommodations are made — leading to further faculty angst. Generally, our colleges admit based on reported psychological test scores (e.g., ACT, SAT) well-qualified students, but they have a decreasing facility with “basic street math” (arithmetical). Arithmetic for the authors’ purpose in this paper, consist of the basic four operations: addition, subtraction, multiplication and division.

Along with the reported relative declines in this nation’s overall education (compared in the tests that measure mathematical preparedness for College). So, this paper explores our frustration arising from encounters with students who earned high ACT scores and yet they struggled with fundamental arithmetic skills, the impact of their reduced skill sets and competencies must affect the scope of their university curriculum. The big discovery was that the placement tests were not capturing a weakness that was predictive of success because they did not embed critical thinking and analytical reasoning is essential for academic and subsequent business success. Successful students must think on their feet and be clever and entrepreneurial enough to detect opportunities for growth and profit. Some entrepreneurial aspects should be embedded into almost every part of the undergraduate business curriculum. There are limited opportunities for an individual faculty member to remediate for prior academic (elementary, secondary or collegiate) weaknesses, so we surmise that accommodations are made — leading to further faculty angst. Generally, our colleges admit based on reported psychological test scores (e.g., ACT, SAT) well-qualified students, but they have a decreasing facility with “basic street math” (arithmetical). Arithmetic for the authors’ purpose in this paper, consist of the basic four operations: addition, subtraction, multiplication and division.

The ACT’s emphasis on Algebra, Geometry, and Calculus may no longer be a good measure of arithmetic preparedness for the study of the first course in accounting. It seems good students now simply learn how to do well on the ACT. Many take ACT prep or review courses to improve their ACT scores. Do the reported math scores mean the participation competencies, not competencies? This dynamic muddies the water making it harder to fulfill our social responsibility as accounting educators. The sum of our individual decisions, grounded in a rational sense of moral hazard will not be known for many years to come.

It is worth stating or speculating that there are perhaps no apparent consequences on the CPA exam—perhaps because it is not tested there either.

Building on Previous Studies

There is a large body of research that documenting the ex- planatory factors that will indicate student success. The work of the Pathways Commission is a possible framework for building this analysis. As a general observation there is a weak correlation between various entrance examina- tions and success in a post-secondary program. It seems that there is some overriding dynamic that has yet to be articulated.

The origin of this paper was to re-visit the frustration over arithmetic weakness by extending the work of Yunker and Krull (2009) in their study entitled “The influence of mathematics ability on performance in Principle of Ac- counting.” They found that ACT and math placement scores were weaker predictors of success than a simple test of basic arithmetic. In looking at their findings it seems, students have learned how to do well on placement tests without, remarkably, having a good grasp of the under- lying arithmetic. This gives us further evidence that the ACT assumption that higher mathematics requires sound arithmetic has uncoupled.

In their paper, Yunker, Yunker, and Krull (2009) built on a series of papers that have in turn advanced the re- search into mathematical preparations. These started with Pritchace, Romeo, and Saccucci (2000) who looked at the connections with mathematics and a success in a princi- ples of accounting class. Ballard and Johnson (2004) did a similar study with a economics students. Yunker and Krull used the Ballard and Johnson testing instru- ment to the studies together, as does this paper.

The big discovery was that the placement tests were not capturing a weakness that was predictive of success because they did not embed critical thinking and analytical reasoning is essential for academic and subsequent business success. Successful students must think on their feet and be clever and entrepreneurial enough to detect opportunities for growth and profit. Some entrepreneurial aspects should be embedded into almost every part of the undergraduate business curriculum. There are limited opportunities for an individual faculty member to remediate for prior academic (elementary, secondary or collegiate) weaknesses, so we surmise that accommodations are made — leading to further faculty angst. Generally, our colleges admit based on reported psychological test scores (e.g., ACT, SAT) well-qualified students, but they have a decreasing facility with “basic street math” (arithmetical). Arithmetic for the authors’ purpose in this paper, consist of the basic four operations: addition, subtraction, multiplication and division.

Along with the reported relative declines in this nation’s overall education (compared in the tests that measure mathematical preparedness for College). So, for example, Folley, Peres, and Poirier (2008) found the SAT to be a poor predictor, math assessment to be a bit better and so postulated that pre-requisite curriculum in mathematics needed further refinement. A related set of developments can be traced in the efforts of the American Accounting Association to ensure ac- counting education is responding to changes in the pro- fessional environment. For them this encompasses the ongoing state of quality assurance and improvement methods. There are some unfortunate conflicts between the professional and academic expectations as evidenced in the Kaplan (2011) commentary, Black (2012) sum- marized 30 years of progressive studies into educational reforms, the most recent of which is the Pathway’s Com- mission.

A particularly interesting aspect of the Pathway’s Com- mission (Behn, 2010) is their recommendation for a new
The Risks and Opportunities Associated with Weak Arithmetic Skills of Accounting Students

model of curriculum. In broad terms there is a concern that what goes on in the classroom is directed towards the issues to be faced. However, taking an open systems approach we cannot assume the inputs, that is students arriving on campus, are a constant commodity. Consideration of this previous work helps us ferret out a more specific purpose for this paper. That is to explore the explanation and implications of the changes in the mathematics emphasis in schools. Consider if Manchester United announced that entry into its development program will be heavily influenced by a players speed. This will cause coaches, who want their athletes to succeed, to favor speed training at the expense of other developmental activities. Why? Regardless of their belief in a well-rounded athlete, time away from “speed” training diminishes their players’ chance of being promoted to the program. So the coach then has an incentive to shift time away from skill development and give that time to speed training.

The extension of this analogy points to opportunities that may arise from this research. Emphasis on the ACT, SAT, and math placement tests has an inevitable impact on the coaches (teachers) upstream from the universities. A good high school will emphasize the calculus, geometry, and advanced algebra that are predominant in in these admissions tests. They have to do it because they are now hurdles in the admission process. We postulate this shift is at the cost of time spent emphasizing arithmetic. So to bring this together, one can see that the ACT and SAT will not be good predictors of arithmetic since they do not include these tests. Post-secondary education that is in tune with the contemporary environment will adjust to the current strengths and weaknesses of freshmen arriving on campus. So, rather than complaining about a skill deficit, an opportunity exists to rely on the new strengths of students and shift time back understanding arithmetic at the college level. In consideration of the environment there is a bias towards factors that students will face at the expense of what they went through to be admitted to university.

Our Study

The business core at Bradley University (Bradley) includes two freshwater level accounting courses: ATG 157, Accounting Principles–Financial, and ATG 158, Accounting Principles–Cost Management. The design of the ATG 157 course presumes the students possess basic elementary-school arithmetic skills. For enrolling freshmen in their required university mathematics courses of their general education requirements, Bradley uses the reported ACT math score in conjunction with its own designed math placement test to measure essential mathematical reasoning. Any student with an adequate combined score on the ACT mathematics component and the Bradley math placement test may take ATG 157 in their first semester, while others must wait until a lower-level math course is completed, such as Math 109 College Algebra.

Anecdotal observations by the Bradley Department of Accounting reveal a general concern about the lack of students’ arithmetic ability, regardless of their combined ACT math and Bradley math placement scores. Consequently, many students struggle with the arithmetic needed to do calculations supporting basic business transactions covered in ATG 157. The anecdotal experiences do not seem to connect with students’ reported ACT math scores and Bradley’s math placement scores. A trial survey of students at Bradley’s summer freshman orientation in July 2009 lent credibility to this concern. This current study was undertaken to gain more insight into the practical arithmetic skills and various other competencies associated with students’ performances in ATG 157. The study will enable the Bradley accounting faculty to examine its concerns regarding its students’ mathematical reasoning with a view to curriculum revision.

Students registered in ATG 157, Accounting Principles – Financial, in the spring semester of 2011 were surveyed. Four sections were offered that had 135 registrations at the time of the survey (32, 35, 30, and 38, respectively). A total of 125 students were present and elected to take the special survey on the first day of classes. To maximize analytical flexibility, good problems were excluded where their data such as the ACT math scores, Bradley Math Placement Scores, and demographic data were missing. That leaves us with 89 students for which we have individual full data sets.

Twelve of the 89 students withdrew from ATG 157 before earning an overall course grade. The 77 students that completed the course achieved an overall GPA of 2.8 on a 4.0 scale for ATG 157. That group was made up of 52 male students and 37 female students. They had consider- able diversity in their academic experiences. Their average semester credit hours completed before the Spring, 2011 semester were 37, while the least experienced had seven hours and the most experienced had 125 hours. Bradley has five undergraduate colleges and a “university” college where undecided students may reside until they choose a college major. Table 1, at the top of the facing page, pro- files the students in four ATG 157 sections, categorized by their chosen college of origin with abbreviated names ease of reading.

The students were asked to answer twelve basic arithmetic questions with a ten minute limit. A copy of the survey is provided in Appendix A. These questions were split between basic adding or subtracting, multiplication, and division word problems involving a simple linear relationship. Calculations were kept very simple, and the students were not permitted to use their calculators. This enabled the faculty to prohibit calculator based prompts to compensation for an inability to mathematically describe and arithmetically complete the sort of basic arithmetic computations underlying many basic business transactions. The survey was administered on the first day of class. There is a risk that the text was not taken seriously that may be offset by a desire to do well at the first meeting of a course.

Hypothesis Development

In step with the first small data set at this point in time, our research and building upon previous studies it is possible to develop five hypothesis out of this study. Previous studies all point to the predictive value of the ACT/SAT. This study points to the need to explore the gap predictive gap along a new line of consideration as follows:

H1: There is an overall weakness in arithmetic skill that the ACT does not capture effectively. Following this we will again look to gain validity by aligning with previous studies (Yunker, Yunker, and Krull, 2009) which affirm that arithmetic is an important factor in predicting success in Accounting 157. By isolating the arithmetic this effect is predicted to be statistically strong.

H2: The arithmetic Quiz will be a better predictor of ATG 157 success than the ACT mathematics score. Our anecdotal experience with students points to an inability to understand arithmetic relationships. The language of math is missing. It is very hard for many thereof to translate words into quantitative relationships. As a result we expect exploration problems to me the most problematic and therefore the most predictive.

H3: Arithmetic problems presented in a word expression format will be more difficult than other formats. The significance of the problems grew exponentially with the ACT is a sound predictor of success in business studies. If we build on the idea of accounting as the language of business, there has to be a positive correlation, arithmetic perhaps become that alphabet of that language.

H4: There is a strong connection between arithmetic, ATG 157 and success in business studies. Our final concern is that individual faculty may make little changes to the system. As discussed teachers, like coaches have to respond to the admissions criteria. Changes to admission processes, like reliance on the ACT, has implications on the skill set of the incoming class.

H5: Faculty responses to the lack of basic arithmetic enable students to proceed in spite of a skill deficit, needed for professional progress.

STREET MATH RESULTS

The overall average percentage score on the twelve item survey was 54 percent, of which about half (27 percent) of the 46 percent missed resulted from wrong answers. The remaining incorrect responses (nineteen percent) resulted from questions that were left blank.

Table 1

<table>
<thead>
<tr>
<th>College of Record</th>
<th>Student Count</th>
<th>Withdrawn GPA</th>
<th>ACT (Math)</th>
<th>Bradley Math (Placement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>35</td>
<td>6</td>
<td>2.7</td>
<td>13.7</td>
</tr>
<tr>
<td>Communications</td>
<td>13</td>
<td>3</td>
<td>2.4</td>
<td>25.2</td>
</tr>
<tr>
<td>Engineering</td>
<td>19</td>
<td>0</td>
<td>3.2</td>
<td>28.1</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td>0</td>
<td>4.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Arts/Science</td>
<td>4</td>
<td>0</td>
<td>3.0</td>
<td>25.5</td>
</tr>
<tr>
<td>Exploration</td>
<td>19</td>
<td>1</td>
<td>2.5</td>
<td>24.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>89</td>
<td>12</td>
<td>2.8</td>
<td>24.7</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct</td>
<td>96%</td>
<td>90%</td>
<td>88%</td>
<td>83%</td>
<td>53%</td>
<td>62%</td>
<td>56%</td>
<td>51%</td>
<td>43%</td>
<td>87%</td>
<td>98%</td>
<td>84%</td>
<td>82%</td>
</tr>
<tr>
<td>Wrong</td>
<td>4%</td>
<td>10%</td>
<td>12%</td>
<td>16%</td>
<td>25%</td>
<td>21%</td>
<td>26%</td>
<td>52%</td>
<td>4%</td>
<td>9%</td>
<td>21%</td>
<td>19%</td>
<td>28%</td>
</tr>
<tr>
<td>Blank</td>
<td>8%</td>
<td>8%</td>
<td>2%</td>
<td>1%</td>
<td>22%</td>
<td>8%</td>
<td>18%</td>
<td>37%</td>
<td>4%</td>
<td>38%</td>
<td>53%</td>
<td>55%</td>
<td>19%</td>
</tr>
</tbody>
</table>
The performance deteriorates as the survey progresses. Only 1 percent of the responses to the first 3 questions were left blank. This grew to 46 percent of the responses for the last three questions. One could ask if the ten minute limit was too short a period of time for the students to demonstrate their competencies. This was also observa-
able when questions were similar. Question 7 asks, "Last year, Jake’s salary was $58,000. At the end of the year, he received a 10 percent increase in salary. What is his salary this year?" Only 56 percent of the students provided the correct answer. How-
ever, only 32 percent of the females answered correctly as compared to 76 percent of the males. One would assume that a prerequisite to closing the national salary gender gap will be an ability to compute salary changes!

In addition to a possible revealed gender gap performance, we see that business students were slightly less able to demon-
strate competency in computing a salary increase. Only 49 percent of the 35 business students were able to answer question 7 correctly. When split by gender, we found that 62 percent of the males registered in business could an-
swer the question. The numbers are small, but it is still noteworthy that only 29 percent of the fourteen females
registered in business could answer the same question. This is a disturbing gap in arithmetic ability for students that have selected into a College of Business major.

We expected basic profit relationships would fall within the natural area of interest, especially for business stu-
dents. Question 3 asked the students: "If a television costs $500 and the sales tax is $25, what is the local sales-tax rate in percentage terms?" Whereas question 8 asked the stu-
dents: "XYZ company’s profits this year are $2,500,000. Its profit rate on sales (in ratio terms) is 0.10. What are its sales this year?" Both questions required arithmetic manipulation of a basic ratio. It was a surprise that business students scored about the same as the overall group.

63 percent of the business students determined an incor-
rect tax rate and 46 percent calculated an incorrect sales amount.

This course leads back to the Bradley Accounting fac-
ulty’s angst over the use of ACT scores to assess basic mathematical competency in the admissions processes and the mathe-
ematics course enrollment. How is it possible that 89 per-
cent of the surveyed students with a relatively strong ACT math profile could not determine the correct sales figure for question 8? 68 percent noted that 43 percent of the business students did not even attempt this straightforward ques-
tion. In terms of ACT scores, the top ten percent students in this study had an average ACT math score of 28.5. That places those students a bit above the 98th percentile of all
their peer high school graduates. It is a shock to note that five of these top students were unable to answer question 8 correctly.

These arithmetic survey results support the ATG 175 fac-
ulty concerns that students lack basic arithmetic competencies and the applied, practical functionality to process basic business transactions. They have serious deficiencies in the basic functional life skills. No wonder the USA
cannot compete even against the developing global econo-
 mies and jobs continue to move overseas. As a group, the

surveyed students are not ready to think about business on their feet or apply critical judgment to financial asser-
tions. However we have a puzzling reality. Previous stud-
ies (Yunker, et. al., 2009) indicate that the ACT and the math survey may be reliable indicators of potential success
for university level education.

Indicators of Success.
The surveyed population of 89 students had an average
ACT math score of 24.7. An ACT math score of 24.7 is impressive. According to the ACT interpretation guide,
this is around the 80th percentile for recent high school graduates. It is reasonable to conclude that such a selective group will be successful in their undergraduate education studies. Many previous studies have indicated that the ACT math score, math placement tests, and credit hours provide some indication of future success. Here are the res-
ults from our 89 survey subjects.

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATG 175 Course Grade</td>
</tr>
<tr>
<td>Grade Frequency (89)</td>
</tr>
<tr>
<td>ACT Mean Math Score</td>
</tr>
<tr>
<td>Mean Math Placement</td>
</tr>
<tr>
<td>Mean Semester Credits</td>
</tr>
</tbody>
</table>

Our subjects produced a result consistent with previous studies. The higher grades in ATG 175 were consistent with higher ACT math scores, higher math placement scores, and greater university experience. But good students prepare for the ACT and math placement test. Good students are persistent and form more produc-
tive study habits as they gain post-secondary experience. However, good students prepare for these exams so overall they do well. We can also see that academic ex-
perience improves performance. This too makes sense as better students will persist and improve their study skills.

Previous research showed the math survey used is a reasonable predictor of success. The table above reveals this was also true with this group. However, this observa-
tion is not satisfactory when we see that students earning an average overall course grade of an A averaged only 58 percent on this measure of basic street math. Our focus is on pro-
fessional studies and we are attracting students with a relatively weak arithmetic skills profile. We are left to won-
der what systemic accommodations have crept into the curriculum to accommodate this arithmetic weak-
ness.

There is a major validity issue here in light of the 89 par-
ticipants’ overall weak arithmetic competencies. As we see we find a way to allocate grades that is consistent with the various achievement measures. Perhaps all we are doing is validating that good students get good grades.

The crucial need for competent women in business merits an additional look at the data. In terms of our population,
nine of the top ten ACT reported math scores were made
students with a mediocre average grade of 78 percent on the math survey. The comparative math average for the
top ten females is 89 percent. This represents a massive re-
cruiting error. Why are we not attracting equally capable women? It is encouraging to note that the females earn a higher overall GPA in the ATG 175 course 2.9 versus 2.7 for the men. Despite their lower overall demonstrated arithmetic competencies on the survey, they earned a sig-
nificantly higher rate of “A” grades. In subsequent work on this topic, the authors will consider why women are
apparently more willing to apply themselves to their ATG 157 studies than the men are.

Findings and Conclusions
The purpose of this paper was to explore faculty frustra-
tion with their students’ inability to process the arithmetic behind basic business transactions. The apparent discon-
nect between sound ACT-MATH scores and classroom performance did not make sense to us. Without some un-
derstanding of the underlying phenomena, faculty are let down by their students. It becomes more obvious in admission decisions, as they are warranted. Why are we not attracting equally capable auth-
ors? We find a way to allocate grades that is consistent with the variable which may explain much of this contradiction.

A significant body of research exists on the topic of stan-
dardized tests that has had limited applications to ac-
counting educations. Harper (2009) provides a reflection from two experienced professors who retook the SAT so
they could better understand a child’s experience. The sur-
pries that many students may not have realized that their much improved understanding was not being mea-
sured. It becomes more obvious in admission decisions, for example Kolluri, Singamseth, and Wahab (2010) that
the assumptions of ability, based on scores are not well
established. Instead Harper realized that good students train for the test and do well, so the results are more of an
indication of access to good test preparations. So we can see that the development and convenience of tests like the ACT had some unintended consequences for

<table>
<thead>
<tr>
<th>Table 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATG 175 Final Grade</td>
</tr>
<tr>
<td>Grade Frequency (89)</td>
</tr>
<tr>
<td>Survey Grade</td>
</tr>
</tbody>
</table>

The Risks and Opportunities Associated with Weak Arithmetic Skills of Accounting Students

Stephen Kerr & George Krull

Spring 2017 (Volume 13 Issue 1)
Journal of Learning in Higher Education 69
accounting educators over the last 30 years. Initially these
tests gave a measure of mathematics in the context of a
curriculum where students had solid skills in arithmetic.
As the tests important to in the admissions process in-
creased, relative to the GPA, school promoting university-
admissions would naturally track the tested topics. We see
now that this also would make arithmetic less important too,
and easy to enable with increasingly available tech-
nology. The assumption that is now appears to be an er-
or about arithmetic, as the mathematics on the ACT can
be handled with minimal use of basic arithmetic. Our
problem then becomes, the arithmetic needed to think on
one’s feet and negotiate typical business transactions, is no
longer available.

This leads to our concern about how the ACT-dependent
admissions process may affect the decisions of students in-
teresting in our profession. We can start by considering
that the ACT is an early filter in the educational process
of entering the profession. The profession needs entrants
who understand financial transaction, can think on their
feet, to audit or negotiate transactions. Good arithmetic
skills are crucial to many aspects of this entrepreneurial
process. It is a great impairment to the profession if mem-
bers are weak in this skill as found in this study.

Are there substantial numbers of high-school seniors
that have good arithmetic skills, but lack access to ACT
preparation, or seniors that lack an interest in mathemat-
ics? For example their experiences with work have them
able to make change but have left them with no skill or
interest in calculus. We know from this study that there
is a group that do well in mathematics but do poorly with
arithmetic. Given that, perhaps there a strong possibility
that there is a good sized group of seniors that are good
at arithmetic but show poorly in mathematics—especially
those topics emphasized on the ACT/SAT test. The size
of this group should be investigated along with the ways
our use of the ACT test discourages them from entering
the education stream feeding the profession.

We see in the math education literature an additional fil-
tering concern. We have found that good students will
succeed by preparing for the ACT exam but that does not
mean they have that they have good sense for basic
arithmetic relationships. But, faculty adjusts so that these
students can still succeed (Ehler, 2005). We know from
other research these students avoid quantitative approach-
ages by suppressing adaptive activities that could change
the situation. (Siegel, Galassi, Ware, 1985) (Pajares, Miller,
1994) We propose that a good area for future research
could examine how this reduces or correlates with the ca-
pacity to design, prepare and utilize analytical procedures
in both controllerhip and audit functions. Again point-
going to how we maybe enabling a skill set to be neglected

that has been an historic strength or an accounting educa-

In conclusion we feel that our exploration of our frustra-
tion with our student’s apparent inability to do arithmetic
adds an extra dimension to Kaplan’s (2012) commentary.
Kaplan warned that our scholarship should reflect more
awareness of the environment. While he did not say so
explicitly, the environment includes the skills and apti-
tude of those entering the profession. Today’s students
are no doubt as motivated as previous generations. Their
strengths should not be assumed to be the same as earlier
cohorts. Individually we cannot the use of the ACT or
similar instruments. However, we can adjust our time and
emphasis to show we understand who is in our classroom
and down-stream professors they will have. A better emo-
tion than frustrations would be to embrace the opportu-
nity and provide incentives for our excellent students to
gain a competitive advantage.

References

Arun R and Rocks J (2011) Academically Adrift: Learn-
ing on College Campuses. University of Chicago Press:
Chicago.

Atkinson RC (2009). Reflections on a Century of Col-
lege Admissions Tests
Paper published with Saul Geiser in Educational Re-

Ballard CL and Johnson MF (2004) Basic Math Skills
and Performance in an Introductory Economics Class,
Journal of Economic Education 35(1) Pages 5-23, Win-
ter 2004

Behn, B. (Chairman). Commission on Accounting High-
er Education, 2000. Pathways to a Profession: Chart-
ing a National Strategy for the Next Generation of Ac-
countants. Sarasota, FL: AAA and AICPA. Black M.
L., Jr.

Black WH (2012) The Activities of the Pathway’s Com-
imission and the Historical Context for changes in Ac-
counting Education. Issues in Accounting Education,

Ehler M (2005) What happens if they aren’t Proficient:
The Predictive Validity of a High School State Assess-
ment, presented at the third research seminar in Ana-
lytic issues in the assessment of Student Achievements.
The Urban Institute, Washington DC. May 2nd, 2005

Folley-Peres K, Poirier D (2008), College Math Assess-
ment: SAT Scores versus College Math Placement

Scores. Educations Research Quarterly, 33.2, Pages
41-46

Harper C., Vanderbei RJ (2009) Two Professors Retake
the SAT: Is it a Good Test? Chronicle of Higher Edu-
cation, V55, n 39, P A30-31, June 2009.

http://www.acstUDENT.org/scores/normal1.html

Kaplan RS (2011) Accounting Scholarship that Advances
Professional Knowledge and Practice. The Accounting
Review, Volume 86, No.2 Pages 367-383

Kolluri, B, Singamsetti R, and Wahab, M (2010) GMAT
and Other Determinants of GPA in An MBA Pro-
american Journal of Business Education, V3, N12, 2010

McKinsey & Company. 2009 Social Sector Office. The
Economic Impact of the Achievement Gap in Amer-
ica’s Schools.

Moore L (2009) Economic “reality” and the myth of
the bottom line. Accounting Horizons Volume 23, No. 3
2009, Paged 327-340

Pajares F and Miller DM (1994) Role of Self-Efficacy and
self-concept beliefs in Mathematical problem solving:
A Path Analysis, Journal of Educational Psychology 86
(2) 193-203

Pritchard RE, Romeo GC, and Saccucci MS (2000)
Quantitative Skill and performance in Principles of
Finance Evidence from a regional University FINAN-
cial Practice and Education 10(2): 167-174 Fall/Winter,
2000

Seigel RG, Galassi JP, and Ware WB (1985) A compari-
sion of Two Models for Predicting Mathematics Perfor-
mance Social learning Versus Math Aptitude-Anxiety.
Journal of Counselling Psychology 32 (4) Page 531-
538.

Yunker PJ, Yunker JA, and Krull GW, 2009. The Influ-
ence of Mathematical Ability on Performance in Prin-
ciples of Accounting. The Accounting Educators’ Jour-
nal, Volume XIX, 2009 pp 1-20

(footnotes)

1 GPA of students completing the course.
2 Foster College of Business Administration.
3 Slane College of Communications and Fine Arts.
4 College of Engineering and Technology.
5 College of Education and Health Sciences.
6 College of Liberal Arts and Science.
7 University Exploration Program (students who have
eyet to identify a college and major).
Appendix

ID Number: ______________________

This is not a placement test. Your scores here are being used for research purposes only. You will have 10 minutes to answer the 12 questions listed. Calculators are not permitted. Please use the space provided on the front and back to make any necessary computations.

Your College: You are entering as a:

☐ Foster College of Business  ☐ Freshman
☐ Communication & Fine Arts  ☐ Transfer student
☐ College of Education & Health Science
☐ College of Engineering & Technology
☐ College of Liberal Arts & Sciences
☐ Academic Exploration Program/University Program (UNV)

11. 122,302 + 652,365 = ?

22. 861,365 – 241,211 = ?

33. The formula for calculating sales tax is \( S = A \times r \), where:
   - \( S \) is the sales tax
   - \( A \) is the cost of the product
   - \( r \) is the sales-tax rate
   If a television costs $500 and the sales tax is $25, what is the local sales-tax rate in percentage terms?

44. The cost of a long-distance phone call is 15 cents for the first minute, and then 3 cents per minute for every additional minute. How many cents would a 24 minute phone call cost?

55. By the end of the year, the population of Galesburg is expected to increase 2% from the current population of 45,000. If this prediction is accurate, what would be its new population at the end of the year?

66. 56.7 x 3.1 = ?

77. Last year Jake’s salary was $58,000. At the end of the year he received a 10 percent increase in salary. What is his salary this year?

88. XYZ company’s profits this year are $2,500,000. Its profit rate on sales (in ratio terms) is 0.10. What are its sales this year?

99. If Janice has 12 quarters, 3 dimes, 6 nickels and 7 pennies, how much money does she have?

110. Take 62 percent of $12,000. The result is:

111. 12,000 x .03 x 2/3 = ?

112. On the first of January the local bank agrees to lend you $20,000 for college tuition, room, and board. They charge you 6% interest per year payable on a monthly basis. How much interest must you pay at the end of January?
The Impact of Process vs. Outcome Feedback on Student Performance and Perceptions

Kathy Paulson Gjerde, Ph.D.
Associate Professor of Economics
Lacy School of Business
Butler University
Indianapolis, Indiana

Margaret Y. Padgett, Ph.D.
Associate Professor of Management
Lacy School of Business
Butler University
Indianapolis, Indiana

Deborah Skinner, Ph.D.
Associate Professor of Marketing
Lacy School of Business
Butler University
Indianapolis, Indiana

ABSTRACT

Much has been written in higher education assessing the value of feedback. This article seeks to explore how altering the feedback message might influence student learning and perceptions of learning. Feedback was provided on in-class quizzes in either the process portion or outcome portion of the quiz. Not only did process-oriented feedback have a more positive impact on student performance on quizzes than outcome-oriented feedback, it also was perceived more favorably by students both in terms of its usefulness and its impact on their learning in the class. However, the quiz feedback students received did not seem to generalize to a similar type of analysis question on other types of assessment instruments. This exploratory study suggests further research is warranted regarding the types of feedback provided, the type of assignment/assessment and the type of thinking required.

Introduction

Feedback is an essential component of learning, growth and development. Feedback provides individuals with information about their behavior or performance so they know what needs to be changed in order to improve. In cybernetics systems theory (Frandsen & Millis, 1993), feedback facilitates self-regulation because it identifies a gap between current performance and desired performance. Once the gap is identified, the individual can take action to close or reduce the gap. Thus, whether the feedback is used by employees, students, athletes, or artists, it is a mechanism to enhance learning and/or performance.

The role of feedback in traditional educational contexts has been studied extensively. Despite all that has been learned about the feedback process in general (e.g., Taylor, Fisher & Ilgen, 1984; Ilgen, Fisher & Taylor, 1979; Ilgen & Davis, 2000; Kluger & DeNisi, 1996) and the evidence that feedback enhances student learning in particular (Black & Wiliam, 1998; Hattie & Timperley, 2007), educators still struggle with how to most effectively use feedback to enhance student learning. Potential obstacles include the substantial time requirements associated with providing detailed feedback, uncertainty about what type of feedback will have the most value, and a lack of control over whether the feedback is utilized, either effectively or at all, by the student. In this paper, we will describe a feedback intervention used in teaching fundamental critical-thinking skills in an upper-level college economics class. Although the results are exploratory in nature, they suggest that feedback focusing on the student’s thought process may have a more positive impact on learning than feedback focused on the final answer (e.g., Brookhart 2008).

Literature Review

Factors Influencing Feedback Effectiveness

Ilgen, Fisher and Taylor (1979) conceptualized the feedback process as a special case of the more general communication process. Looking at feedback from this per-
The Impact of Process vs. Outcome Feedback on Student Performance and Perceptions
Kathy Paulson Gjerde, Margaret Y. Padgett, & Deborah Skinner

The feedback message focuses primarily on the content of the information provided to students about their performance. Some of the prior research investigating the feedback message has examined the nature of the feedback comments provided to students. For example, in a descriptive study, Mutch (2003) content analyzed the feedback comments that instructors provided and identified several different ways that these comments could be categorized (e.g. in terms of what was commented upon, the tone of the comment and whether the comment was positive or negative). Other research has compared the effectiveness of different types of feedback. For example, Mutch (2003) compared the effectiveness of what they termed “basic” feedback, where students were simply told that their answer was correct or incorrect (Kluger & DeNisi, 1996). Our research examines this recommendation empirically.

In an educational context, one way to provide process-oriented feedback is to give students feedback on the thinking process they used in reaching their final answer. This contrasts with outcome-oriented feedback which is directed toward the answer provided by the student. Our research extends the feedback literature by developing an intervention that compares the typical method of providing the feedback message by evaluating the answer, and an atypical method of providing the feedback message by commenting on the critical-thinking process students use to arrive at the answer. Hence, the first research question is:

R1: Will providing feedback to students about the thinking process they used in developing their answer on an assessment improve classroom performance more so than providing feedback to students on the outcome or answer portion of the assessment?

The Feedback Recipient: Student Perceptions of Feedback

As noted above, when investigating the impact of feedback on student performance and learning it is also important to consider the feedback recipient, in this case, the student. Their perception of the feedback they receive will have a significant impact on if and how they respond to the feedback (e.g. Pokorny & Pickford, 2010; Weaver, 2008). Perhaps not surprisingly, research finds that students often do not actually use the feedback they receive (e.g. Glover & Brown, 2006; MacLellan, 2001; Sinclair & Cleland, 2007). This may be partially due to student perceptions that the feedback is not useful (Jonsson, 2012) or that it doesn’t enhance their learning. Poulos and Mahony (2008) also emphasize the importance of considering student perceptions when assessing feedback effectiveness. They conducted student focus groups and then did a thematic analysis of the resulting transcripts. Their analysis identified a number of different themes which influence student perceptions of feedback effectiveness. These themes included the timeliness and delivery of the feedback, the significance of the feedback in terms of being useful and contributing to learning, and the meaningfulness of basing feedback on grading criteria and of receiving comments in addition to the grade. Their research demonstrates that determining what makes feedback effective is very complex and not necessarily uniform across all students.

Nevertheless, the prior research makes it clear that when evaluating the effectiveness of any feedback intervention, student perceptions of the feedback should be considered. If students don’t understand the feedback, they may not find it helpful or helpful in developing their learning. This is likely to be true of feedback which is not providing feedback on their performance. Consequently, in addition to looking at the effect of process vs. outcome feedback on student classroom performance, this study seeks to explore and compare student perceptions of these two types of feedback. Specifically, we examine student perceptions of the usefulness of process versus outcome feedback as well as their perceptions that learning occurred as a result of the feedback. Hence the final two research questions are:

R2: Will providing feedback to students about the thinking process they used in developing their answer on an assessment improve student perception of the usefulness of the feedback more so than providing feedback to students on the outcome or answer portion of the assessment?

Method

Sample and Context Description

The subjects for this exploratory study were 48 students (X males and Y females,) in two sections of a 300-level economics elective. All students had completed an introductory principles of microeconomics course as well as an introductory principles of macroeconomics course. The same economics professor taught both sections of the course. Class activities, exams, texts, materials, pace, etc. were the same between the classes. Both classes met two a week for 75 minutes in the afternoon.

T-tests comparing students in the two sections showed that the two sections did not differ in terms of their gender, major and college. Although students in Section 1 had a higher cumulative GPA and had completed more credits (both cumulative and in the semester in which the study was conducted) compared to the students in Section 2, these differences were not statistically significant (see Table 1).

In terms of content and structure, the course utilized a set of tools and basic framework of analysis to understand various aspects of the employee-employer relationship. The aim was to help students apply basic
The Impact of Process vs. Outcome Feedback on Student Performance and Perceptions

Kathy Paulson Gjerde, Margaret Y. Pidgrett, & Deborah Skinner

1. Spring 2017 (Volume 13 Issue 1)

2. Journal of Learning in Higher Education

3. 77

4. 76

5. zes were divided into three groups: (1) Group I received quiz feedback that focused on their brainstorming process (i.e. process feedback treatment). In contrast, students in Section II received feedback solely on their answer (i.e. outcome feedback treatment), while students in Section II received feedback solely on their brainstorming process (i.e. process feedback treatment).

6. Results

7. The quizzes in both sections followed the same pattern, as described above, and answers were graded on the same 5-point scale. However, to assess whether the type of feedback improved outcome, the instructor varied the written comments on the students' quizzes (R1). In particular, students in Section I received feedback solely on their answer (i.e. outcome feedback treatment), while students in Section II received feedback solely on their brainstorming process (i.e. process feedback treatment).

8. Measures

9. The primary dependent variable for R1 was student performance on the nine quizzes as well as their overall performance. Overall performance was assessed by performance on the midterm, performance on the final exam as well as final grade in the course. To examine R2 and R3, at the end of the semester, students were asked to assess the usefulness of the feedback received during the semester (R2) as well as the impact of the quiz feedback on their perceived learning in the class (R3). Note that both feedback usefulness and perceived learning were assessed by 3 items (see Table 3). All items were measured using a 5-point rating scale, with the “1” being “strongly disagree” and “5” being “strongly agree.” Additionally, students’ perceived effort was measured in order to determine if there were differences in effort or motivation between the two sections. Perceived effort was measured with 3 items, using a 5-point rating scale with “1” being “no/none” and “5” being “a lot.” Finally, students were asked for their perception of the main focus of the feedback on the quizzes. This measure was included to determine if students understood the nature of the feedback they received and thus, served as a manipulation check.

10. To determine if our feedback manipulation was successful, students were asked to indicate their extent of agreement with the following statement: “The feedback I received on my in-class quizzes was focused on how I analyzed/processed the information I read.” If our manipulation was successful, students who received process feedback should agree with this statement to a greater extent than students who received outcome feedback. As shown in Table 4, this is exactly what we found.

11. The first research question examined the impact of process vs. outcome feedback on student learning. We first examined learning as measured by overall performance. T-tests comparing the two sections on performance on the midterm exam, final exam and course grade revealed that despite differences in quiz-related feedback, both sections performed similarly on these instruments (see Table 2).

12. Given that the difference in feedback between the two sections was confined to the case quizzes, we also examined student performance on the quizzes themselves. These results are summarized in Table 3. For quizzes in...
Group I and Group III, we found that the section receiving process feedback performed better than the section receiving outcome feedback on all quizzes except Quiz 1. This difference was statistically significant for Quiz 3 and Quiz 9.

Additional insight into the impact of process vs. outcome feedback on performance can be gained by examining the pattern of mean quiz scores over the course of the semester. As described above, the quizzes were divided into three groups, with Group I and Group III quizzes containing an analysis-based question and Group 2 containing a description-based question. Figure 1 depicts mean quiz scores for Group I (Quiz 1 - Quiz 3), Group II (Quiz 4 - Quiz 6), and Group III (Quiz 7 - Quiz 9).

When we look at the change in quiz scores within Group I, we see that students receiving process feedback improved significantly more than students receiving outcome feedback. More specifically, within Group I, although students in both sections improved between Quiz 1 and Quiz 2, the rate of improvement was greater in the section which received process-oriented feedback. Moreover, when we look at the performance difference between Quiz 1 and Quiz 3, we find that students receiving process-oriented feedback improved significantly more than students receiving outcome-oriented feedback.

When the focus of the quiz shifted from analysis to description in Group II, the gains realized by students in the section receiving process-oriented feedback over their peers in the outcome-oriented feedback section dissipated. Our results showed that students in the outcome-oriented feedback section performed similarly to students in the process-oriented section for Quiz 4 and Quiz 6; on Quiz 5, the group receiving outcome feedback performed significantly better than the group receiving process feedback. These results suggest that the outcome-oriented feedback might be more relevant or useful than the process-focused feedback for the less ambiguous, description-oriented, quiz questions.

When students once again were given analysis-based quizzes (Group III quizzes), our results suggest that there was greater retention of previous feedback for students who had received process-oriented feedback. In particular, comparing Quiz 6 and Quiz 7, there was a noticeable drop in the performance of students receiving outcome-based feedback. Students receiving process-oriented feedback did not experience the same sharp decline; in fact, after a slight decline on Quiz 7, their performance continued to increase. Looking at the difference in performance between Quiz 7 and Quiz 9 shows that again students receiving process-oriented feedback improved significantly more than students receiving outcome-oriented feedback. Further, looking at the change in quiz scores across the entire semester (i.e., comparing performance on Quiz 1 and Quiz 9), shows that the section receiving process-oriented feedback improved significantly more than the section receiving outcome feedback.

Although we cannot rule out the possibility that these performance differences were due to pre-existing differences between the two sections, the fact that the two sections did not differ in reported effort or motivation (see Table 4), in their cumulative or semester GPA or in the number of credits completed prior to taking the course suggests that the performance differences on the quizzes is more likely due to the nature of the feedback received rather than to other factors.

Research Questions 2 and 3

The second and third research questions focused on student perceptions of how useful the feedback was and its impact on their learning. T-tests comparing the two sections provided some evidence that students who received process-oriented feedback on quizzes perceived that feedback to be more useful in terms of improving their performance in the class than students receiving outcome-oriented feedback on quizzes. The lack of differences between the two sections in terms of perceived usefulness of feedback received on other assessment instruments is consistent with the fact that feedback manipulation only occurred on the quizzes. Students receiving process-oriented feedback also perceived that the quiz feedback had a greater impact on their learning in the class than students who received outcome-oriented feedback (see Table 4). Specifically, although there was no difference between the two sections in terms of perceived impact of the course on writing skills, the section receiving process-oriented feedback reported a greater improvement in their ability to analyze or process what they had read as well as a greater awareness of how to use feedback to improve their answers compared to students in the section receiving outcome-oriented feedback.

### Table 4

<table>
<thead>
<tr>
<th>Student Perceptions of Feedback Usefulness and Learning</th>
<th>Section 1 Outcome-oriented Feedback</th>
<th>Section 2 Process-oriented Feedback</th>
<th>Difference in Means (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of Feedback Usefulness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The feedback I received on my in-class quizzes positively impacted my performance in this class.</td>
<td>3.667</td>
<td>4.350</td>
<td>0.683** (0.402)</td>
</tr>
<tr>
<td>The feedback I received on my case reports positively impacted my performance on this class.</td>
<td>4.333</td>
<td>4.180</td>
<td>0.233 (0.352)</td>
</tr>
<tr>
<td>The feedback I received on my mid-term exam positively impacted my performance in this class.</td>
<td>3.524</td>
<td>3.750</td>
<td>0.226 (0.462)</td>
</tr>
<tr>
<td>Perception of Learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After taking this course, I am better at analyzing/processing what I read.</td>
<td>4.048</td>
<td>4.450</td>
<td>0.402** (0.025)</td>
</tr>
<tr>
<td>After taking this course, I am better at explaining my thoughts in a written format.</td>
<td>4.095</td>
<td>4.263</td>
<td>0.168 (0.341)</td>
</tr>
<tr>
<td>After taking this course, I am more aware of how I use feedback to improve my answers to questions.</td>
<td>3.810</td>
<td>4.368</td>
<td>0.558*** (0.003)</td>
</tr>
<tr>
<td>Perception of Effort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I made _____ effort to improve my writing capabilities in this class.</td>
<td>4.095</td>
<td>4.300</td>
<td>0.205 (0.244)</td>
</tr>
<tr>
<td>I made _____ effort to improve my understanding of theory in this class.</td>
<td>3.762</td>
<td>4.180</td>
<td>0.338 (0.135)</td>
</tr>
<tr>
<td>I made _____ effort to improve my understanding of personnel applications in this class.</td>
<td>4.048</td>
<td>4.200</td>
<td>0.152 (0.555)</td>
</tr>
<tr>
<td>Perception of Type of Feedback</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The feedback I received on my in-class quizzes was focused on how I analyzed/processed the information I read.</td>
<td>3.333</td>
<td>4.200</td>
<td>0.867** (0.005)</td>
</tr>
</tbody>
</table>

** Significant at 1%, * Significant at 5%, ** Significant at 10%
The purpose of this study was to compare the effectiveness of two different types of feedback – feedback focused on the student’s thinking process prior to generating an answer (process-oriented feedback) and feedback focused on the student’s answer (outcome-oriented feedback). We compared the impact of these two types of feedback on student performance as well as their perception of the usefulness of the feedback and its impact on their learning in the class. Although this was an exploratory study, our results suggest that process feedback may be more beneficial than outcome feedback for more complex analysis-based assignments. Specifically, we found that while both types of feedback resulted in performance improvement on quizzes, students receiving process-oriented feedback had significantly greater improvement than students receiving outcome-oriented feedback. They improved more within both parts of analysis questions (Groups I and Group III) as well as across the entire semester when comparing performance on the first quiz with performance on the ninth quiz. Process-oriented feedback focusing on the student’s brainstorming/thinking process may be more beneficial than outcome-oriented feedback because it addresses the more fundamental steps a student needs to take in order to produce a better outcome. Students may more easily perceive the value of this feedback, which would increase the likelihood that they will apply it to subsequent quizzes. When students receive feedback only on the outcome (their answer), they may not be able to translate that information into what they need to change in order to improve their answer on a subsequent quiz, and thus, perceive it as having less value in improving their performance. Furthermore, feedback addressing their answer may have resulted in students focusing only on their grade and not attempting to understand and apply the feedback to the next quiz.

It is noteworthy that the quiz feedback students received did not seem to generalize to a similar type of analysis question on the midterm exam or to the case reports which also required this type of analysis. Students who received process focused feedback focused on the same on the case reports as students receiving outcome feedback and actually performed less well, although not significantly, on the parallel question on the midterm exam. In fact, neither class appeared to be able to transfer learning from the quizzes to either the exams or the case reports. It is not clear why students were unable to apply their learning from the quizzes to other forms of evaluation in the class. It is possible that students did not recognize the similarity between the quiz questions and the exam question and case reports or that they did not realize that they could apply this method of analysis to problem solving in other contexts. Support for this possibility comes from the conversation the first author had with a student in the class who was trying to decide whether to accept a job offer. When it was pointed out to the student that she could apply the method of analysis used on the quizzes to this situation, she appeared surprised – she apparently did not automatically see that the situation was similar and thus, did not recognize she could apply something she had learned in the class to her personal situation. Helping students to see how they can apply learning from one context to another would be beneficial. Future research could investigate whether providing students with a prompt that highlights the similarity between an exam question and the previous quiz questions might be sufficient to trigger application of thinking strategies practiced and learned on the quizzes to the exam.

It is interesting that students receiving outcome-oriented feedback actually performed better on the descriptive quiz questions than the students receiving process feedback. Because these questions were less ambiguous, were factual in nature, and thus, were either correct or incorrect, feedback focused on the outcome (answer provided) seemed more beneficial than feedback focused on the process (thinking process). This finding is suggestive that different types of feedback might have more or less value depending on the nature of the assignment and the type of thinking required. Future research in this issue by varying the nature of the feedback provided to students on assignments that focus on different levels of thinking in Bloom’s taxonomy (Bloom, Englehart, Furst, Hill, Krathwohl, 1956; Anderson & Krathwohl, 2001) seemed more beneficial than feedback focused on the process (thinking process).

Not only did process-oriented feedback have a more positive impact on student performance than outcome-oriented feedback, it also was perceived more favorably by students both in terms of its usefulness and its impact on their learning in the class. This may be because it showed students what they needed to change in order to perform better instead of simply highlighting what was incorrect with the answer they provided. Furthermore, these students were able to see a more substantial improvement in their performance on the quizzes throughout the semester as they presumably applied, and then benefitted from, the feedback. This would likely have resulted in stronger perceptions that the feedback was enhancing their learning in the class.

CONCLUSION

Taken together, our results suggest instructors may be able to influence both student learning as well as students’ perception of their skill development simply by changing the type of feedback they provide to students. They also generate some additional questions worth investigating further. In particular, it is necessary to require separate brainstorming and feedback in order to obtain the performance improvements that we observed in this study! It may not always be possible or even desirable to require students to brainstorm prior to writing their answer as was done in this study. If students are told that they are being provided feedback on their thinking process and that the purpose of the feedback is to help them improve on subsequent assignments, would that accomplish the same thing as having separate brainstorming-related feedback even if that feedback was associated with their answer? Future research could address this question.

As noted above, future research should also address approaches that instructors might use to help students recognize that they can apply thinking strategies practiced in one assignment to other related, but not necessarily identical, assignments. Also important is helping students to recognize the opportunities to utilize the methods of analysis presented for academic materials to non-academic situations. These skills and methods of analysis should enhance effectiveness in work-related contexts but if students do not apply these to these contexts, their value is lost.

Because this study was exploratory in nature and had several limitations, it is not clear if the findings will generalize to other samples and settings. However, our results suggest that further study is warranted. If we better understand what type of feedback is most appropriate for what types of assignments and for what purposes (e.g., for improving what types of thinking skills), we can provide students with feedback that will have more value – both as perceived by students and in terms of impact on student performance and learning.

References


---

**Appendix**

**Sample Case Quiz**

Stephen Connor, research director at RSH, is faced with the challenge of replacing a star semiconductor analyst, Peter Thompson. Each of the five potential candidates possesses certain critical skills, experiences and relationships and lacks others.

- Would you recommend hiring Sonia Meetha? Why or why not?
- Brainstorm and Organize Thoughts (must fit in the box below):
- Answer (must fit in the box below):
The Effect of Individual Motivation and Cognitive Ability on Student Performance Outcomes in a Distance Education Environment

James W. Logan  
University of New Orleans  
Department of Management  
University of New Orleans  
New Orleans, Louisiana

Olof H. Lundberg  
University of New Orleans  
Department of Management  
University of New Orleans  
New Orleans, Louisiana

Lawrence Roth  
St. Cloud State University  
Department of Management  
St. Cloud, Minnesota

Kenneth R. Walsh  
University of New Orleans  
Department of Management  
University of New Orleans  
New Orleans, Louisiana

ABSTRACT

The authors explored the effects of general mental ability and motivation (operationalized as conscientiousness) on performance in an online distance education course. The results supported the hypotheses that both higher levels of motivation and higher general mental ability are positively associated with academic performance in a distance learning environment, while low levels of either motivation or general mental ability were associated with lower levels of performance. The results also support the presence of a significant interaction effect between motivation and general mental ability in terms of their relation to performance. High levels of either motivation or general mental ability alone with low levels of the other factor did not produce high levels of performance, demonstrating the importance of simultaneously considering both factors. Theoretical and practical implications of the results are discussed.

Distance education refers to institution-based, formal education provided to geographically diverse students through interactive telecommunications systems. Institutions that have an educational mission as all or part of their purpose have been quick to utilize distance education technologies as these technologies offer an effective way to both expand the student population base and take advantage of technological capabilities to more efficiently address the needs of current student populations.

Academic institutions, especially, are increasingly using distance education to provide academic courses. By 2007, 3.9 million students were taking at least one online class (Doyle, 2009). A single massive open online course (MOOC), Norvig and Thrun’s AI class, has been shown to enroll 160,000 students (Carr, 2012). Driving this increase is the convergence of several factors which make distance education an increasingly effective method to deal with several practical problems and opportunities.
First, in many areas of the world, there is a both a growth of the university-age undergraduate population, and a growth in the need for education of older populations who must continue life-long learning in order to adapt to changing educational needs in the workplace. Governments and other organizations are reluctant to invest the capital expenditures required to build new conventional campuses and educational facilities, preferring to attempt to “do more with less” by encouraging distance education as a way to deal with increasing educational needs over a more geographically dispersed or diverse population (Oblinger, Barone, & Hawkins, 2001).

Second, education consumers are increasingly shopping for courses that best accommodate their learning styles and schedules when pursuing higher-education degrees or skill training (Johnstone, Ewell, & Paulson, 2002; Paulson, 2004; Carriere, 2000). Today’s customers of education, raised on the instant availability of the digital communication and accustomed to accomplishing work on their schedule because of this availability, increasingly demand that at least some, if not all, of their educational sources be flexible and delivered in formats other than traditional classroom settings.

Third, these trends are facilitated by rapidly improving technology that provides for a continuously improved and more effective distributed learning environment (Oblinger et al., 2001). Major organizations are investing very heavily in differing distance education technologies and systems, lending validity to the fact that although the technology of distance education may not have reached the stage of standardization, the use of distance education is likely a permanent change in the educational landscape and not a fad whose implications can be ignored.

Fourth, distance education is attracting a new subpopulation of higher-education learners – those who are “generally older, have completed more college credit hours and more degree programs, and have a higher all-college GPA than their traditional college peers” (Diaz, 2002, p. 2-3).

Finally, in addition to its use in the higher-education sector, distance education also has strong implications for education and training in private, public, and military organizations (Dello, 2005; Schreiber & Berge, 1998). The combination of all of the above factors points to an increase in the range of applications of distance education in the future, and increasing organizational concern with the efficacy of distance education efforts.

**Distance Education Effectiveness**

Successful outcomes of distance educational experiences depend on a number of factors, including both institutional (e.g., the user-friendliness of technology and quality of content) and individual (i.e., ability and motivation) characteristics. The growth of distance education as a major distribution channel for lifelong learning services targeted toward working adults offers an opportunity to identify both characteristics of successful distribution systems, and equally important, identification of methods of student classification to determine which students are more likely to be successful in the distance education environment. Identification of characteristics of successful student populations will help ensure that distance education learning techniques are used where most pedagogically appropriate, efficient, and effective.

There is a large amount of prior research, especially from scholars engaged in work in educational systems and new technology, on various aspects of distance education. A great majority of prior research has been focused on the stage of standardization, the use of distance education, and less with determining what populations might best utilize distance education (De Lorenzo, 2005). Distance education literature also has historically suffered from a lack of standardization of term definition and usage. Distance education is a field in which many different disciplines come together to be used in combination to achieve a desired end that cannot be accomplished by any single discipline; therefore, this lack of standardization is not unusual. The purpose of this paper is to address the mentioned situation with respect to student performance outcomes.

There is also a substantial and increasingly need to better identify those students who “fit” into distance education courses, so that appropriate students are exposed to the most appropriate pedagogical methodologies for their characteristics. For example, at the institution of two of the authors, an urban research university, the College of Business Administration has a goal of offering 30% of class sections each semesters in a distance education format. Anecdotal evidence suggests that students enroll in these classes for various reasons, with a correspondingly wide variation in success rates, yet there is currently no system to classify students in any fashion to determine either their suitability for the method used or how they might be better counseled to enhance their probability of successful outcomes using the distance education method. Our university is not unique in this aspect, as classification of students to help ensure success in certain learning environments is the exception rather than the norm at most institutions. Students self-select when taking MOOCs which can have dropout rates as high as 95% (Carr, 2012). An understanding of what students belong in what type of course is critical in harnessing the potential of these environments.

**Hypothesis 1:** GMA scores are positively related to performance in a distance education course.

**Motivation**

Campbell (1976) suggested that motivation could be characterized as the choice to initiate effort on a certain task (direction), the choice to expend a determined amount of effort (intensity), and the choice to continue expending that amount of effort (duration). Researchers have used the personality construct of conscientiousness as a proxy for motivation because highly conscientious individuals are likely to display high levels of all three aspects of motivation due to their organized, achievement-oriented, and persistent nature (Mount et al., 1999).

Schmidt and Hunter (1992) labeled conscientiousness as the most important trait-based motivation variable in the field, and empirical research suggests that it is the strongest individual difference predictor of performance, with the exception of GMA (e.g., Behling, 1998; Hogan, Rybicki, Motowidlo, & Borman, 1998). Additionally, Schmidt and Hunter’s (1998) results indicated that conscientiousness significantly contributes to the predictive validity of overall job performance beyond GMA. Schmidt and Hunter (1998) also reported similar results for integrity tests and structured interviews, both of which have large conscientiousness components. Although other
The Effect of Individual Motivation and Cognitive Ability on Student Performance Outcomes in a Distance Education Environment

Sample
The participants consisted of a total of 96 undergraduate business school students enrolled in a management course offered online by a public university in the United States. The course strengthened as conscientiousness increases and the relationship between GMA and conscientiousness was trivial (r = .04, ns).

Ability x Motivation
Are the joint effects of ability and motivation on performance of an additive or interactive nature? If the former, then both motivation and ability are significantly related to performance in a distance education course, and their effects are independent and complementary. If the latter, then increments in ability have different relationships with performance at different levels of motivation and increments of motivation have different relationships with performance at different levels of ability. Stated alternatively, the higher the ability, the greater the impact of motivation on performance and the higher the level of motivation, the greater the impact of ability on performance.

Hypothesis 2: Conscientiousness is positively related to performance in a distance education course.

Conscientiousness, we applied Bauer and Curran’s (2005) extension of the Johnson-Neuman (JN) technique to estimate regions of significance. Regions of significance indicate the levels of conscientiousness at which the group mean difference is significant. They provide an inferential test for any possible simple slope (Bauer & Curran, 2005). This
yielded 95% (non-simultaneous) regions of significance defined by a lower bound of -2.738 and an upper bound of 0.19. The minimum and maximum values of (mean-centered) conscientiousness were -3.5 and 4.3. The upper region fell within the observed range of conscientiousness scores. As the lower region did not, we did not represent or interpret it further.

Figure 1 is a graphic representation of the results of our application of Bauer and Curran’s (2005) extension of the [N] technique to Cohen et al’s (2003) suggested protocol for identifying the forms of interactions. It contains a plot of the equations at low, average, and high levels of conscientiousness scores (1, 0, and 1 standard deviations from the mean). As shown in Figure 1, the ACT-performance relationship was non-existent among workers at low (simple slope: β = 0.56, ns) levels of conscientiousness. In contrast, the relationship was positive among workers at average (simple slope: β = 3.16, p < .01) and high levels of conscientiousness (simple slope: β = 3.45, p < .01). Consequent with the simple slopes analysis, the region of significance was between the average level of conscientiousness and one standard deviation below the mean of conscientiousness. Thus, ACT scores were unrelated to performance only among the individuals relatively low in conscientiousness. Conscientiousness was unrelated to performance among individuals with low ACT scores.

**Discussion**

We proposed that both GMA and conscientiousness are related to performance in a distance education course. The results were consistent with our predictions. We also proposed that the joint effects of GMA and conscientiousness (i.e., ability and conscientiousness) are interactive rather than additive. The results indicated that as conscientiousness increased, the effect of GMA on performance increased. Consistent with the interactive hypothesis, the GMA-performance relationship held for all but individuals relatively low in conscientiousness.

We offer four possible strengths of the current study. First, replication is needed because we had only one sample. Second, our sample consisted of 96 undergraduate business students. Although anecdotal evidence indicated that many or most of these individuals had part-time or full-time jobs in the private, public, or military sectors, the generalizability of the results to other populations is not known. Similarly, the course content and our performance criterion may not be representative of distance education courses in settings outside of higher education. Third, we operationalized GMA in terms of the ACT score and motivation in terms of conscientiousness. Other GMA measures may have been more appropriate and/or would yield different relationships.

Equating motivation with conscientiousness permitted us to assess motivation in terms of individual characteristics, but motivation operationalized as a situational characteristic (e.g., supervisors monitoring course progress) is likely to provide an alternative approach to testing the interaction hypothesis. The distance education research literature in the educational field tends to define motivation as a situational characteristic, not an individual characteristic. It would seem this would be a fertile area for research to determine the relatedness of the two methods of defining motivation with regard to performance in a distance education context.

**Conclusion**

Performance in a distance education course may represent a unique aspect of performance. Maximum performance reflects capabilities or what students “can do,” whereas typical performance reflects what students “will do” (e.g., Kanfer & Ackerman, 2005). A student fulfilling distance education course requirements faces a highly independent set of tasks. Thus, the application of ability and motivation of the student may be more important in the distance education environment than other learning environments.

As we noted previously, the emergence of distance education as a distribution channel for lifelong learning services targeted toward large segments of the education-consuming population offers an opportunity to identify which students are likely to be successful. Not all individuals are predisposed to perform well in distance education courses. Unlike most education and training situations, students are likely to be successful. Not all individuals in the educational field tend to define motivation as a situational characteristic, not an individual characteristic. It would seem this would be a fertile area for research to determine the relatedness of the two methods of defining motivation with regard to performance in a distance education context.

**References**


This page intentionally blank.
The aim of Academic Business World is to promote inclusiveness in research by offering a forum for the discussion of research in early stages as well as research that may differ from ‘traditional’ paradigms. We wish our conferences to have a reputation for providing a peer-reviewed venue that is open to the full range of researchers in business as well as reference disciplines within the social sciences.

Business Disciplines
We encourage the submission of manuscripts, presentation outlines, and abstracts pertaining to any business or related discipline topic. We believe that all disciplines are interrelated and that looking at our disciplines and how they relate to each other is preferable to focusing only on our individual ‘silos of knowledge’. The ideal presentation would cross discipline borders so as to be more relevant than a topic only of interest to a small subset of a single discipline. Of course, single domain topics are needed as well.

Conferences
Academic Business World (ABW) sponsors an annual international conference for the exchange of research ideas and practices within the traditional business disciplines. The aim of each Academic Business World conference is to provide a forum for the discussion of research within business and reference disciplines in the social sciences. A secondary but important objective of the conference is to encourage the cross pollination of disciplines by bringing together professors from multiple countries and disciplines for social and intellectual interaction.

International Conference on Learning and Administration in Higher Education (ICLAHE.org)
All too often learning takes a back seat to discipline related research. The International Conference on Learning and Administration in Higher Education seeks to address this imbalance by providing a venue for research outside our discipline boundaries. The conference seeks to attract an international and diverse audience of researchers interested in learning and administration in higher education. The conference encourages the submission of manuscripts, presentation outlines, and abstracts pertaining to any topic that relates to learning and administration in higher education. We believe that all disciplines are interrelated and that looking at our disciplines and how they relate to each other is preferable to focusing only on our individual ‘silos of knowledge’. The ideal submission would take a general focus on learning rather than a discipline-specific perspective. Instead of focusing on “Motivating Students in Group Projects in Marketing Management”, you might broaden your perspective to “Motivating Students in Group Projects in Upper Division Courses” or simply “Motivating Students in Group Projects”. The conference aims to encourage the cross pollination of disciplines by bringing together professors from multiple countries and disciplines for social and intellectual interaction.

Learning
We encourage the submission of manuscripts pertaining to pedagogical topics. We believe that much of the learning process is not discipline specific and that we can all benefit from looking at research and practices outside our own discipline. The ideal submission would take a general focus on learning rather than a discipline-specific perspective. Instead of focusing on “Motivating Students in Group Projects in Marketing Management”, you might broaden your perspective to “Motivating Students in Group Projects in Upper Division Courses” or simply “Motivating Students in Group Projects”. The objective of the conference is to encourage the cross pollination of disciplines and the submission of manuscripts pertaining to pedagogical topics from multiple countries and disciplines. We believe that many of the challenges facing academic departments are not discipline specific and that learning how different departments address these challenges will be beneficial. The ideal paper would provide information that could be useful to administrators regardless of their own discipline.