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A MESSAGE FROM THE PROVOST AND DEAN OF FACULTY

We are delighted to see the inaugural edition of the DeVry University Journal of Scholarly Research. Scholarly activity is an important component of a faculty member's role at DeVry University. It is fitting that we now have a journal to showcase some of that scholarly activity. We are especially pleased that this initiative was born out of discussions at our annual Faculty Symposium and was driven by a group of our faculty. Scholarship has always been on display at our annual symposiums, but our professors recognized the need to share some of this work with a larger audience. Thus with the help of sixty of our professors, this journal came into being.

Thanks to all of our authors and editors! We look forward to many more editions going forward.

John J. Gibbons, Ph.D.
Dean of Faculty

Donna M. Loraine, Ph.D.
Provost/Vice President, Academic Affairs

A MESSAGE FROM THE EDITORS

In 2012, the Higher Learning Commission (HLC) peer reviewers identified as an "area of improvement" that DeVry University must "share more with external organizations in terms of faculty scholarly work, research, and our many best practices." We know from the annual DeVry Faculty Symposia that our colleagues already engage in the highest levels of scholarly endeavors. With "scholarly activities" as a criterion on annual faculty evaluations, writing and research is a major issue, with many wondering how they could showcase their research in meaningful ways. A group of faculty from the South Florida metro believed that they had a novel solution, and presented the idea of a faculty journal at the 2013 DeVry Faculty Symposium. A formal proposal was sent the following month to Dean of Faculty John Gibbons, and in October 2013, the first conference call with a small group of interested faculty began initial planning.

In the months leading up to the publication of the Spring 2014 issue, this dedicated group of colleagues, including Managing Editors, College Editors, Copy Editors, and a Web and New Media Editor, participated in bimonthly online meetings organized by John Gibbons and Anna Koral, Senior Academic Affairs Specialist. A call for papers was emailed to colleagues in November 2013, and under the leadership of Co-Managing Editors Sarah Nielsen and Deborah Helman, the double-blind review process began. Authors received their papers back in February, with comments and suggestions for improvement. Out of 28 submissions from College of Business & Management, College of Liberal Arts & Sciences, and College of Engineering & Information Sciences, seven are now published in the inaugural Spring 2014 issue.

The purpose of the journal is to empower DeVry colleagues to make meaningful contributions in their field, to share them with a broader audience than has ever been possible, and to inspire other faculty to do the same. The intent is to share our research with all DeVry stakeholders and the broader community. These scholarly, research-oriented papers are the author's original contributions. Papers advance or challenge teaching, learning, and practices in a particular field. Since they are designated as "working papers," they can be submitted to an established scholarly journal. The idea is that authors get valuable feedback from DeVry's editors and reviewers to improve the paper, increasing the likelihood that it will be accepted in a selective journal in the author's field. With research being accessible to a wider audience, authors contribute meaningful knowledge in their respective fields, and DeVry University will receive long-overdue recognition and position itself as an institution that values and promotes scholarly research.

DEVRY UNIVERSITY INSTITUTIONAL REVIEW BOARD (IRB) GUIDELINES FOR RESEARCH

DeVry University established an Institutional Review Board (IRB) in March, 2012. The purpose of an IRB review is to assure, both in advance and by periodic review, that appropriate steps are taken to protect the rights and welfare of humans participating as subjects in a research study. IRBs attempt to ensure protection of subjects by reviewing research protocols and related materials. IRB protocol review assesses the ethics of the research and its methods, promotes fully informed and voluntary participation by prospective subjects capable of making such choices (or, if that is not possible, informed permission given by a suitable proxy), and seeks to maximize the safety of subjects.

Employees of DeVry who want to conduct research must contact the DeVry IRB. The IRB has an application and guidelines that will be sent back to employees to fill out to get approval from the IRB to conduct research. The first person to contact is Dr. Tracey Colyer (see contact information at right).

Universalizing Global Sustainability Creative Processes: A Sustainable Solution

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Abstract

Reducing and reversing the environmental impact of economic growth is difficult when a sizable proportion of the world's population has yet to benefit. Possible solutions to global sustainability challenges are not effectively shared between developed and developing countries. The purpose of this qualitative study was to highlight the need for increased understanding of global environmental sustainability challenges and the universality of creative processes. Research questions involved understanding how sharing sustainability solutions would help achieve global sustainability. Critical theory formed the conceptual framework of this article. Business leaders and commercial farmers in Zimbabwe were interviewed; data were organized, edited, coded, formatted, and analyzed to determine themes and trends. Themes that emerged included climate change knowledge and willingness to live sustainable lives. Results highlighted the need for universalizing global sustainability creative processes. Universalizing global sustainable creative processes may help raise a large number of people's standards of living and at the same time reduce the negative environmental consequences of economic activity.

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Keywords: Climate change, global warming, sustainable, global sustainability, business

Sustainability is a huge global challenge partly due to the poor economic environment in many developing countries (King, 2008). A billion people, mostly in Africa and Asia, survive on less than 2% of the world's wealth, with billions throughout the world living on less than U.S. $2 a day (Harvey, 2009). According to King (2008) and Nuthall (2009), the aspirations of this proportion of the world's population yet to benefit from economic growth may not be denied. Specifically, creative processes for global sustainability in developed countries are not effectively shared with sub-Saharan Africa's agriculture-based developing countries such as Zimbabwe. These developing countries were chosen for this study because potential damages from global warming show risks to world agriculture as the most important (Pradosh & Bhagirath, 2010; Schoen, 2011). Global sustainability is a business issue because business is one of the most powerful forces on earth, with enough reach, influence, personnel, and assets to confront and correct most serious environmental problems that face humanity (Rankin, 2010; Sitarz, 2008).

Schellnhuber, Molina, Stern, Huber, and Kadner (2010) edited thoughts from the first Interdisciplinary Nobel Laureate Symposium on Global Sustainability by the world's most pre-eminent thinkers. This resource is a discussion of scientific and political strategies for reconciling human civilization with its physical and ecological support systems. Challenges facing humankind in the 21st century that include climate stabilization, sustainable land use, and equitable development are highlighted. Global sustainability is unlikely to be achieved without a Great Transformation, making all facets of society more respectful of the existing planetary boundaries. Therefore, universalizing creative processes is fundamental to solving global sustainability challenges.

According to King (2008), sustainability is achieved by achieving environmental, economic, and social goals as failures in any realm are perceived to threaten the others. King's goal was to expand on the understanding of the economics of sustainability such as by finding a way to raise the standards of living of a large number of people while reducing the negative environmental consequences of economic activity. King presented a way to accomplish human development and wealth distribution without economic growth or at least without unsupportable strain on the environment such as global warming or other environmental concerns. King (2008) believed that the contributions of subsistence agriculture and the unpaid efforts of women worldwide are to be included in the economics of sustainability. This article suggests methods to universalize sustainable creative processes as a way to help solve global sustainability challenges.

Mintzer (2008) realized that the question facing many entrepreneurs was where to begin. He provides 101 recommendations to make businesses greener. Both simple suggestions, such as buying rechargeable batteries, to larger-scale changes, such as installing solar panels, are offered. Mintzer (2008) asserts that such recommendations would work best for global sustainability if they could be made available to all economies. The assumption in this article is that the universality of global sustainability creative processes is the key element in finding a way to raise the standards of living of a large number of people in a sustainable way.

One of the biggest challenges of global environmental governance is the problem of consumption (Dauvergne, 2010). However, to mitigate the ecological effects of consumption there is a need for more global cooperation. The current international initiatives, such as the Marrakech process to draft a 10-year framework for sustainable production and consumption, need to go well beyond simply promoting efficiencies, new technologies, and a greening of household consumption (Dauvergne, 2010). International cooperation through sharing global creative processes might be paramount to solving global sustainability challenges.

Purpose Statement
The purpose of this qualitative study is to highlight the need for increased understanding of global environmental sustainability challenges and the universality of creative processes. Such an exploratory research is done to diagnose a situation with the goal of discovering new ideas (Zikmund, 2009). New ideas of solving global sustainability challenges, creating,

and expanding markets for the United States (US) economy may result in helping job creation, thereby contributing to positive social change.

Definition of Terms
The following terms and phrases are defined as used in this article. *Climate change* versus *global warming*: According to Hertsgaard (2011), the term *climate change* refers to effects the "higher temperatures have on the earth's natural systems and the impacts that can result, such as stronger storms, deeper droughts, shifting seasons, and rising sea level" (p. 5). The term "*global warming* refers to the man-made rise in temperatures caused by excessive amounts of carbon dioxide, methane, and other greenhouse gases in the atmosphere" (Hertsgaard, 2011, p. 5).

Sustainability: According to the World Commission on Environment and Development (WCED), *sustainability* is "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Tregurtha & Nyman, 2014, p. 206).

Research Questions
The central research question for this article was as follows: How can sharing global sustainability creative processes between developed and developing agriculture-based economies help to achieve global sustainability and thereby bring about a positive social change? The assumption was that sharing global sustainability creative processes could help achieve global sustainability and at the same time raise the standard of living of a large number of people. Interview questions (*Appendix A*) for 23 participants were structured to discover answers to the following research questions: (a) Are people in developing economies aware of causes of severe weather, global sustainability challenges, and creative processes? (b) Are people in developing economies willing to embrace change to help solve global sustainability challenges? (c) How can developing economies contribute to the achievement of global sustainability? (d) How can sharing global sustainability creative processes between developed and developing agriculture-based economies help achieve global sustainability and thereby bring about a positive social change?

Theoretical Framework and Validity
In this article, Critical Theory is used to help explain and predict phenomena and show how this study is related to existing knowledge. The aim of using this theory is to encourage positive social change, not simply to document and critique society changes (Seiler, 2010). The most significant objective of critical theory is to "transform our present society into a just,

rational, humane, and reconciled society" (Jensen, 2009, para. 1). Therefore, the purpose of using critical theory is to inform the expectations and aspirations of this article. The hope is to transform society by recommending universalizing global sustainable creative processes to help achieve global sustainability and at the same time raising the standards of living of a large number of people.

On document analysis, the use of the conceptual frameworks of analysis of critical theory added validity to the research. According to Creswell (2013), validity may also be brought by spending prolonged time in the field with or without collecting data. I was born, raised, and spent more than three decades in Zimbabwe and also made several visits to the research field during the past 10 years, resulting in an in-depth understanding of the phenomenon under study. Therefore, the ability to convey detail about the site and the people lent credibility to this study, as the more experienced a I was with participants in their usual setting, the more accurate or valid the findings are (Creswell, 2013).

For internal validity of interview participants (IP), the risk of their biased selection was checked through an experienced research assistant and a community partner organization. The selection of these was purposeful, but individuals solicited for their experiences were randomly selected such that characteristics had the probability of being equally distributed among participants (Creswell, 2013). Regarding external validity, the research data were gathered from a representative portion of commercial farmers in Zimbabwe and business leaders. This was more externally valid and generalizable to other agriculture-based economies than laboratory research. The use of the qualitative methods of document analysis and interviewing in this article ensured that it addressed issues of external validity – that is, addressing issues of application and real world (Duncan & Harrop, 2006).

Research Method and Design

Qualitative methodology is the best choice for this article. This is because it has the capacity to provide deep understanding of this study's research question compared to quantitative methods that often pinpoint the direction, but not reasons behind the direction (Bryman, Becker, & Sempik, 2008). According to Marshall and Rossman (2010), strengths of qualitative methodology include the skill to capture human experience to know how people explain their conditions. In this article, phenomenological designs of interviews and content analysis were also used. For interviews, a sample size of 17 commercial farmers and 6 business leaders from all 7 provinces

of Zimbabwe was selected to be representative of the population. This sample selection occurred because potential damages from global warming showed the risk to world agriculture. Such global warming effects made this sample and the population it represented more receptive to global sustainability creative processes that may help improve their consumers' livelihood. At the same time, the threat of these effects might help motivate this population to reduce the negative environmental consequences of economic activity and strengthen their triple bottom line of profits, people, and the planet. Purposive and snowballing sampling methods were used to select participants so that many different orientations in attitudes to this study's research questions were represented. The purposeful sampling procedure was followed by randomization, which added reliability to the study (Bloomberg, & Volpe, 2012). These were the critical case and theory-based techniques.

Data Collection

Data for this article were collected from secondary sources such as journal articles, books, dissertations, theses, and qualitative interview data. Interview questions approved by Walden University's Institutional Review Board (IRB) were used to ask 23 participants about their experiences in relation to severe weather and what might need to be changed to help global warming and climate change issues. A pilot study on five randomly selected participants who were not included in the subsequent study interviews was conducted to validate the instrument, determine the final protocols, and refine data collection strategies rather than to formulate an analytic scheme or develop theory. The result of the pilot study was validation of interview questions as essential, thorough, and providing applicable information. These questions were formulated to be significant enough to answer research questions of this study.

Data Collection Technique

Data collection techniques included library visits for secondary data. Primary data were from interviews. Rubin and Rubin (2012) believed that using in-depth interviews "has extended our intellectual reach and, by turns, roused and satisfied our intellectual capacity" (p. xv). These interviews uncover hidden assumptions and biases; they "examine that which is often looked at but seldom seen" (Rubin, & Rubin, 2012, p. xv). Therefore, interviews offered this article rich findings on global sustainability challenges and the universality of creative processes.

Data Analysis Technique

After interview data were collected and organized, they were edited and coded before analysis. Meaningful categories and character symbols were established for emerging themes. These were codes on the study's topics and perspectives held by interview subjects. The codes were formatted using HyperRESEARCH software, which is a solid code-and-retrieve data analysis program that enables researchers to analyze findings and draw conclusions (Researchware, 2014). Data from document analysis were analyzed using the conceptual framework of the critical theory. This framework was used to scrutinize perceptions, experiences, and solutions of global sustainability challenges and the universality of creative processes.

Findings

Findings included four themes: (a) lack of global sustainability knowledge, (b) willingness to change, (c) willingness to contribute to global sustainability, and (d) universality of creative processes.

Global Sustainability Knowledge

Data collection results suggested that people in Africa's agriculture-based economy of Zimbabwe were aware of climatic changes but did not know why these changes were happening and how to adapt to and take advantage of shifting climatic change circumstances. IP8 wrote, "People are committing more sins than ever before angering God and our ancestral spirits who then punish us by withholding rain in order for us to repent" (IP8, 2011). This shows lack of knowledge about causes and possible solutions to negative effects of climate change. According to Stringer (2010), some people and their countries are not currently in a position to even envision a different life than today as they cannot imagine it; thus, they will not work to solve global sustainability challenges because of lack of knowledge and vision. If people do not know or understand the problem, they will not be able to solve it. Therefore, spreading global sustainability creative processes from developed countries to developing countries could help make tangible improvements to individuals, communities, organizations, and societies, resulting in positive social change.

Willingness to Change

All participants showed willingness to change if that was going to help solve climate change problems they are currently facing. The reason to this may be that they survive by producing much of their food except during droughts ("Zimbabwe Agriculture," 2014). However, Tipton (2011) believed that the most common hurdle to change is lack of knowledge. Participants for this study were made aware of possible causes of climate change as global warming.

As IP10 stated, "Anything that can save us from drought or its effects will be received with open hands just because without rain we have no life..." (IP10, 2011). Even though all participants indicated their willingness to change, Zuma (2009) believed that climate recovery paradigms based on solutions that residents of a developing country did not create themselves will not succeed. King (2008) and Zuma (2009) are correct in their belief that there should be an agreement that acknowledges the common liability of all nations to reduce emissions while not slowing the development of developing countries.

Willingness to Contribute to Global Sustainability

Based on most participants' answers, there is willingness to help contribute to end negative effects of climate change such as droughts, thereby helping to achieve global sustainability. IP15 noted:

> ...As sons and daughters of the soil, anything that we can do to save our crops and animals...will be welcome. The problem is people do not know what causes droughts, how to avoid them and if anyone has a solution, people will be happy to learn to get their farming lives back (IP15, 2011).

If people are willing to help, then the implication is that it is possible to effectively universalize global sustainability creative processes as a way of helping combat global sustainability challenges. However, developing countries' contributions to global sustainability can only work if they are fortified with knowledge, finance, technology, and capacity building support. According to Zuma (2009), developing countries may be able to reduce global emissions if developed countries take the lead. Therefore, availability of global sustainability resources to developing economies from developed countries may help many people gain from economic growth and at the same time reduce the negative environmental consequences of economic activity.

Universality of Creative Processes

Most (95%) participants' answers suggested that the universality of creative processes may be the answer to global warming that affects climate change. As IP22 noted:

> If we can do what is done in America...there will be jobs for people. With many people out of jobs, anything that may improve their lives will help.... To tell someone without food that you should recycle your waste to save the environment will not make sense to the person at all... (IP22, 2011).

The reason behind this indication may be the belief that practicing what is done in developed countries may result in successful and happy lives. Therefore, colleges and universities worldwide should answer the call to come up with a global approach to education for sustainable development. This may make it possible for people in different world regions who have diverse approaches and understandings of sustainable development to live sustainable lives (Manteaw, 2008). Business leaders in developing countries also need to be informed that practicing sustainable creative processes from developed countries such as the US may strengthen their bottom line and thereby position them as industry leaders.

Recommendations for Action

Climate change trends indicate increasingly severe negative effects on the majority of countries with disproportionate impacts on poor and vulnerable populations (Masocha, 2011). As the map below indicates, most countries requiring external assistance for food are in Africa, and these are in the world region on course for the warmest year on record (Masocha, 2011). The following *Figure 1* adapted from United Nations Food and Agricultural Organization Global Information and Early Warning System (FAO/GIEWS) (2014) shows 33 countries that required external food assistance in 2014, an increase from 30 in 2008:

Figure 1: Countries Requiring External Assistance for Food
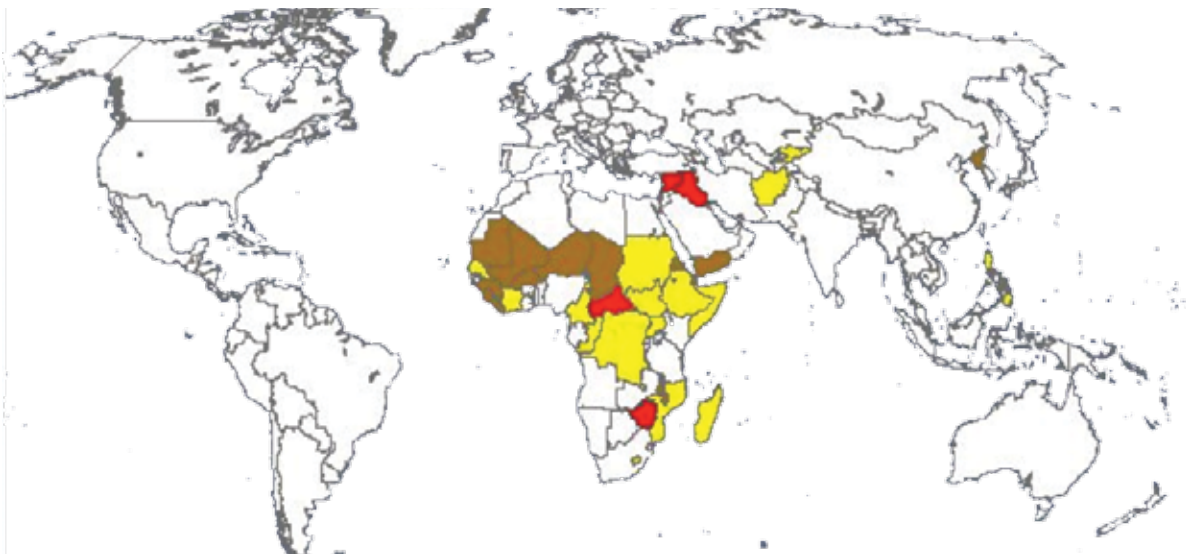
Figure 1: World map showing 33 countries that required external food assistance in 2014. Red shows countries that had a shortfall in aggregate food production or supplies, brown shows countries with widespread lack of food access, and yellow shows countries with severe localized food insecurity.

Laszlo (2010) is correct to say that without a change in direction, the world is on its way to overpopulation, growing potential for conflict, and severe climate change. Although this study may be too small to be used to suggest such grandiose action plans, these may still help to make a positive social change. Therefore, Stein (2008) is correct when he argued that "any effort we make to return to more reliable and resilient tools will also constitute a giant step toward sustainability and environmentally responsible self-sufficiency" (p. xvi).

Through research, teaching, publishing, and acting as models in their own operations, universities must lead society to a sustainable future (Wright, 2009). Trubetskova (2010) also proposed Vernadsky's theory of the biosphere and the noosphere that represented a ready-to-use conceptual framework for universal sustainability education that can be effectively implemented by educators at all levels and in various educational settings. Therefore, sustainability education may help in attempts to achieve global sustainability and must become a part of any professional curriculum in higher education as today's college students are tomorrow's decision makers and key players at local to international levels.

Business leaders, organizations, individuals, and communities must also pay attention to results of this study. Business leaders must pay attention because "improved brand reputation is perceived as the biggest benefit of addressing sustainability"

(Massachusetts Institute of Technology, 2011, para. 2). Besides, the biggest business opportunities in the 21st century are for green businesses solving environmental problems such as climate change

(Koester, 2011). Therefore, business strategic planning for climate change may result in maximizing the triple bottom line of profits, people, and the planet in the face of climate change, thereby contributing to positive social change. Likewise, developed countries need to develop products that are sustainable for use in developing countries and help them with appropriate technologies (Mugabe, 2009). This article may help stimulate the much-needed action on global sustainability solutions as well as inform some important policy debates, resulting in more inclusive and sustainable development.

Applications to Professional Practice and Implications for Social Change

The findings of this study are relevant to improved business practice. Policies that encourage and sustain jobs also help to reduce our carbon footprint and help raise those in developing countries out of poverty (Barbier, 2010). Business leaders should encourage learning activities that underscore the interconnectedness of life's different systems in terms of economics, environment, society, and culture. A well-structured and executed global sustainability strategy in developing economies can benefit the planet, people, and businesses' bottom lines. According to Stringer (2010), adapting sustainable solutions in the workplace can increase the triple bottom line by reducing costs, maximizing productivity, improving recruiting and retention, and increasing shareholder value. For this reason, developing economies' entrepreneurs should embrace the idea that they can lead the way in developing practices and processes that reduce the environmental impact of climate change. The consequences would mean positive social change and job creation through the exporting of US goods and global sustainability expertise. Therefore, universalizing global sustainability creative processes may be one of the most powerful solutions to global sustainability.

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Appendix A:
Semi-Structured Interview Questions

1. In what industry or industries do you make your living most?

2. Explain how you think changing weather conditions or patterns can negatively affect your industry and way of life.

3. What effects has changing weather conditions on the majority of Zimbabweans or any other country that has most of its people survive mostly on agriculture?

4. Explain or list what you think has changed in weather conditions during your lifetime.

5. What do you think might be the causes of such negative or positive changes in weather conditions?

6. Explain what you think or suggest might be key solutions to such negative or positive climate changes.

7. Some solutions to global warming and climate change such as recycling and use of alternative energy that include solar power have been formulated and practiced by some US businesses leaders. Explain if you think universalizing such sustainability processes may be the answer to global warming that affects climate change.

8. What global sustainable methods do you think would be of most help in solving global warming and climate change challenges in agriculture-based developing economies such as Zimbabwe?

9. Identify five key areas in the agriculture-based developing economy of Zimbabwe that are, or can be, negatively affected by climate change due to global warming.

10. In your personal capacity, your community, organization, and or business, what do you think you can do to help global warming and climate change challenges facing the world today?

11. Explain why you are worried or not worried about effects of global warming such as floods, excessive droughts, and extreme weather conditions negatively affecting your future life or business performance.

12. List or explain any other comments you might have in connection with global warming and climate change.

Mutual Funds and Sales-Based Fees: Why are Investors Still Paying Loads?

Article Author: Christopher S. Rodgers, Keller Graduate School of Management

Author Note: Christopher S. Rodgers is an Associate Professor of Business & Management, Keller Graduate School of Management, Henderson, NV.

Abstract

The purpose of this paper is to document and discuss the rationale of paying loads on mutual funds and to present some possible explanations for this behavior. Over the past 50 years, investments in mutual funds in the United States have increased dramatically in popularity among individual and institutional investors. With the advent of the Internet, not only has the popularity of mutual funds increased, but how they are purchased and the fee structure of mutual funds has also been impacted. This paper will include a brief summary of these trends; the primary focus of this paper is to determine whether investors who pay loads actually receive any tangible or intangible benefits in order to overcome this additional cost.

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Keywords: Mutual funds, load-funds, no-load funds, mutual fund classes

Over the past five decades, mutual funds have grown in numbers and in popularity. According to the Investment Company Institute (ICI), the US mutual fund industry is currently the largest in the world with over $13 trillion in net assets, an increase of about $1.4 trillion in 2013 alone, accounting for about 49% of the worldwide market (ICI, 2013). This increase in demand has been attributed to an aging US population, increased participation in employee sponsored retirement plans, the trend towards investment diversification, and uncertainty about the solvency and liquidity of corporate and government managed retirement options (ICI, 2013).

Mutual funds have become popular for various reasons, but the primary reasons appear to be affordability, diversification, and selection (Madura, 2011). For a relatively small investment, mutual fund investors can build a well-diversified portfolio of stocks, bonds, and other commodities that meet their specific investment goals and also receive the benefit of professional portfolio management (Madura, 2011). There are currently thousands of mutual funds for investors to choose from and most have initial minimum investments of $5000 or less (Kiplinger, 2014). In the following sections, mutual fund classes and related fees, the expenses associated with each, and the current trends that appear to be emerging in the industry will be explained.

Mutual Fund Classes and Related Fees

According to the U.S. Security and Exchange Commission (SEC, 2014), many mutual fund companies offer different types of shares to their clients called "classes." The SEC has identified 3 basic classes of mutual funds that are available to individual investors who charge an asset-based sales fee, also known as a sales load. These classes are "Class A," commonly referred to as "front-load" funds; "Class B,"

commonly known as "back-load" or "contingent deferred sales charge" (CDSC) funds; and "Class C," commonly known as "level load" funds (ICI, 2013).

According to the Financial Industry Regulator Authority (FIRNA, 2014), Class A funds typically assess a sales charge at the time of purchase. This amount is subtracted from the initial investment, which means for every $100 invested into a class A fund charging a 5% load, only $95 is used to purchase the fund, and 5% goes to the broker or other intermediary (FIRNA, 2014). In this case, the pre-purchase adjustment suggests the investors would need to make about a 6% return on their net investment to essentially break even.

Class B funds, commonly known as back-loads, generally have initially higher loads as a percentage of all funds than class A funds, but these charges are designed to decline over time and are assessed when the fund is sold rather than purchased (FIRNA, 2014). According to the American Institute of Certified Public Accountants (AICPA, 2014), in most cases, if the investor holds the fund long enough, the load can be reduced substantially or eliminated completely over the effective holding period. Unlike class A funds, 100% of the investment in class B funds is invested, and the load assessed is based on the proceeds at the time of sale, which in an appreciating market could be substantially higher than a front-load charge (AICPA, 2014).

Class C funds generally charge a very low or no front sales charge. Just like class B funds, all or most of the money is invested in the fund, but these funds are subject to relatively higher annual charges of about 1% or more per year (FIRNA, 2014). These deferred charges are commonly referred to as level-loads (ICI, 2013).

A fourth class is known as no-load funds. As the title suggests, these funds are not subject to a front-end load or contingent deferred sales load (ICI, 2013). With no-load funds, 100% of the purchase goes into the investment, and the proceeds of the sale of the fund are not subject to a deferred load charge (SEC, 2014).

Loads can be substantially reduced or eliminated. Investors who make large purchases, exchange funds within the same "family" of funds, or who commit to regularly purchasing funds, may be eligible for discounts, commonly known as "breakpoint" discounts (FIRNA, 2014).

Other Mutual Fund Expenses

Other mutual fund expenses investors generally incur are ongoing expenses designed to cover portfolio management, administration, accounting and pricing, shareholder services, marketing charges, and other miscellaneous costs associated with managing the fund (ICI, 2013). These are generally expressed as a percentage of the fund's assets and are known as the fund's expense ratio (FIRNA, 2014). These fees are considered indirect fees since they are originally paid from the fund's assets and later assessed against investors' shares. They are generally assessed on all funds regardless of class and are stated as a percent of the funds value at the time of assessment (ICI, 2013).

Trends in Mutual Fund Purchases

Over the past 10 years, mutual fund investors appeared to be moving away from sales-based fee funds to no-load funds. In 2003, 36% of mutual fund transactions involved some form of load charge compared to only 25% in 2012 (ICI, 2013). At the same time, purchases of no-load funds increased from 49% to 61% (ICI, 2013). Over this period, investments in mutual funds nearly doubled (ICI, 2013) making the shift even more dramatic. Still, the data suggests that investors who pay loads still make up a relatively substantial share of the mutual fund market, but their percentage and numbers appear to be shrinking (ICI, 2013).

The economic principle of cost-benefit analysis suggests that in order for a decision or action to be economically rational, the marginal benefits of the option should be greater than its marginal costs (McConnell, 2012). Other studies suggest that using the three basic components of objective value — quality, service, and costs — are appropriate when assessing cost/benefit relationships (Kerin, 2013).

If the evidence suggests that the cost/benefit relationship is not rational, then why do many investors continue to pay loads? Some of the related literature suggests that there may be more components to value other than quality, service and costs. Along with practical benefits such as quality and service, one should consider functional benefits such as time and effort, and emotional payoffs, such as having someone else responsible for the stress of making complicated decisions (Zeithami, 1988). Many investors may be willing to pay for guidance, research, and advice, and even to have their investments made for them because they do not believe they have the time or knowledge to do these activities themselves (Mladjenovic, 2013).

Purpose and Research Questions

The primary purpose of this paper is to assess whether funds that charge asset-based fees, commonly known as "load funds," provide a value greater than the cost associated with these funds. The three research questions that need to be answered are: (a) Do loan funds perform better than no-load funds? (b) Do load funds charge lower annual fees than no-loads? and (c) Do load fund companies provide services that are no available to clients who purchase no-load funds?

Method

In order for sales-based charges, such as front and deferred loads, to be considered economically rational, the funds should provide benefits that are greater than their costs. To meet this test, load-funds should provide value that is equal to or greater than competing options, such as no-loads. The consumers of these funds should expect the quality and service associated with these funds to be higher, and they should experience overall costs that are equal to or lower than the costs charged by no-load funds.

The data and analysis presented in this study are based upon the one-year, three-year, and five-year performance and expenses experienced by top performing funds over the five-year period ending December 31, 2013. In my original sample, all equity, bond, and commodity-based mutual funds that are commonly available to the general public and subject to reasonably predictable initial costs were included.

The data used to support this research project were acquired from the Kiplinger Mutual Fund Finder (Kiplinger, 2014). This includes cost information and returns for over 28,000 mutual funds based on the December 31, 2013 closing prices. This database was downloaded into Excel, where it was refined, upgraded and analyzed in order to provide the findings and conclusions of the study.

Since the primary focus of this study was to determine whether load-funds available to the general public provide value above and beyond their additional cost, the following exclusions and refinements were employed: To eliminate funds that are not available to the general public, funds that were only available to institutions (class I, Q, W, X and Y funds), retirement accounts (class K and R funds), or employees of mutual fund companies (class Z funds), were excluded from this study. So were funds with initial minimum investments of over $10,000.

Since holding periods of deferred load-funds were not practical to determine, class B and class C funds were also excluded from the study, essentially leaving only front-end and no-load funds as the focus of my analysis.

Typically, the most tangible benefit associated with the quality of mutual fund management is the return on investment. In order to challenge the assumption that load-funds may be better managed than no-load funds, I analyzed types of funds based on their one-year, three-year, and five-year actual and load-adjusted performance. To do this, I identified the top 100 performing funds in the following six categories and identified the percentage of the top performing funds in each category: 1-year, non-adjusted; 1-year, load adjusted; 3-year, non-adjusted; 3-year, load adjusted; 5-year, non-adjusted; and 5-year, load adjusted. To determine the load-adjusted return in each category, I initially selected the top 500 funds in each category, determined what the investment basis would be at the beginning of the investment term, and multiplied this basis times the actual return of the investment. I then re-sorted the samples based on the newly calculated load-adjusted returns for each sample set and reviewed the top 100.

My next objective was to challenge the assertion that expense ratios of front-load funds are lower than the expense ratios charged by no-load funds. To do this, I selected the top 100 front-end and top 100 no-load funds based on their one-year performance and tested the samples to see whether there were any significant differences between the annual expenses charged by these two different classes of funds.

My third challenge was to address the assumption that load-funds offer value-added services to its investors that no-load funds and no-load fund providers do not. I did this by researching various full-service and discount mutual fund providers to determine whether the services were available and at what cost.

Results

In order to challenge the assumption that load-funds may be better managed than no-load funds, I recorded and analyzed the standard and load adjusted one-year, three-year, and five-year returns of the top performing front-load and no-load funds in each category. My findings are summarized in *Table 1* and show that overall, no-load funds have outperformed load-funds in all six categories: 1-year, non-adjusted; 1-year, load adjusted; 3-year non-adjusted; 3-year, load adjusted; 5-year, non-adjusted; and 5-year, load adjusted. In the categories of non-adjusted performance, load-funds represented between 36% and 39% of the top performing funds, while no-loads

represented 61% to 64% of the top performing funds. When adjusted for loads, front load-funds represented only 22% to 28% of the top performing funds, while no-load funds represented between 72% to 78% of the top performing funds. This analysis suggests that front-end load-funds do not outperform no-load funds and actually underperform no-loads by a ratio of about 2 to 1. The evidence, therefore, also suggests that the argument that load-funds may be better managed than no-load funds is not supported.

Table 1: Mutual Fund Performance based on Fee Structure: Top 100 in Each Category

Performance Category	Number of Load-funds in Category	Number of No-Load Funds in Category
1-year non-adjusted	38	62
1-year load adjusted	27	73
3-year non-adjusted	39	61
3-year load adjusted	28	72
5-year non-adjusted	36	64
5-year load adjusted	22	78

In order to challenge the assumption that expense ratios of load-funds are lower than the expense ratios of no-load funds, I selected the 100 top performing no-loads and compared their expense ratios to the top 100 performing load funds. In this case, I included all class A, B, and C funds in the load sample. The average expense ratios for these samples were 1.75% for the load funds and 1.22% for the no-loads. Again, my analysis suggests that the argument that no-load funds have higher expense ratios than loads was not substantiated.

My last challenge was to address the assumption that investors who pay loads have access to more resources and services than investors who select the no-load option. The review of 10 websites affiliated with five full-service brokers and five discount brokers listed in *Table 2* did not support this assumption. These 10 websites provided basically the same research tools, and all sites provided additional financial advice and services that could be obtained for a fee.

Table 2: List of Full-Service and Discount Brokers Evaluated in Study

Full-Service Brokers	Official Website
Merrill Lynch	http://www.ml.com/index.asp?id=7695_15125
Morgan Stanley	http://www.morganstanley.com
Edward Jones	https://www.edwardjones.com/en_US/index.html
UBS	http://www.ubs.com/us/en.html
Raymond James	http://raymondjames.com
Discount Brokers	**Official Website**
Charles Schwab	https://www.schwab.com
Fidelity	https://www.fidelity.com
TD Waterhouse	http://www.tdwaterhouse.com
Scottrade	https://www.scottrade.com
E-Trade	https://us.etrade.com/investing-trading/v1

Note: Website addresses as of 2/28/2014

Discussion

In this study, the evidence suggests that there may be little, if any, economic rationale for mutual fund investors to pay loads. The evidence suggests that load-funds do not provide benefits greater than their costs in the areas of quality, cost or service. Load-funds failed to outperform no-loads at a ratio of nearly 2:1 before being adjusted for loads. Also on average, they appear to charge higher annual expense ratios than no-load funds. With regards to service, there was very little evidence to suggest that load-funds provided services above and beyond those offered by no-load providers.

This research also showed a dramatic shift away from asset-based fees in favor of no-load funds. This shift appears to be driven by at least three factors. The first would be an observable increase in participation in employee-sponsored retirement plans that are generally funded with no-load funds. The second could be attributed to the promotion of no-load funds by discount brokers and online trading platforms that appear to target self-directed investment selection and maintenance. The third could be related to the fact that no-load funds are performing as well or better than their fee-based counterparts.

The results of this study and others like it should be of interest to investors and investment companies alike. Investors who are able to select and monitor their own fund investments should understand that in most cases, their personal investment performance can be improved by taking more control of the process and developing the basic skills required to do so.

Investment firms, if they have not already, should begin to develop revenue models that can take advantage of the growing market of self-directed investors and adjust their fee schedules to incorporate this trend. It does not appear that there is any going back to the way it was: Those who try may be destined to go the way of the buggy whip.

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The Optimal Strategic Planning of Apheresis Programs Using a Genetic Algorithm

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Abstract

With an increasing demand for blood and blood products, it has become increasingly important to design, plan, and execute an effective apheresis blood collection protocol. Based on the process of dialysis, "apheresis" allows certain blood products to be removed from the body and returns others back to the patient. This study defines a population of software-based chromosomes, each composed of thirteen common apheresis procedures. A given chromosome represents a possible solution to a volume and product-based strategic plan, with each procedure providing an allele, which represents the number of times that the procedure is performed. The chromosomes breed using a genetic algorithm, swapping procedures and randomly mutating. The success of a given chromosome is judged by a fitness factor that is based on profitability and how close the procedures in a chromosome collectively meet goals stipulated in a strategic plan. The results of this study strongly indicate that an industry that is currently losing money in spite of the presence of free donor resources can potentially be returned to profitability through planning supported by optimization algorithms.

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Once considered staid, the blood industry is undergoing a tremendous change. As America's population grows, so grows the demand for human blood. Currently, the 1,195 blood bank establishments in the US produce more than 16 million units of red blood cells (RBCs) annually, of which some 14.5 million are actually transfused (Pereira, 2007; Perez, Carden, & Haarmann, 2010). These collection and transfusion volumes have increased annually. Pereira et al. (2007) suggest these numbers will continue to increase, reaching an increased blood transfusion demand of more than 22 million units per year by 2030 and more than 26 million by 2050. Coincidently, there is evidence that the percentage of the population who donates blood, the "donor pool," is shrinking; the blood supply is decreasing. Therefore, blood bank operators will have to increasingly rely on innovative and strategic donor management techniques, including greater reliance on apheresis RBC collection to collect a sufficient annual supply of blood to match the country's demand. In this paper, an advanced algorithm has been developed that will aid blood bank management in determining the "optimal" mix of apheresis procedures to achieve a predetermined unit volume goal within a set population of existing apheresis donors. The authors contend that the utilization of such algorithms has the potential to simultaneously (a) define a highly efficient basis for collecting the planned volume of blood products; (b) reduce the number of procedures that must be performed to accumulate that volume, making a more efficient use of the existing donor base; and (c) result in a greater financial return for the blood bank. The purpose of this paper is to determine the how such an optimization algorithm could be designed, and validate its efficacy using realistic blood product collection data.

The technical core of this paper addresses the development of an apheresis program using strategic planning and an automated optimization approach based on a genetic algorithm; the conceptual basis of such an algorithm is defined here (Banzhaf, Nordin, Keller, & Francone, 1998). The strategic plan represents the unit collection goals for one or more blood banks. It addresses both whole blood (WB) collection as well as the use of apheresis from fixed locations and increasingly, the use of mobiles. The plan itself addresses an arbitrary but fixed period of time; this may represent anything from a number of months to years, but the authors' experiences within the blood banking industry suggest an annual plan represents the optimal range.

In this paper, a basic strategic plan has the following characteristics: (a) Red Blood Cells (RBC) – the number of RBC units that will be collected via whole blood or apheresis; (b) Single Donor Platelets (SDP) – the number of SDP units that will be collected through apheresis; and (c) Plasma (PL) – the number of PL units that will be collected via whole blood or apheresis.

In this paper, an example of a small, fictional, regional blood bank with modest collection goals will be utilized, although the approach is easily scalable to large, multi-location blood banking organizations. In this example, the following strategic goal is put into place for a given year (See *Table 1*).

Table 1: An Example Strategic Goal

Product Type	Number of Units
RBC	33000
SDP	7000
Plasma	29000

With these unit figures in place, the mechanism of collection is determined. This is either through whole blood or an apheresis program. In our strategic plan, we state this as a simple set of percentages, i.e. M%/N% where M represents the number of RBC units collected via whole blood collection and N the collection through apheresis. In this example, the relative percentages will be 85%/15%, where 85% of our RBC collection will be through whole blood, and 15% through apheresis. The following basic assumptions are made with respect to SDP and Plasma: (a) All SDP is collected exclusively through the apheresis program; (b) plasma is manufactured from whole blood at a standard rate of 0.988 Plasma units per WB unit; (c) any excess plasma that is not manufactured from whole blood will be collected through the apheresis program; (d) all RBC units are

manufactured from WB at a rate of 1 RBC unit to 1 WB unit; and (e) although important, in this paper, the loss rates that occur as a result of collection or manufacturing are not considered.

Assuming an 85%/15% split between WB and apheresis collection, the following apheresis plan for our example blood bank is presented based on the assumptions above (See *Table 2*).

Table 2: An Example Apheresis Plan

Product Type	Number of Units
RBC	4950
SDP	7000
Plasma	1286

Study Design and Method

In the following section, the fundamentals of (a) an apheresis program will be introduced, and the (b) design and implementation of the study will be outlined.

An Apheresis Program

In building an apheresis program for a given strategic planning period, a blood bank should determine the type and number of apheresis procedures to be performed. These are named according to the manufacturers of apheresis machines. However, each procedure draws a combination of RBC, SDP and PL units by separating those products from the blood and returning it to the patient. Such a process typically takes 45-120 minutes.

In this example, the following set of procedures (PR) numbered 1-13, which represent a typical range of procedures, is presented. These are specified as follows (see *Table 3* on the following page):

Table 3: An Example Set of Procedures

Procedure	UNITS			Marginal Contribution
	RBC	SDP	PLA	
PR1	1	1	0	$598.91
PR2	2	0	0	$300.81
PR3	1	1	1	$649.81
PR4	1	2	0	$1204.81
PR5	1	2	1	$1259.81
PR6	1	3	0	$1814.81
PR7	0	2	1	$1052.81
PR8	0	2	0	$997.81
PR9	0	1	0	$387.81
PR10	1	0	1	$39.81
PR11	0	1	1	$442.81
PR12	0	3	0	$1607.81
PR13	0	3	1	$1662.81

Each unit column represents the number of units drawn from an eligible donor for a given procedure. Of particular note here is the *marginal contribution*. This is the amount of profit made by the blood bank, assuming that the products drawn are sold at market value. The sum also factors in the cost of labor (including blood bank operations and phlebotomists) and the disposable kit used by the machine for each procedure. These figures are presented as a representative example only.

The list presented here is not exhaustive. For example, a blood bank with high plasma requirements may utilize a "jumbo plasma" procedure, typically to meet the needs of transplant, burn or cancer patients. This procedure can draw 2.5 units of plasma per execution. In other cases, blood banks may not implement a given procedure because of the physiological limitations of their donor base, the perceived risk of side effects, or simply that the time required would inconvenience the donor. In short, a given chromosome will be composed of different procedural genes tailored to the specific requirements of an individual blood bank.

In building a program, the planners are required to meet the unit goals stipulated in the strategic plan. Such an activity requires that the following factors

be taken into account: (a) A specific combination and number of procedures must be performed to meet the strategic planning goals for each unit type; (b) a specific combination and number of procedures must be performed to maximize the revenue represented by the marginal contribution of each procedure; (c) the specific combination and number of procedures should not overproduce, as this will lead to wastage, incurring a loss based on the cost of the procedure and biological disposal; (d) the specific combination and number of procedures should not under-produce as this will require the blood bank to go to a third party to buy the blood at market rate to meet its own customer requirements, and in the best case not realize a profit from the sale; and (e) the specific combination and number of procedures must be physiologically achievable by the donor population available to the blood bank.

When an apheresis program is planned manually, in the authors' experience, it typically takes up to a week, and the results may be less than optimal. In reality, the problem is almost certainly *Non-Deterministic Polynomial-Time Hard* (NP-Hard) (Garey & Johnson, 1979). Simply stated, there are no known right solutions that can be found "quickly" in polynomial time, and in fact, many strategic plans may be unfeasible. A recourse is to use an *optimization algorithm*, which given the factors outlined above will produce a possible "best fit" solution and build an apheresis program that meets our collection goals, *if that goal is in fact feasible*. In the next section, a technique to address finding optimal solutions is presented.

Design and Implementation

This paper demonstrates a well-known approach to optimization using a genetic algorithm. This provides a solution search process that mimics some of the processes of natural evolution. The approach characterizes a given apheresis program as a *chromosome*. This is made up of thirteen *genes* that correspond to the procedures outlined in *Table 3*. A gene has a characteristic called an *allele*, which represents the number of times it is performed during the strategic planning period.

A typical genetic algorithm has an *initialization phase* and a number of *evolution cycles*. In the initialization phase, a set of random solutions is constructed. The example builds a population of chromosomes that represent 500 possible solutions. In each chromosome, the allele of each gene is randomized between 0 and the maximum number of times it may be performed on that blood bank's donor population. This maximum number is determined by the availability of donors with the appropriate physiological characteristics necessary to undergo the procedure, and the number of times during the

strategic planning period they can donate. In simple terms, each gene is a procedure executed by an apheresis machine, and is assigned a random number of times it is performed, limited by the constraints of the donor base.

The evolutionary cycle is designed to breed new chromosomes, through the following "biological" processes: (a) crossover – two chromosomes can "breed" by producing offspring that share genetic material. Simply stated, the algorithm will swap genes of the same type of procedure, but with different alleles (the number of times it is performed). (b) mutation – the allele of one or more genes in a chromosome can be randomly "mutated" by assigning the allele a random value. Simply stated, natural mutation is represented by randomizing the number of times a given procedure is actually performed.

The resulting population is then compared against a *fitness function* that determines how close a given apheresis chromosome is to the unit collection goals set by the strategic planning goal. The fittest chromosomes will live to "breed" in the next evolutionary cycle. The less fit will be removed from the population pool; this is a process called *selection*. As

respect to the overall strategic planning goal. The next section will address the characterization of (a) an apheresis program as a chromosome, and (b) the procedural gene.

The Apheresis Chromosome

A potential apheresis program is characterized as a population of *chromosomes*. Each chromosome represents a possible strategic planning solution for an apheresis program, in terms of the procedures to be performed and the number of times each procedure is executed during the strategic planning period. As in actual genetics, a chromosome is made up of a number of *genes*, where each gene represents a specific procedure that can be undertaken by an apheresis machine and the number of times it will be performed.

In this paper, a chromosome is represented as a list of thirteen genes, which correspond to common red blood cell (RBC), single donor platelet (SDP), and *plasma* (PL) combinations that draw these *blood products* from a physiologically eligible donor. In simple diagrammatic terms, the chromosome and the constituent "gene" procedures (PR1-13) can be visually represented as follows (see *Table 4*).

Table 4: A Visual Representation of a Chromosome

PR1	PR2	PR3	PR4	PR5	PR6	PR7	PR8	PR9	PR10	PR11	PR12	PR13	PR14

a consequence, over a number of cycles, the fittest will survive and if it is feasible to do so, will move closer and closer to an optimal solution to the problem.

The algorithm goes through 300 evolutionary phases; this is an arbitrary value that provides an optimal solution without a significant wait time for the user (when executed as software). At the completion of these cycles, the fittest chromosome is extracted and presented as the best "optimal" solution. This can then be used as a basis for manual fine-tuning. In essence, a labor-intensive process that normally takes days can take less than a minute using algorithmic optimization.

The Design of the Genetic Algorithm

In the following sections, the structure and execution of the genetic algorithm will be examined. In particular, it will address the following concepts: (a) chromosomes – how a total possible apheresis program can be represented genetically as a chromosome; (b) genes – how a given procedure executed by an apheresis machine and the number of times it is performed can be captured as a gene; and (c) fitness function – how our algorithm calculates the relative fitness of each apheresis program with

The Procedural Gene

The "genetic material" of the chromosome represents a specific apheresis procedure. As discussed above, it represents a combination of RBC, SDP, and PL units that may be drawn from a single performance of that procedure. As shown in Table 3, each gene represents a unique combination of blood products drawn, where 0-3 units of each product type are drawn. The primary limiting factor associated with each procedure is the physiological eligibility of a given donor, typically a factor of weight and the interval between previous donations.

In our approach, each gene is assigned a percentage value, representing two factors: (a) the percentage of the donor base that is physiologically eligible for the procedure; and (b) a reduction of the value assigned to 1. to indicate business and patient standard of care factors that may make the blood bank less willing to perform that procedure (e.g. a low marginal contribution, a low unit yield, the donor base being unwilling to spend the time required for high yield procedures, and so on).

In the first factor, the total represents the percentage of the total donor base that can be recruited for that procedure. For example, 40% of the donor population may be eligible for both PR12 and PR13, in our example a "triple" SDP and a "triple" SDP and "single" PL respectively. This does not mean that they will actually undergo that procedure, only that they are in fact physiologically eligible. As a consequence, the cumulative percentage of all the genes in a chromosome may far exceed 100%. In our example, we assign the following eligibility percentages to each gene (see *Table 5*).

Table 5: An Example Eligibility Breakdown by Procedure

Procedure	Eligibility %
PR1	5%
PR2	100%
PR3	6%
PR4	2%
PR5	3%
PR6	0.05%
PR7	22%
PR8	46%
PR9	0.5%
PR10	0%
PR11	11%
PR12	45%
PR13	20%

As per factor (b) above, this variable will change based on the local donor population of a given blood bank based on physiological and managerial factors. These factors can never raise the eligibility percentage determined in factor (a) above; they can only lower it!

In biology, genes often express themselves in different forms, typically referred to as an allele. In human genetics, this can lead to the expression of different physical traits, such as eye color. In this simplified model, the allele is simply the number of times that a given procedural gene is performed on an eligible donor during a specific strategic planning period. As a consequence, a given chromosome will represent a specific apheresis program, composed of a number of genes representing specific types of procedures performed a given number of times.

In the next section, this paper will demonstrate how a chromosome is considered optimal using a fitness function.

Designing the Genetic Fitness Function

The chromosome structure described represents the basic component of the genetic algorithm. However, the stipulation of how many times a procedural gene can be performed and limiting it by donor population does not in any way judge whether the apheresis program will meet the strategic planning goal of the blood bank in an optimal way. This is the role of a *fitness function*. This is a single numerical figure that determines the relative closeness of a given chromosome to meeting the strategic planning goals of the blood bank in terms of the RBC, SDP and PL products required in a given planning period. The higher the fitness value, the closer a given apheresis program represented by the chromosome, its constituent procedural genes, and the allele representing the number of times that the procedure is performed, will meet that planning goal.

To characterize the fitness of a given chromosome, it is necessary to capture key factors that represent the primary drivers of the blood bank apheresis collection: (a) marginal contribution, (b) overproduction of blood products, (c) donor eligibility, and (d) calculation of chromosome fitness. These are addressed in the following sections.

Marginal Contribution

Every apheresis procedure has an associated cost. This is typically computed by the cost of labor (the attending phlebotomist and operational staff) and the cost of the disposable kit used by the apheresis machine to undertake a specific procedure. These costs are subtracted from the amount of profit made by the blood bank for each unit sold to derive an overall *marginal contribution*. Thus:

Marginal Contribution =
Profit from Blood Products – Labor Cost – Kit Cost

In this example, marginal costs for each specific procedure are based on a derivation of real-world data from actual blood bank financial operations, as shown in *Table 6*.

In assigning these marginal contribution values, the following prices per unit of blood product are also assumed, based on current market prices.

Table 6: Product Prices per Unit

Blood Product	Price in USD
RBC	$254
SDP	$610
Plasma	$55

It should be noted that actual prices vary based on region and market fluctuations, but the relative proportion between product types is generally stable, and therefore is sufficient for the basis of this example.

Clearly, it is in the best interest of a blood bank to undertake procedures that maximize revenue, while meeting the specific blood product requirements of their customers. The marginal contribution in terms of total dollar value contributes directly to the fitness function value. Therefore, the *allele* of each gene is multiplied by the marginal contribution of the procedure it represents to derive a total. Thus:

Total Marginal Contribution =
sum of (gene marginal contribution X allele)

In simple terms, the total is derived by multiplying the marginal contribution of each procedure in the apheresis program by the number of times it is performed.

A given apheresis program, of course, is not driven simply by maximizing the number of units. The production of an apheresis program is constrained by a number of limiting factors that will now be addressed in turn, starting with underproduction.

A blood bank will typically represent the sole supplier for a specific customer, typically a hospital or specialized medical unit. These will require a specific number of units of a given product type, and in the case of RBC units, a given Rh factor within a specific time frame. Although this paper addresses a more strategic view of blood product requirements over a longer planning period, an apheresis program that ultimately under-produces will to some degree not meet the product requirements of its customer base.

In such circumstances, a blood bank will have to go to a wider market and purchase the units required at market value. As a consequence, the blood bank is likely to make little or no profit from the transaction. In many circumstances, blood banks will often undertake a degree of "horse trading," where a sale is contingent upon the buyer also purchasing units that are about to expire and/or are difficult to resell, such as AB negative blood, as part of the transaction. In these circumstances, the blood bank is likely to make a significant loss.

To reflect underproduction in the fitness function, it is assumed that the result is reduced by the dollar value that the chromosome and its constituent genes fail to meet a strategic goal. Of a given product type expressed in units, in simple terms, the blood bank loses the potential profit of the sale of a specific unit type by not meeting its planned production goals. Example: A chromosome produces 6000 SDP units with a strategic goal of 7000 SDP. Therefore, it has under-produced by 1000 units. The fitness function is then penalized by a sum equal to 1000 units x $610, which equals $610,000. This is subtracted from the total marginal contribution of the chromosome.

Overproduction of Blood Products

The paper will now examine the opposite problem: overproduction of blood products. A blood bank may "over produce" in order to sell blood products and increase revenue; however, such additional production should be considered as part of the strategic plan. In cases where an overage is produced that far exceeds market demand, the result is *wastage*.

Wastage incurs a number of costs. The first is the cost of biological disposal, which is typically undertaken by relatively large units of weight and has been considered negligible for the purposes of this study. The second takes revenue directly from the marginal contribution of the overall apheresis program. Although it is physically possible to track an individual unit back to a specific procedure and calculate the actual loss, the approach more abstractly divides the cost across the whole apheresis program.

For each blood product where there is wastage, the loss is determined as a proportion of the total marginal contribution only for those genes that represent procedures that draw that specific product type. This is further refined by the number of units drawn by that type of gene and the number of times it is actually performed (the *allele*). In simple terms, the blood bank loses a proportion of the overall marginal contribution based on the relative value of that unit type.

The final factor is derived from the physiological ability of the blood bank donor population to actually donate blood products.

Donor Eligibility

As already noted, a given gene is limited by the number of eligible donors who can actually undertake the procedure it represents. The gene specifies a percentage of the total donor base that actually sets an upper limit of the allele of each gene. Therefore, a given gene procedure is limited to being performed a maximum number of times consistent with the physiological limitations of its donor base.

Given these factors, the fitness of a specific chromosome can now be analyzed.

Calculation of Chromosome Fitness

The derivation of the overall fitness value of a specific chromosome is therefore derived from the following:

Fitness =
Total Marginal Contribution – Underproduction Cost – Over-production Cost

In order to clearly differentiate a chromosome that is "close" to the best solution — by meeting the strategic goal established by the blood bank—a chromosome is not algorithmically "penalized" where the actual unit totals of RBC, SDP and PL collected are within 5% of the strategic plan total for that product type using either overproduction or underproduction.

The following section includes results of the data collected, followed by a discussion and conclusions.

Results

Using the chromosome, gene and fitness function, it was possible to derive an optimal apheresis program using a genetic algorithm. The implementation used the open source JGAP framework (Meffert & Rotstan, 2002) that provided the abstractions necessary to configure and run an algorithm based on standard principles and best practices established in the literature (Philip, Toafiki, & Kehinde, 2011).

The two optimal solutions in the blood bank example are presented here to demonstrate the efficacy of the genetic algorithm. The first run produced the following unit collection results (see *Table 7*).

Table 7: First Run Unit Collection Results

Product Type	Units Collected	% Deviation from Goal
RBC Collection	4951	0.0002%
SDP Collection	7349	0.49%
PL Collection	1979	53%

Analyzing the chromosome and its constituent genes yielded the following apheresis program solution in terms of the number of each procedure to be undertaken (see *Table 8*).

Table 8: First Run Number of Procedures Required

Procedure	Number
PR1	283
PR2	2064
PR3	349
PR4	65
PR5	115
PR6	11
PR7	657
PR8	38
PR9	284
PR10	0
PR11	423
PR12	974
PR13	435
Total	**5698**

This yielded the following SDP *split rate* (the average number of platelets yielded by the apheresis program) and total profit (see *Table 9*).

Table 9: First Run, Split Rate and Total Profit

Measure	Change
Split Rate	2.02
Total Profit	**$4,576,689.68**

The split rate is of particular note, as values ranging from 1.6 — 1.75 are typically considered excellent in the industry. This demonstrates that the algorithm has the potential to more efficiently manage the donor base and produce a higher average SDP yield.

The second run produced the following optimal solution (see *Table 10*):

Table 10: Second Run Unit Collection Results

Product Type	Units Collected	% Deviation from Goal
RBC Collection	4949	0.0002%
SDP Collection	7349	0.49%
PL Collection	2122	65%

Table 11 represents a breakdown of apheresis procedures that would have to be performed to meet these collection goals.

Table 11: Second Run Number of Procedures Required

Procedure	Number
PR1	157
PR2	2128
PR3	362
PR4	65
PR5	105
PR6	4
PR7	667
PR8	534
PR9	2
PR10	0
PR11	537
PR12	728
PR13	451
Total	5740

Note that the solution in many respects is significantly different, with this solution achieving similar results with over 100 fewer procedures. It also leads to the following split rate and profit (see *Table 12*).

Table 12: Second Run, Split Rate and Total Profit

Measure	Change
Split Rate	2.034
Total Profit	$4,581,268.10

Again, this slightly "better" solution produces a high split rate above the 2.0 mark and a slightly higher profit margin.

Discussion

Clearly, the diversity between both optimal solutions indicates that a given blood bank would be wise to use the genetic algorithm a number of times to determine the most optimal solution that will yield the highest profit, while best managing their donor base by reducing the number of procedures.

It should also be stressed that the algorithm represents a *starting point* for strategically building an apheresis program. Clearly, factors such as patient management and care issues will play a factor in the choice of specific procedures to perform within a given planning period. For example, a blood bank may wish to minimize the amount of patients who undergo SDP "triples" such as PR12 and PR13 simply to reduce the amount of time they spend on the apheresis bed as a patient standard of care, rather than issues such as donor throughput.

It should be noted that the plasma requirements showed the greatest deviation from goal – up to 65% in the examples. The algorithm fails here because an optimal solution does not exist based on the numbers of plasma units collected that can meet all the collection requirements of each unit type. An ideal solution would be to introduce a "jumbo plasma" procedure provided by apheresis machines that could collect up to 5 units of plasma. This would be ideal where blood banks have customers with large plasma requirements such as burn treatments, oncology centers or pharmaceutical concerns. However, the low price of plasma per unit will yield only a minimal profit (if any) to the blood bank, and they would be wise to generate the plasma through whole blood collection.

Conclusions and Future Work

This paper has made a case for the use of optimization algorithms in planning apheresis programs for the blood banking industry. This has critical implications for an aging population where blood supply will need to be closely matched with demand to meet growing volume requirements. Currently, blood banks operate

their apheresis programs on a donor-by-donor basis. This paper outlines the need to stipulate a volume collection strategy and collect products using an optimal process to meet the strategic goals, use the donor base effectively, and maximize profitability. This paper demonstrates that genetic algorithms applied to strategic apheresis planning can determine an optimal combination of procedures that result in (a) a greater volume of units at a higher profitability and (b) a more efficient use of the donor base by reducing the number of procedures that the blood bank should perform. Additional work has already been completed by the authors to match the optimal volumes collected to specific collection days, driven by historical data and immediate requirements, as well as specific product characteristics such as RH factor. In the blood-banking industry, where the donor freely volunteers the product and the industry is still *losing* money, an automated strategic-driven approach to apheresis planning can potentially help offset what is really a startling economic situation.

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Identifying an Ideal Game Programming Education for Career-Oriented Students

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Abstract

This paper starts with discussing the various types of skillsets required by the different types of positions found in the game industry and provides suggested job descriptions and qualifications for each position. It then continues with the differences between generalized game development education programs and education programs dedicated to game programming. It also discusses the need of a career-oriented education for game programmers. Finally, it reviews the current status of educational programs that offer courses specifically focused on the topic of "game programming" under the category of "game development." This paper contains four sections: (a) game industry technical position career paths, (b) current game education review, (c) game programming education status, and (d) education appropriate for game programmers.

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According to the NPD Group (2014), a leading information technology research and advisory company, the worldwide video game market in 2013 was $15.39 billion. The global market is predicted to reach $82 billion by 2017 and the computer game design is among the top 10 hot college majors that lead to jobs (Gandel, 2013). "Computer game design" is the category used to describe game design, development and programming. To meet the demand, the game industry needs skillful programmers. Postsecondary institutions, public and private, have also responded to the trend and have been providing education in the field of game development since DigiPen Institute of Technology introduced its first program in 1993.

Game programming is a high-tech discipline encompassing software engineering (Congleton, Manrique, Shibata, & Wu, 2011). According to the International Game Developers Association (IGDA, 2008), an ideal curriculum for game programming must provide students with a solid foundation of programming fundamentals and core technologies. It must also provide students with career-related knowledge and skillsets (IGDA, 2008) so that graduates will be proficient from the first day of employment to write the kind of software required by the game industry (Congleton et al., 2011). However, one of the author's previous studies (Wu, 2014) has identified several disparities in the instructional outcomes between the existing curricula and the expectations of the game industry, especially when it comes to the skillsets required for game programming. The disparities are (a) curriculum objectives and structure, (b) instructional content, and (c) disparity caused by curriculum orientation (Wu, 2014).

This paper attempts to identify the need for a career-oriented educational curriculum for game programmers. It contains four sections: (a) game industry technical position career paths, (b) current game education review, (c) game programming education status, and (d) education appropriate for game programmers. These sections are following by a conclusion with recommended curricula. The goal of this paper is to help readers identify an ideal education of game programming at postsecondary institutions that would meet their career goals. The targeted readers include curriculum designers, administrators, faculty, and other staff in the position of guiding students.

Game Industry Technical Position Career Paths

Large-scale commercial games, such as *Call of Duty: Modern Warfare 3, Super Mario 3D World, World of WarCraft: Warlords of Draenor,* or *NBA Live 13*, are usually products of large game development teams. A game development project requires a variety of talents to fulfill the many different types of positions. Although the game industry was mainly created by hobbyist programmers in its early days, often inside their garages, the advance in technology and complexity in gameplay has forced the game developer positions to split over and over into a variety of specialty career paths. It is necessary to distinguish these technical positions.

The term *game developer* refers to an individual game developing specialist, a team of game-related experts, or a studio-like company that develops games (Moore & Novak, 2010). Game developers are divided into three major technical positions separated by skillsets: (a) game designers, (b) game artists, and (c) game programmers. Each of these positions will be discussed below. These are three unique technical positions, each requiring a career-centered education. For example, among the required technical skills, game designers and game programmers only overlap in one area, which is "testing and prototyping," as shown in *Figure 1*. Game artists and game programmers only overlap in the area of "information design." The next sections will discuss the required skillsets of these three technical jobs; each section is equipped with a table that lists the required skills. Although a game development generalist can oversee a game development project, the skill-intensive work must be done by those who have specialized skillsets.
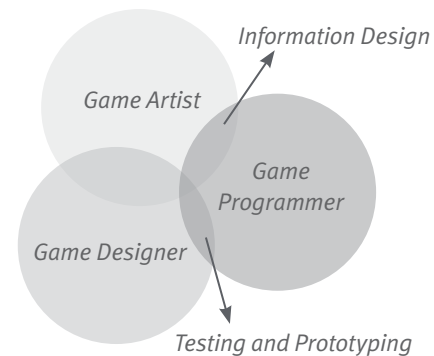
Game Designers

Game design includes the design of characteristics of game objects, flows of gameplay, player interactivities, visualization and digitization of storytelling, and level of challenges as well as the design of user interfaces, information, and world interaction (IGDA, 2008). In a studio, a *game designer* mainly lays out the game structures, including the story board, storyline, interaction of game objects, and structure of the mapping mechanism, as well as architecture, levels, and flows of the game. They also collaborate with artists, programmers, testers, and producers to find creative and effective solutions to problems. Some technical game designers analyze feedback from all stakeholders to evaluate where gameplay falls short of expectations, and iterate on fine-tuning the game design.

Game designers specialize in graphics or technical design, and they usually do not have specialty in game programming. Game designers typically possess degrees in computer-based graphics or a fine-art degree with focus on computer-related courses (Taylor, Parish, & Fiden, 2007). Game designers typically are not programmers, and are trained to develop game code. *Table 1* (see next page) provides a list of skills required for this technical position.

Table 1: Skillsets of Game Designers

Skillset	
(a)	Storytelling
(b)	Abstract Design Elements
(c)	Approaches to Game Design
(d)	Board-game and Roleplaying Design
(e)	Content Design
(f)	Control Schemes
(g)	Custom Tool Use
(h)	Design Integration
(i)	Game Design Documentation
(j)	Game Idea and Game Player Fun
(k)	Game Player Analysis
(l)	Game Tuning
(m)	Interface Design
(n)	Play Mechanics
(o)	Play Testing and Prototyping
(p)	Psychological Design Considerations
(q)	Spatial Design
(r)	Task Design
(s)	Understanding the Atomic Parts of Games

Game Artists

Game artists are commercial artists mainly involved in conceptualizing, drawing, visualizing, and creating components of games. They also (a) review and analyze artworks using a broad range of media including computer and digital media, (b) create character illustrations to visualize game objects, and (c) pro-actively complete conceptual artwork to be used for marketing and branding of the game (Llopis, 2010; Moore & Novak, 2010; Taylor et al., 2007). Use of two-dimensional (2D) and three-dimensional (3D) graphics programs is an important part of this technical position. A game artist possesses talents in fine arts, knowledge in game graphics, and skills in 3D modeling software and tools. Game artists are specialists in visual design; however, they typically are not skilled in game programming. It is also necessary to note that game art is a commercial art, not a fine art. *Table 2* (on right) is a list of required skills to perform this technical job.

Table 2: Skillsets of Game Arts

Skillset	
(a)	Figure Drawing of Game Characters
(b)	Architecture
(c)	Basic Visual Design
(d)	Digital-based Art with Game Content
(e)	Information Visualization
(f)	Motion Graphics
(g)	Non-narrative Graphics/Abstraction as Expressive Tool
(h)	Procedural Content
(i)	Visual Asset Generation
(j)	Visual Design for Comics and Interactive Context
(k)	Visual Narratives (Drawing, Painting, Filming, and Photography)
(l)	Working with 3D Hardware
(m)	3D World Design

Game Programmers

A game programmer primarily develops a "codebase" for video games and game development tools (Moore & Novak, 2010). A codebase refers to the human-written programming code specifically made for a program. A codebase may be stored in various source code repositories and manipulated by various code editors. Therefore, a game programmer is a software engineer, programmer, or computer scientist.

Game programmers must know fundamentals of computer sciences and software engineering in addition to programming skills. Game programmers need to be competent in mathematics and physics. Video games heavily depend on the implementation of graphics, which are visual effects of mathematical computations, and realistic movements of a game object (falling, flying, exploding, etc.). Game engine programmers need a good command of physics to develop the efficient code. 3D game programmers heavily rely on advanced mathematical concepts, such as quaternion, vector, matrix, and linear algebra to develop algorithms and coding solutions (Llopis, 2010; Moore & Novak, 2010). *Table 3* (see next page) is a list of skills required to be a component game programmer.

Table 3: Skillsets of Game Programmers

Skillset
(a) Artificial Intelligence
(b) Computer Architecture
(c) Design/Technology Synthesis
(d) Game Engine Design
(e) Game logic
(f) Graphics Programming
(g) Information Design
(h) Networks
(i) Play Analysis
(j) Prototyping
(k) Sound / Audio Programming
(l) Style and Design Principles
(m) System Architecture
(n) Team Working
(o) Tools Construction

Game programmers acquire knowledge, technologies, and techniques continuously. They may be required to develop games for PCs, cellphones, smart phones, and the Web as well as console devices like *PlayStation, Game Boy*, and *Xbox*. Game programmers need to be adaptable and agile in order to independently upgrade their skillsets. Game programmers usually work in a team environment to plan, develop, code, test, debug, and deliver video games. In a large-scale game development team, programmers are subdivided into three areas (Llopis, 2010; Moore & Novak, 2010): (a) general game programming: everything directly related to the game such as sprite and animation programming, score keeping, character movements, networking, and graphics programming; (b) game engine programming: creating a framework for coding libraries to store, retrieve, and manage images, characters, environments, and sounds to be used by similar games in order to shorten time of game development projects; and (c) tools programming: developing tools for content creation used by game artists and designers or creating middleware for enhancing gameplay. The job title of game programmers in a game studio varies depending on the responsibility. Table 4 lists typical titles and their job descriptions (Liming & Vilorio, 2011; Moore & Novak, 2010). Each job title may also represent a sub-discipline of game programming.

Table 4: Title and Job Description of Game Programmers

Job Title	Job Description
Game Programming Generalists	Programming generalists write basic code for video games for other programming specialists to add advanced features. They often have the opportunity to assist specialists and may have influence and work on different areas of advanced game code.
Tool Programmers	They write code to improve process and gameplay experience on various disciplines such as content creation tools, world creation, UI, encounter tools, game content, mission creation, installer/launcher and patcher. They also collaborate with the UI Team on design sense and workflow improvements. They frequently create tools that can be used to help developers edit games and preview the game from the player's perspective when the game is released.
Lead Programmers	They provide technical leadership in designing and implementing large scale, complex game applications that require high performance and availability. They also write code to develop application architects for games. They also bring together the work of other programmers in building a final product.
Gameplay programmers	Gameplay programmers are responsible for writing code that directly touches on the game experience, such as controls of game character, artificial intelligence (AI) to drive two enemies to fight with weapons, animations, and other game mechanics to facilitate players to interact with the game.
Interface Programmers	Interface programmers write the code for the interface designer and make them functional. They build the databases that keep track of game data such as game points, progress, and character status.
Artificial Intelligence Programmers	AI programmers are responsible for development and maintenance of AI systems including path-finding and behavior systems. They write code to implement AI algorithms including A*, decision trees, and expert systems. This position is one of the most challenging roles of game programming due to (a) the making computer-controlled characters interact and behave realistically; or (b) the developing sets of rules to dictate how characters interact and respond to the player, the game environment, or other game artifacts and game states.

Job Title	Job Description
Engine Programmers	Engine programmers control how the software goes together, interacts with the hardware, and manages the game's complex play states. Engine programmers may determine how assets such as sounds and graphics are stored and reproduced by the device. They write specialized code for advanced features such as networking, physics and rendering in order to realistically move game objects. They need knowledge and skills to eliminate extraneous artifacts that might otherwise slow down loading and playing times. They have excellent programming and scripting skills and are familiar with a wide variety of game development software.
Graphics Programmers	Graphics programmers program the rendering requirements for on-screen and off-screen staging of game artifacts that are either in (or about to be in) the camera's view. Graphics programmers must be very adept at optimizing and analyzing game code to maximize software performance for player interaction with environments and characters within simulations and games. They may also have a level of responsibility to perform technical art, write texture scripts, manipulate 2D and 3D graphic elements, and write programs for special visual effects.

Note: Adapted from Liming and Vilorio, 2011; Moore and Novak, 2010.

As addressed by the International Game Developers Association (IGDA) curriculum framework and research, game programmers need to have a variety of skills, including technical skills and "software skills." IGDA is a non-profit organization that maintains a network of individuals, companies, and schools from all fields of game development to collaboratively recommend best practices to interested groups (IGDA, 2008). Soft skills generally include personal, interpersonal, emotional, and communicative skills. Many game programmers, after years of practice, realize that the lack of soft skills frequently affects team performance. Game programmers must meet the due date, and often have to deal with all kinds of people, personalities, and unexpected situations.

A game programmer will develop the game codes that run and control the game. Core competencies include writing codes to achieve the game features as envisioned by the game designer, artists, and/or other developers. Although qualifications for a game programmer may vary by employer, they tend to have a number of common characteristics. At the minimum, a game programmer should possess the following technical skills and capabilities: (a) write game codes in C, C++, and other demanded languages; (b) provide technical solutions within context constraints; (c) develop game codes based on specific game platforms; (d) handle a variety of tasks in an efficient manner and within deadlines; (e) follow the production schedule as well as internal deadlines for projects; (f) work independently as well as in a team; (g) learn quickly and comprehend the game plot and desired playing experience; and (h) possess strong organizational, communication, and interpersonal skills.

Many game companies emphasize in their job ads that they want candidates to have a minimum of two years' experience. With this requirement, how would a new graduate ever get a job in this industry? This is a highly controversial question for this paper to answer. However, the rise of Internet and the electronic marketplace inside the Internet, such as Google Play, have brought new hopes to students seeking careers of game programmers. Schools and instructors can encourage students to make casual games as extracurricular activities and sell them online, although the ROI (return on investment) is arguably low; therefore, this is not an easy route but all students should not overlook it.

Students can start a game-making business while they are enrolled in school, and continuously develop new games on a regular basis as part of their portfolios. These games must be playable and demonstrate a student's game programming skills. As a general rule, selling one or two casual games over a two year period is not considered an acceptable accomplishment. However, selling a new game every two months through the newly rising digital marketplaces, such as *Google Play*, demonstrates desirable skillsets.

Current Game Education Review
According to Entertainment Software Association (ESA), as of June 2012, more than 300 postsecondary institutions are currently offering video game education in the United States (ESA, 2012). These institutions include two-year colleges, four-year colleges, universities, and trade schools. These education programs may be categorized into two major types: "CS-based" and "dedicated programs."

A CS-based program is a collegiate program that leads to a degree in Computer Science. Curriculum and instructional contents of CS-based degrees typically abide by the CS framework developed by

the Association for Computing Machinery (ACM, 2004). In a nutshell, the ACM framework requires the study of computation theories.

A dedicated program is curriculum designed to focus on the teaching of job-centered skills and knowledge required to perform a technical and professional job in the game industry. Dedicated programs of game-related education are not required to abide by any curriculum framework, including the ACM's CS framework. *Table 5* describes these two categories with descriptions of their subsets.

It is necessary to note that *Table 5* does not include a new subset: there are schools that offer bachelor's degrees in Multimedia Design with a game development concentration. The author also observes inconsistency in the nomenclature of programs. University of California, Irvine, has created an undergraduate program within its Donald Bren School of Information and Computer Sciences to grant a degree in "Computer Game Science." It is a CS-related major that combines the study of CS-based computation theories as fundamentals with the application of two game-specific subjects: game creation and interactive media (University of California, Irvine, 2013). The author, however, considers "computer game science" as a derivative of traditional CS programs.

Table 5: CS-based vs. Dedicated Programs

Curriculum	Description	Sample Degree
CS-Based	Curricular structure is designed based on ACM's CS framework. The objective is to train computer scientists. Students typically learn general knowledge and skills of CS/SE and graduate with a CS degree.	B.S. in CS
Traditional CS with Specialization	A CS-based curriculum that dedicate selective courses to game-related subjects in order to obtain a specialization in game art, game design, or game programming. The name of specialization in this subset also includes game development, or a combination of art, design, and program.	B.S. in CS with specialization in Game Programming
CS Derivatives	A variation of traditional CS programs with coursework centered on game-related topics, such that of the Computer Game Science degree at University of California, Irvine.	B.S in Computer Game Science
Curriculum	**Description**	**Sample Degree**
Dedicated	A curriculum specially tailored to prepare graduates to work in the game industry. Students often take more career-related courses than "CS-based" majors. The program objective is to train technical workers for the game industry. Similar to the Bachelor of Science in Nursing (BSN) degree, students will graduate a college degree that is more specific to a technical job.	B.S. in Games Programming *or* B.S. in Game Design and Development, *or* B.S. in Computer Game Science
Game Development	A curriculum dedicated to teach general game-related subject. Students will obtain basic skills and general knowledge suitable as a "generalist" (not specialist) for most aspects of game development projects.	B.S. in Game Development
Game Design	A curriculum dedicated to teach theories, processes, and practices of the design of video games. Instructional content are centered to the skills and knowledge for a career as game designers.	B.S. in Game Design
Game Programming	A curriculum dedicated to the learning of practical skills and knowledge that are centered on game programming, simulation programming or both.	B.S. in Game and Simulation Programming
Game Art	A curriculum focusing the study on game-related fine arts. Students learn to use digital tools to create 2D and 3D graphics to be used as game objects. They also learn to create animated characters and 3D modeling.	B.A. in Game Art

Note. Adapted from Congleton et al. (2011)

Game Programming Education Status

There are three types of curriculum offered by postsecondary institutions to deliver education of game programming: (a) traditional CS degrees, (b) game-programming specific degrees, and (c) certificate programs. Each type targets on a special subset of students with a different program objective and instructional philosophy. It is important to note that technical careers in the game industry require applicants to have an earned degree, or sometimes a certification of specialty. Since these three types of curriculum are unique in aspects; like duration of the program, curricular emphasis, admission requirement, student population, and accreditation, it is helpful to review their natural settings in order to understand how they nurture future game programmers.

Traditional CS Degrees

Many CS-based curricula have added one or more game programming courses to their required coursework, especially those leading to a specialization in game programming or game development. Nevertheless, these programs did not change their program objective-- prepare students for being general computer scientists; therefore, they usually do not offer curricula centered on game programming. On the other hand, traditional CS-based curricula are consistent with curriculum design framework outlined by the Computer Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). ABET is an accreditation for academic programs in the disciplines of applied science, computing, engineering, and engineering technology, based on the recommendations of the national ACM/IEEE Joint Curriculum Task Force. The ACM Two-Year College Education Committee (2009) also provides a curriculum model of computer science for two-year colleges to follow. Under these curricular design frameworks, traditional CS curricula are inevitably theory-oriented. Graduates with CS-based degrees are able to demonstrate understanding of the field of computing with strong theoretical foundations. They can apply knowledge of computing to specific problems and produce solutions, and may be proficient in one or two programming languages. However, their coursework usually do not cover how to immediately transfer these knowledge and skills in the programming of video games. CS degree holders often need to obtain additional training opportunities in order to acquire practical knowledge and skills to work in the game industry as a programmer. This is a disadvantage to those who have already decided to pursue a programming career in the game industry.

Game Programming Specific Degrees

In recent years, a number of regionally and nationally accredited colleges and universities, mainly in the private sector, responded to the growing demand of game programmers and began to offer dedicated game degrees. They are career-oriented degree programs that prepare students for an entry-level programming position in the game industry. Possibly due to the relatively new and immature pedagogies, dedicated degree programs do not have a formulated curricular model. Unlike a traditional CS-based degree, the game education sector does not have an occupation-specific accreditation body to regulate and evaluate game-related curricula. Without a standard of accreditation, similar to the American Veterinary Medical Association (AVMA) that accredits schools for veterinary medicine in the United States, these game education providers are flexible in their game programming curricula.

Certificate Programs

Postsecondary institutions may offer a certificate in game programming. These certificate programs are not consistent in many aspects, such as number of required credits, required core and elective courses, instructional contents, program objectives, and minimum time required to complete the program.

The field of education for game programmers lacks accreditation standards and an instructional design model that is recognized and accepted by educational institutions of game programming as well as the game industry. Curricula of game programming do not need to comply with any industry-accepted framework. Consequently, many of the skills in demand by game companies are seldom taught at educational institutions. Graduates frequently lack readily transferrable skills to write the software code for the game industry. This is a reoccurring issue that needs to be resolved.

Education Appropriate For Game Programmers

As in every industry, competition for programmer jobs in the game industry is fierce. It is necessary for those who wish to pursue a career in game programming to understand the curriculum goal and instructional content of game education. Although there are several hundred schools in the U.S.; including universities, colleges, and trade schools, offering game-related education programs, choosing the wrong education may lengthen the time to reach the goal.

Curricula of CS-based programs with options in game development and/or design typically focus on non-coding topics such as storytelling, graphics, gameplay features, and production. They provide generalized game education. Students may be required to learn basic programming skills; however, the focus is not on the topic of game programming. By the same token, degree programs dedicated to game development and/or design do not center their instructional content on game programming. Their curricula may include basic programming as one of the instructional areas; however, the curriculum objective is not to nurture employable game programmers.

There are degree programs in game art, or game graphics design, offered by fine arts departments of postsecondary institutions. They are not program offered by either CS or engineering departments. These are programs for students interested in becoming game artists, not programmers, although students may be required to take an introductory level of a programming course (Wu, 2014).

On the other hand, both degree programs dedicated to game programming and CS-based programs with a specialization, concentration, track, option, or minor in game-programming are the two types of degree programs offering curricula for students seeking careers in game programming. It is, however, necessary to note that CS-based programs may require students to take more CS core courses that are not relevant to game programming, while dedicated degree programs in game programming have course-work centered more on game programming at the expense of some CS core courses. Taking into account that game programmers are practitioners, a career-oriented education is an optimal option for the prospects. Although game programmers may be involved in studies to find novel solution for games, their intention is not to build theories. Therefore, the curriculum for game programming should be career-oriented with instructional content centered on teaching the employable knowledge and skills of game programming.

Career-oriented education is one model of higher education that responds agilely to the changing demand in the labor market. It focuses on preparing students for entering the job market quickly. A career-oriented college helps students to learn skills they need in an efficient way by offering curricula that focus more on job-related subjects and topics, hands-on

work experience, and possible internships. A career-oriented curriculum is a set of courses and their contents designed to prepare students for a specific occupation with a focus on skills needed to perform the job. It seeks the most direct way to help students reach their career goals.

Conclusion

Technical skills required to be a game programmer have little overlap with other types of game developers, such as game designers, artists, and development generalists. Those who wish to pursue a career in game programming should enroll in a curriculum dedicated to game programming. Recommended programs are the following: (a) traditional CS curricula with specialization in game programming, and (b) degree programs dedicated to game programming. These two types of curricula, with properly designed instructional content, can equip students with skillsets that are more aligned to the demands of the game industry. However, traditional CS curricula have a broader scope of topical areas, and focus largely on the learning of theories. They typically do not teach game-related topics. If a CS curriculum is said to provide a specialization in game programming, especially to facilitate students in pursuing the career of a game programmer, then its instructional content must center on skills and knowledge of game programming to the level needed by the game industry. Dedicated degrees are anticipated to be more career-oriented, and their instructional content must match the hiring needs of the game industry.

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Beating the Two Cultures Divide

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Abstract

In 1959, English scientist and writer C.P. Snow coined the term "the Two Cultures" to describe a split between university departments, divided roughly by the sciences and the humanities, with neither side having a good understanding of what the other does. Although many decades have passed since that declaration, the intellectual divide and turf warfare between university departments persists, and may perhaps be greater than in 1959. The intellectual split poses particular problems for college instructors of undergraduates, in both what they teach and how they teach it. This paper offers some proposals for instructors and academic departments to bypass "the Two Cultures" debate by broadening the field of their instruction, offering more courses that naturally bridge the divide, and increasing cross-disciplinary communications.

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The phrase "the Two Cultures" refers to the title of a lecture that English novelist and government science expert C.P. Snow gave in May, 1959, and published in 1963. The lecture sparked a furor in higher education throughout the 1960s. In 2009, on the 50th anniversary of the lecture, many professors and intellectuals weighed back in on the debate. The picture of academia that emerges from revisiting Snow's arguments shows that the problems he described have not disappeared, and that the current situation presents college instructors with many serious problems regarding what they teach and how they teach it.

In brief, this is what Snow (1963) said: "The intellectual life of the whole of western society is increasingly being split into two polar groups… Literary intellectuals at one pole – at the other scientists…Between the two a gulf of mutual incomprehension" (pp. 11-12). Essentially, Snow said that there were several factors working in the society of higher education causing a great divide between two camps, the sciences (including the physical sciences, mathematics, and the research side of the social sciences) and the humanities (including arts, languages, literatures, and cultural studies). These factors included scientific elitism, liberal arts elitism, external forces such as politics and religion, and mountains of ignorance on the part of each camp regarding what the other camp was doing.

The Divide

One might suspect that in the intervening years, matters have somehow gotten better, that somehow the two sides have managed to patch things up, or at least call a truce. However, retrospectives from the last few years conjured up the same old divides that Snow discussed fifty years before. A review of the

current form of the Two Cultures debate from both a humanities side and a sciences side demonstrates how strong and active the debate continues to be.

The Two Cultures Divide from the Humanities Side

One perspective from the humanities side on the Two Cultures debate is that little attention was paid over the decades to answers from the humanities for redressing this Two Cultures problem. Paik (2010) calls for a renewal of the humanities in universities, but also says that "a true renewal of the humanities is not something that can be resolved at the level of the university" (p. 528). According to Paik, university students need proper preparation in the humanities before entering the universities. He argues that the preparation should come not only from primary and secondary education, but also from family and society. Paik's position that humanities education needs social renewal necessarily assumes that the humanities are not receiving the kind of attention they should, and when placed in the Two Cultures argument, the position still implies that the sciences are receiving greater or more worthwhile attention.

A different critique of the Two Cultures debate involves seeing science and engineering education as receiving greater attention and money from university administrations. The argument is that science and engineering graduates better serve the needs of business than do humanities graduates. Slouka (2009), for instance, reflecting on Snow's lecture stated that the contending cultures are not now Humanities and Science, but Humanities and Business, a situation that favors science-based education over humanities-based education. In essence, as Slouka sees it, science education is the servant of Business, and humanities education is disregarded because it cannot serve business needs in the same way. Slouka says that the reason for education in the new model is to produce "human capital" (noting that the modifier here is *human* and the subject is *capital*). Slouka says that the new educational imperative is that people must be educated to increase the Gross Domestic Product. Education, according to this model, should teach people only what they need to know to get hired. The result is that business leaders, not educators, are setting the tone for what qualifies as "education." The calls for education reform specifically target increasing outcomes for math and science in part because math and science can deliver the "economic citizens" whom today's education model calls for.

The Two Cultures Divide from the Sciences Side

There were also salvos from the other side. Orzel (2009) counters Slouka's argument by summarizing it as saying, "The Humanities are responsible for all that is good about human culture, while Science is an alien invention that is cold and aloof and brings as much ill as good" (para. 5). Orzel contends that "science is what makes us human." According to Orzel, "Art and poetry is nice and all, but without science, we'd be hairless apes shivering in caves, hoping the lions don't get us" (para. 6). The aspect of Orzel's critique that stands out in regard to the Two Cultures debate is the amount of antipathy toward the perspective from the humanities. Orzel's perspective represents at least one common thread in the debate: the elevation of science as "necessary" and the demotion of humanities as "extra."

Another perspective is that science education, not humanities education, is receiving the short end of university budgets and administrative attention. Krauss (2009) says that it is science education getting the beating and not the humanities. His characterization of higher education is that although both humanities and science courses get used merely to fulfill student requirements, "the big difference is that these students cannot help but be bombarded by literature, music and art elsewhere as a part of the pop culture that permeates daily life" (p. 32). Yang (2012) writes about the "skepticism" he faces as a biology teacher at a liberal arts college as a sense that "natural sciences are of marginal importance" as far as professors of the humanities are concerned (p. 60). Indeed, professors of science often express these feelings that science is marginalized as a specialty in contemporary higher education, receiving neither the attention nor the respect that it deserves.

Even more recently, Stewart (2013) has recalled Snow's picture of the university in discussing the contentious issue of "biopolitics." Stewart contends that humanities academics have pursued too far the dead end of postmodernism in critiquing science. As Stewarts sees it, the postmodernist approach engages "in a critical perspective" from professors of "intellectual capacity," yet produces no important criticism because it disregards the intellectual foundations of science through arguments that deny "the validity of knowledge" and "meaning outside of context" (p. 95). Even worse, such critiques rely far too heavily on a self-referential set of texts and assumptions, in essence repeatedly committing the fallacy of argument from authority. Stewart contends that the postmodernist critique of science "stands in direct contrast with the goals of science" (p. 95).

Stewart argues that a role for "literary biopolitics" exists, but only if literary scholars give up the postmodernist approach and begin "grappling with the science they seek to critique" (p. 98).

Implications of the Conflict

The problems for higher education from this fractious sniping are many, but perhaps the three most important are: (a) college graduates too often are neither civically literate nor intellectually aware, and so are unprepared to be critical thinkers or leaders in their businesses and cultures; (b) students are receiving a fractured educational experience in which they see no overlap between classes, even classes within the same department, and see little to take from their educations into their lives; and (c) academic departments have now become enclaves competing for resources.

Unprepared Graduates

Recent surveys and reports show that graduates do not meet expectations for intellectual capacity after college. Scott (2013) reports, for instance, that employers are increasingly disenchanted with college graduates, and that a major reason for this disenchantment is that the job candidates do not use logical reasoning well and do not articulate their thought processes well. Employers for jobs involving creativity, teamwork, planning, and leadership are seeing increasing value in having large amounts of liberal education in the overall education of job candidates because the employers view liberal education as providing the missing thinking skills. A study conducted by the *Chronicle of Higher Education* and American Public Media's *Marketplace* supports what Scott reports. Their survey results from 704 respondents showed that employer concerns were not as often about candidates who lack job-specific skills as they were about candidates who lack critical thinking, writing, and oral communications skills (Fischer, 2014).

One likely reason that graduates are falling behind in critical thinking and related skills that many employers deem desirable is the denigration of liberal education from professors in the sciences and those fields aspiring to be like the sciences. When these professors convey to students that humanities and liberal education are, at best, abstractly necessary, but are mostly disposable, then many students are likely going to view their humanities and related classes as merely "required," pro forma, and not worth taking on as essential to their educations.

Fractured Educational Experience

There is some evidence that the student experience in universities is fractured by the types of discipline classes are in. Jones (2007) found that generic skills, especially critical thinking, receive different definitions and sometimes contradictory valuations based upon the disciplinary epistemology of a field of study. Jones compares the teaching of critical thinking in the fields of history and economics to demonstrate the divergence in understanding of critical thinking because both history and economics share historical origins as disciplines, but history is more humanistic and economics more scientific. Jones determined that, in history, the idea of critical thinking involved embracing multiple approaches and perspectives to discipline-specific problems, but in economics "paradigmatic stability" was more important than open debate for the idea of critical thinking (p. 88). The results of such differences as they relate to the teaching of critical thinking skills include graduates with distinct generic skills sets based upon discipline of the degree, and ignorance of generic skills outside those emphasized by the education in that discipline, plus confusion among educators about what the core of a university education ought to be.

Additional evidence comes from a study of students at the eight campuses of the University of California based on data collected in 2006 (Brint, Cantwell, & Hanneman, 2008). The study shows that students have both different levels of academic engagement and different types of academic engagement, depending upon academic discipline. Among other things, analysis of the data showed two distinct types of academic engagement based upon undergraduate majors in either the Humanities and Social Sciences group or the Sciences and Engineering group. These types of engagement included such factors as amount of interaction between professors and students, how often students study in groups, and the types of academic behaviors that are rewarded in grading. The differences between the two academic groups were significant enough to justify their categorization as different "cultures of engagement" (p. 386). The study demonstrates that the Two Cultures Divide Snow described is built into the education system itself, which may contribute as a factor in the perpetuation of a lack of understanding between the two sides at the professorial level.

Academic Enclaves

To provide a succinct summary of the increasing isolation of academic departments relative to each other, Rigden and Stuewer (2008) state, "What Snow described in 1959 as the cessation of communication between the literary and scientific communities can

be accurately applied in 2008 to university campuses generally" (p. 377). Rigden and Stuewer contend that academic departments have become "bunkers" separated from each other. Little cooperation of substance happens among faculty from different subject areas. They further contend that because academic research is contracting into smaller specialties, even to the extent that academics within the same department are isolated from each other by the narrowness of the field of study, cross-disciplinary communication is likewise contracting. In such an environment, it seems highly unlikely that most students will graduate as the broadly knowledgeable, multi-literate thinkers the universities contend that they produce, and so will continue to disappoint potential employers.

The situation of "divided camps" in the university has even penetrated to those academic departments that are neither strictly hard science, nor strictly humanities in orientation. Hughson and Tapsell (2006) discuss this problem within the field of physical education as an academic discipline in New Zealand. They note that the discipline is divided partly by epithets that each side applies to the other, with the science-oriented teachers calling the humanities-oriented teachers "story-tellers," and the humanities-oriented teachers calling the science-oriented teachers "ruler-heads" (p. 416). Probably, the situation is much the same in physical education departments in other English-language universities, including those in the United States.

That departments are "bunkers" has implications for how academics do what they do, including how and what they publish and teach. King (2010) notes that the departmental structures of most universities, and the typically narrow-field means by which academics advance their careers, restrict the possibilities for multidisciplinary research. Additional hindering factors are different methodologies between disciplines. The situation perpetuates itself because students major in specific disciplines, these days often with narrower specific focuses, and few cross-disciplinary majors exist.

The narrow focus of the departments thus replicates itself in the students. The students do not see the value or perhaps even the existence of cross-disciplinary activity because they do not meet professors who either value it or practice it themselves. The students are then unlikely to be well-prepared for the complexity of life outside the university, which often requires dealing with diversity, broad knowledge, communications challenges, and logical problem solving.

Proposals for Bypassing the Two Cultures Problem

Of course, attempts to bridge the divide Snow described exist. Rao and Kavitha (2010), for example, contend that hybridized science and humanities fields such as geopolitics and sociobiology are already beginning to bridge the gap, and they encourage more such endeavors take place. Wilson's *Consilience: The Unity of Knowledge* (1998) argues that all knowledge is converging upon agreed-upon principles crossing all boundaries of intellectual disciplines. Among Wilson's proposals is the idea that ending the "culture wars" will require both scientific and humanistic studies to enter cooperatively the "unexplored terrain" of knowledge (p. 137). Wilson proposes that a key question for such cooperative exploration is how biology and culture interact. Along these lines, Yang (2012) notes the growing importance of discoveries in biological sciences to the physical arts, such as painting and sculpture.

Most of these attempts to bridge the divide focus on cultural forces and institutions external to classroom higher education, such as academic research. However, a more likely bridge would come from within the institutions of higher education in reforming pedagogical practices. Action from the professors themselves can create the internal pressure more effective for institutional change. There are three noteworthy areas to pursue along these lines: (a) broadening the fields of instruction used in classes; (b) offering more courses that naturally bridge the Two Cultures Divide; and (c) increasing communications between professors of different disciplines.

Broadening the Field of Instruction
The first action would be for instructors to make incorporating concepts from other fields a regular part of their instructional activity. For instance, Coppin (2010) has a set of lessons in his proofs class that he calls the "poetry" of proofs. He says that emphasis on numeracy rather than on "authentic mathematics" sustains the Two Cultures Divide (p. A29). According to Coppin, too much of the teaching of mathematics is oriented toward technical and research concerns. Therefore, he offers the idea of using "inquiry-based learning techniques, focusing on student presentations created without outside aid" (p. A29). The focus should not be exclusively on mathematics for everyday use, but on the beauty of mathematical proofs. Such a focus would get students to see that mathematics involves critical thinking and aesthetic appreciation in addition to the ability to calculate.

Another idea for math comes from Denmark. Iversen (2006) writes about the Danish Ministry of Education's development of math curricula that focus on competencies in learning. The plan, says Iversen, "focuses more on the *purpose* of learning mathematics than to the specific curriculum" (p. 87). Mathematical expertise would entail both abilities internal to mathematics and abilities linking mathematics to the rest of the world. This would involve having students work on such concepts as *induction, empirical investigations*, and *verification*, with activities centered about *argumentation and proof in mathematic*s. Iversen proposes that different subjects be intertwined to create instruction math problems that are both relevant and "non-routine" (p. 97). For example, students in math classes could work on physics problems requiring the relevant math competencies, or could work on comparing the ideals of proof in mathematics with ideals of proof in philosophy.

In those academic disciplines that overlap both sciences and humanities, embracing both sides rather than taking a side will probably better serve the discipline. Hughson and Tapsell (2006) argue this point as it relates to physical education. They say that studies in physical education need humanistic inquire, especially in preserving ethical outlooks within the science-based aspects of physical education. They further argue that maintaining the humanistic studies in the teaching of physical education will prevent physical education from becoming a purely utilitarian field. This hope, in a way, echoes and answers Slouka's concern that overwhelming concentration on sciences and math education creates a merely functional kind of education that serves commercial needs and ignores the broader needs for an educated populace. Fields of study, such as physical education and history that use both scientific and humanitarian modes of thought, can be models for cooperation between the "camps," as Snow called them, as long as there is active striving to maintain this jointure. In the curricula of such mixed fields of study, the courses that make up the major do not have to be chosen on an either/or basis, for example, from a mission statement that might say, "At our University we teach history on a scientific basis." Instead, the curricula could and should require courses from multiple relevant perspectives. A department could go further in requiring that each course uses perspectives from both the sciences and humanities areas of the major subject of study.

Instructors in any field need to be willing to step outside their "comfort zones" for effective interdisciplinary class activities. In particular, instructors should allow students to bring into the classroom concepts and methods about which the instructor may know little. In a college writing class, for example, instructors should not always assign papers on topics that suit the education of the instructor, such as cultural marginalization, literary analysis, media studies, and so on. Instead, instructors should broaden the range of topics to include the sciences, business, or history. When instructors design assignments that require material from outside the instructor's discipline, the responsibility for managing such assignments requires, in turn, that the instructors become familiar with the knowledge and methodologies of those other disciplines. Learning the methodologies of other disciplines may be the factor that contributes the most to breaking down the distrust between academics in different fields.

Offering Bridge Courses

Many courses in college curricula already contain bridges across the Two Cultures Divide, at least in their titles and concepts. An obvious choice for such a course is science fiction. Freedman (2001) notes that science fiction naturally invites readers to question the epistemological grounds of both literature and science. Another likely course for such a bridge is a history of science course. In such a course, students in the sciences can learn about the methodologies of history, and students in history can learn about the development of the methodologies of science. These courses exist, yet they are often treated as "belonging" to one department or the other. Rarely do professors teach these classes with their potential to bridge divided academic disciplines in mind. For such courses to work effectively as bridges, course designers should build the courses making the cross-disciplinary elements central to the course.

Even stronger bonds between disparate disciplines are likely if undergraduate majors require such bridge courses for completion of a degree. It should not be too difficult for a physics department to require that physics majors take a course in science fiction that emphasizes analyzing the science in science fiction. Likewise, a history of science requirement for both science majors and history majors might work very well, not only to bridge conceptual bonds, but also to have students in different fields work together on the same project.

Increasing Cross-disciplinary Communications

The third action professors may take to bridge the divide is to open the communication channels between them and the others from other fields. Kemp (2009) points out that "specialization" in all

fields is the actual divide, saying, "What is needed is an education that inculcates a broad mutual understanding of the nature of the various fields of research, so that we might recognize where their special competence and limitations lie" (p. 33). Professors should take it upon themselves to give themselves some kind of education outside their immediate areas of expertise. Professors need to learn how to talk to non-experts. One step in this process would be for professors and instructors to talk to other professors and instructors about their fields of study, and the methods, ideas, assumptions, and issues related to those fields. There should be more opportunities, such as conferences and institutions, at which professors across disciplines meet and share the latest developments in their fields.

Perhaps the most important and impactful way of bridging the divide is having instructors from different disciplines work together in a single course or in paired courses. This kind of activity has been done before, but not regularly, and certainly not often enough to bring departments closer together. An example of such interdisciplinary collaboration is instructive. Two professors at the University of Louisiana at Monroe, one in Professional Writing and one in Health Studies, used collaborative writing service-learning projects between students in the professional writing course for science majors and students in the social epidemiology course. According to the authors, collaborations of this kind allow professional writing to students to help health studies students become better writers, and health studies students to educate professional writing students about health issues (Hill & Griswold, 2013). In addition to the real benefits to the students that such a course pairing could offer, a program of this kind has the advantage of bridging the science-humanities gap at the level of the students. Course pairings do not have to be in the service learning model. The important requirement for successful course pairings is a clear set of advantages to students that they would not get if taking the same courses separately. Programs like this can break the pattern of conflict so that it no longer perpetuates itself.

Conclusion

More than fifty years later, the Two Cultures Divide still exists. It is wide as ever. Only individual efforts have gone to bridging the gap, producing few meaningful changes. However, a conscious, concerted, systemic effort from within the university society itself can complete the bridge. Feasible means exist for getting this effort going.

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The Importance of the Humanities in Education: Balancing Practical and Transcendent Goals

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Abstract

This paper explores the alleged "crisis in the humanities" and reviews the recent literature and some of the major highlights of an ongoing debate. The post-modern age has seen a rise in practical education, necessary in an increasingly technological culture, concurrent with (but not the cause of) losses of literacy, grounding in the history of Western civilization, and even common decency. These losses, although not attributable to American higher education exclusively, have roots in early concepts of relativism, pragmatism, the scientific method, and the virulent emphasis on metrics. This article does not suggest that practical education has no value but, rather, seeks to reassert the value of elevated thought and metacognition. The first section explores highlights from the literature, the second section includes observations from data to understand literacy historically, the third section explores the limits of relativism and pragmatism, the fourth section examines ethics as an experience of the mind, and the final section argues on behalf of a spirited approach to education, one that balances practical goals with equal measure of attention to the heart.

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If one *Googles* "The Humanities in Crisis," one finds nearly seventeen million articles on the subject (search conducted on March 9, 2014). That there is a preponderance of discussion about the so-called "crisis" in the humanities is in itself cause for wonder. When asked the value of studying the humanities in a business or technical curriculum, students are far more likely to perceive the possible utility of the humanities as tools to move products across cultures than they are to see the humanities as a means of questioning profit goals. Today's students inherit the Horatio Alger rags-to-riches story of meritocracy, which remains popularly believed, despite increasingly scant evidence that opportunities are equal, that hard work always pays off, and that when we are good and deserving, our material wants are fulfilled.

As society faces worldwide issues — global warming, religious bickering, poverty, greed, human suffering, population explosion, nuclear weaponry, and increasing random violence in the nursery — the humanities rise in importance, if not in our universities then on our streets, offering hope, empowerment, and satisfactions that transcend materialism. It is in social tension that the humanities flourish; for, although grooming the masses for an abstract business machine might work for a time, history shows that oppressed human beings tend toward revolution. And, perhaps, we are seeing the seeds of revolution in such movements as "Occupy Wall Street."

President Obama's keen interest in education is welcomed but also under scrutiny for its potential utilitarian approach to university ranking. Utilitarian education has the effect, argued Schwartz (2013),

of enhancing the perception that you go to college to learn a trade (para. 2). Sundquist (2012) saw the "crisis in liberal arts" (a diluted term for the humanities, sharing blurred real estate with the social sciences) as authored "first by those offended by its radicalization, then by those offended by its corporatization, and more recently by those offended by its ossification and inefficiency" (p. 591). Plumb argued in 1964 that two world wars stole away humanity's innocence and brought humanists "face to face with a crisis in their existence: they must either change the image that they present, adapt themselves to the needs of a society dominated by science and technology, or retreat into social triviality" (as cited in Sundquist, 2012, p. 592).

Sundquist observed that the "crisis" extends back prior to the *1964 Report of the Commission on the Humanities*, which warned that "the present state of the humanities had created 'a crisis for national leadership'" (as cited in Sundquist, 2012, p. 592), implying that the dearth of leadership was consonant with a lack of humanistic understanding of the world correlated to a rise in specializations, particularly in business, science and technology. The problem, Sundquist pointed out, is not that individuals are less interested in teaching good humanistic goals, like ethics, morality, history, philosophy, and the like, nor that students are averse to such areas of inquiry, but rather that there are no clearly available jobs for individuals thus prepared. In the marketplace, such training has little corporate value, and students are "siloed" to obtain credentials that are relevant to hoped-for future employment. Whereas the *1964 Report of the Commission on the Humanities* called for "men [sic] of talent, intellect, and spirit," our modern society calls for those willing to perform tasks and processes that promote business interests, whose essential goal is, if we are to accept Milton Friedman's definition, "to make a profit for its shareholders" (as cited in Baase, 2013, p. 37). Both the 1964 Commission report and the creation of the National Endowment for the Humanities (NEH) of 1965 emerged in the context of Civil Rights and Voting Rights Acts and offered an egalitarian vision to a society in social and political conflict.

Over a decade later, in 1980, the Rockefeller report, *The Humanities in American Life*, implied a dismissal of the charming quaintness of the earlier 1964 report, whose goals could "scarcely be obtained today" (as cited in Sundquist, 2012, p. 598). The Rockefeller report rejected general aesthetics in favor of a boundaried approach in which "some of Shakespeare's plays are better than others, some Navajo myths are better than others, some black [sic] autobiographies are better than others" (as cited in

Sundquist, 2012, p. 598). And thus the report nullified aesthetic concerns across genres of literatures, forming a kind of literary segregation in which all genres are separate, but equal. With the humanities in disarray, Mack disaffectedly asked, "how long can a democratic nation afford to support a narcissistic minority so transfixed by its own image" (as cited in Sundquist, 2012, p. 598)?

In contrast to Mack, Garland (2012) observed that "compulsory education is a sustained assault on universities to turn them into production lines for the social factory" (p. 31). He offered an extreme point of view, that such education is "one-size-fits-all," a fragmentary education, "regurgitated in tests and exams," designed to "provide capitalism with fresh slaves" (pp. 31-32). Humanistic education in art, history, literature, and languages *must* be "devalued and rendered obsolete in terms of fitting [graduates] into employment," and that compulsory education offers little more than "conformity and servility" (p. 32).

More recently, Konnikova (2012), in a *Scientific American* blog entitled, "The Humanities Aren't a Science, So Stop Treating Them Like One," added vigor to a defense of the humanities, pointing out the hopelessness of quantifying that which is qualitative in nature. She rejected the notion that every "softer discipline" is inadequate "unless it becomes *harder*, more *quantifiable*, more *scientific*, more *precise*" and questioned whether scientific methods of argument do not undermine "the very heart of each discipline that falls into the trap of data, numbers, statistics, and charts," concluding that "most of these disciplines *aren't* quantifiable, scientific, or precise. They are messy and complicated. And when you try to straighten out the tangle, you may find that you lose far more than you gain" (para. 5).

In hindsight, the rise in business, science and technological vocations, reflected in a style of argument that imitates the scientific method and requires statistical, metrical measures and proofs, a bewildered humanistic scholarly community has found it increasingly difficult to justify its existence, let alone its importance. After 1980, even humanists were on board with the need for practical (vocational) outcomes among students. (They still are.) This notion that one's education must have a practical purpose has occurred subtly and persistently over centuries, to become a new hegemony—one to which even its victims subscribe. Professional humanists, therefore, have found it ever more difficult to make sensible what the humanities are and what humanists do. As Jacobe (2013) noted: The business paradigm, with its orchestral media representation, portrays the academic as "out of touch, impractical, existing

at a distance from the realities of the everyday life, concerned instead with the life of the mind and, always, privileged" (p. 59). Humanists themselves, in collective low self-esteem have experienced a kind of intellectual dysmorphia in which the muscle of their former idealism seems to have turned to fat: The befuddled academic, the "man" of jelly-stained lapels and silver spoons cannot compare to the clean, sleek, sharp-eyed business "man" in his tailored suit, his finger on the pulse of American materialism.

Curtis (2013) rejected the traditional belief that the humanities and the university system are, in fact, the last refuge for "dissent and heterodox knowledge" (p. 75). He argued that university systems globally are increasingly driven by "a class of people with significant interests in the advancement of free-market doctrine, rendered ever-more sovereign," paralleling medieval education energized by popes and princes and reflective of their agenda of submission to auth-ority (p. 74). He argued that it would be "foolish" to regard academia as a place of "immutable purpose" (p. 83).

And finally, Krapp and Liu (2011) suggested that humanistic education, since 1945, has increasingly been offered to the "highest bidders" and those already "economically and academically privileged…. all gestures toward democratization notwithstanding" (p. 29). Their argument hearkens back to W.E.B. Dubois' horrified rejection of Booker T. Washington's notion of industrial education. The Harvard-educated Dubois favored the ideals of education of minds, regardless of race, and believed that a rich humanistic education in medicine, law, philosophy, and history ought to be the goal. In the South, however, such a vision was unimaginable, and Washington sought a practical education interested in producing skilled workers for industry. The debate then implied bifurcated educational access along color lines, but we can observe the same bifurcation along class and economic lines today.

Education today, a social science rather than a humanities area, is connected to scientific methodology and relies on data, metrics, and evidence for its theories. However, "fact," in mathematics and science, is the most intangible and abstract concept of all, for in its strictest definition, it requires that something always be true and never false. Therefore, it only exists as an ideal—a notion which contemporary social science tends to obfuscate; metrical data satisfies only the mind that rejects intuition, ambiguous possibilities, transcendent truths, and qualities of conditions that have no proofs or measures. The self-limited belief in the scientific method (which, incidentally, is *only*

interested in questions that *have* answers, according to physicist, Alan Lightman) is the zeitgeist of our age. We cannot succeed in any argument defending the quality of education as a humanistic study when the very presumptive rules of engagement are against us.

Having explored the relevant literature, the next section, Data Data Everywhere, focuses on observations from data and begins to understand literacy historically. This section will be followed by The Limitations of Relativism and Pragmatism, which explores the limits of relativism and pragmatism and calls for a return to virtue. The fourth section, Inner Ethics, examines ethics as an experience of the mind. The final section, Bringing Back Mystery/Wisdom Under Investigation, argues on behalf of a spirited approach to education, less reliant on methodologies and metrics, one that balances practical goals with equal measure of attention to the heart.

Data Data Everywhere
Data collected on behalf of the Association of American Colleges and Universities, measuring achievement among twelfth graders (using the National Assessment of Educational Progress [NEAP] test) showed that nearly 60% of students lack basic skills (as cited in Brodhead, & Rowe, 2013, p. 26). Fifty-one percent of employers said that a liberal education is "very important," and 94% rated liberal education as "somewhat" to "very important" (Brodhead, & Rowe, 2013, p. 33). The National Science Foundation (NSF) reported that Humanities education funding has declined by over 10% from 2005-2011, a decline that must be seen in the context of over 40% fewer funds than Mathematical and Physical Sciences in the same period (Brodhead, Rowe, et al, 2013. p. 40). The development is nothing short of ironic, given a report submitted to the US Department of Education from the Equity and Excellence Commission, which observed that only a quarter of America's primary and secondary-school students perform comparably with average students in the highest performing school systems in the world (The Equity and Excellence Commission, 2013, pp.12-13). A new, further federal cut of 49% cut to the National Endowment of the Humanities ($71 million) hovered in the House recently (National Humanities Alliance, 2013, para. 4). Hanushek and Woessman, who correlated gross domestic product with the Program for International Assessment (PISA) scores, argued that if appropriate measures were undertaken immediately, it would take twenty years to recover from the declines of liberal education and that if successful, the U.S. economy could expect to grow 700% by the end of the century (as cited in Lawrence, 2013, para. 3). Recently, Pennsylvania suffered a $304 million cut in education,

while simultaneous construction of a new $400 million prison has gone forward (Stroud, 2013). And, there are many indictments coming from populist sources: *Waiting for Superman*, for example, ranks America 25th in math and 21st in science, and dead last when comparisons are restricted to the top 5% of students (Weber, 2013, p.4). Although these observations in fragments may cry out for "proofs" and documenta-tion that appeal to the limits of cognition, there is nothing inherently unreasonable in talking about the giant elephant in the room: our colleges and streets are filled with people disconnected from society, lacking avenues to explore sublime beauty, transcendent reason, historical connection to elevated moral paradigms, and eloquence in written and oral presentations. Our very government's implacable divisions along party lines, testifies to our losses of consensual understanding, ethics, and of a united society.

At the same time that we regard the absence of a sophisticated and complete literacy that comprehends historical, political, and philosophical grounding, we notice ubiquitous losses of respect and often of common decency. We do not have "free" speech, as Frye (1963) concluded nearly half a century ago; we have "uninhibited speech" (p. 47). We do not have "genuine speech" (the communication of a "genuine personality"); we have "bastard speech," the voice of the "ego" uninterested in communication, but rather only in "expression" (Frye, 1963, pp. 41-42). Bastard speakers do not live in the virtues of a truly *liberal* society, but rather in the malingering decadence of a *permissive* one. One need only listen to the many vulgar, private conversations held in public spaces or drive among those who insist on texting, endangering all travelers, to observe the fraying of society's edges by selfish and self-involved egos.

No one would seriously make the argument that the pursuit of science, business, or technology is wrong *per se*, but it is worth discussing what has happened and will continue to happen if we separate science, business, and technology from a study of human history, ethics, and society. In contrast to a balanced approach between the heart, mind, and spirit, the utilitarian implication that education is measured by practical outcomes occurs where the twin philosophies, relativism and pragmatism, are married and where society holds too few careers for those trained in eloquence, art, poetry, history, philosophy, and languages.

The Limitations of Relativism and Pragmatism

Our educational institutions need to be unanimous in teaching the good habits of moral reflection across the board as a deep and integral component of student development. Training in the humanities, argued Schwartz (2013), immerses students in complicated and competing ideas about truth, nourishing a "wise appreciation of the complexity of the world and its problems" (para. 8). Without an equal measure of training in this *way* of examining global problems, society has no absolute ground on which to advance moral reasons for disallowing chemical warfare on a global scale, as an example. Instead, there is only a relativistic model, in which some chemical warfare may be worse than others.

Indeed, relativism is attractive because it appears to stick only to the "facts" — what is local, observable, measurable: what one can "say," presumably with objectivity and proof. In this limited view, one can only talk of what we know as that which is provable. There is no rationally compelling evidence of any proofs, however, outside of individual thought (though there is certainly the appearance of proofs in data consumption). Hence, those who define what is normative for education take comfort in knowing what can be observed and argued, in their own view, cleanly and metrically. It is hard-headed, professedly clear-minded, and self-limiting, and often leads to what Hazleton (2013) referred to as "heartless conviction."

Another feature of relativism is its love of quantifiable data. It loves metrics and concrete measures, and steers its course according to them. These metrics are developed, calculated, and interpreted by the friend of metrics — the expert, the data analyst — almost exclusively based on valorizing cognitive skills that have been increasingly admired in Western society and virulently embraced in education. Metrics form the data "facts," which provide us with a self-contained, subjective experience of knowing, that in its fervent hope to be objective is ironically emotive. Truth, or claims of truth, subsides beneath the pretension and presumption that data "fact" is incontrovertible. We often hear the old saw, "the data do not lie." But, indeed, the data do lie, and they lie all the time: for every statistic there is a contradicting statistic. No one knows the origin of the sentiment, often attributed to Disraeli: "there are lies, damned lies, and statistics."

The non-cognitive world of human worth, thought, value, and wisdom unfolds in an infinitely messy, cluttered variety, often without any proofs: from the utterly, senselessly delicate beauty of a butterfly's

wings, to the inconsolable knowledge and grief that no matter what we do in this world, our end is certain: we die. If we have any heart at all, we weep; unless, of course, our hearts never received any training in beauty or delicacy of feeling. In that event, our care of butterflies and polar bears and the laughter of children only matters in the practicality of their existing, or not at all.

Inner Ethics

It cannot be proved whether there is knowledge that exceeds or transcends experience and instruction, knowledge that is encoded onto us in the sense that we do not choose it, but there it is; yet, we live as if there is an inner code. Aristotle called it "entelechy," coining the term: "having (echo) its purpose (telos) within (entos)" (as cited in Durant, 1926, p. 57) C.S. Lewis (1952), the brilliant amateur theologian and philosopher, put the matter with exquisite simplicity: "Consequently, this Rule of Right and Wrong, or Law of Human Nature, or whatever you call it, must somehow or other be a real thing….a real law, which none of us made, but which we find pressing upon us" (p. 20). Lewis put in simple terms Kant's categorical imperative — that is, the sense of right and wrong for all people, for all times. The *categorical imperative* is required to prevent society from unraveling. Durant (1926) tells us that we have lost Kant's fine distinction, i.e., that our goals should not be to make ourselves happy, but rather worthy of happiness (p. 209). Thus, Kant hearkens back to Aristotle's "good life," which was not good because it made the individual happy, but good because the individual lived in a state of moral purpose.

Ours, however, is not a virtuous age, and what ought/ ought not to be studied in a college curriculum is determined not by what is virtuous, but rather by what is practical, useful, gainful, utilitarian, and above all – *measurable*. The business paradigm tells us that the cost of education must not outweigh its benefits, but increasingly it is questionable whether the benefits of education are worth their rising costs. Gone are the days when education was sought purely for the noble purpose of gaining knowledge. Perhaps those days never existed.

The root of utilitarianism predates its 18th century English announcement by John Stuart Mill. It is Judeo-Christianity that brings us utilitarian concepts and which valorize the "plain man" under which the virtues currently stifle and gasp. At a sociological level, Christ is the quintessential "plain man" of humble origins who rises to leadership in the context of cultural and political conflict. Of course, the Protestant Reformation paved the way for our still-current modern notions of the rugged individualist, who bends the

laws and achieves "his" goals despite all obstructions. The notion of the individualist is embedded in the rejection of priestly intercession between man and God. Although the sale of indulgences in the late Middle Ages was an obviously corrupt practice, the solution — that man can speak to God alone, without priestly intercession — has had the unintended effect of elevating the individual. And the rugged individual, the plain speaking man, takes deep root in the Puritans. Their survival is their vindication, the proof that they were favored of God.

Indeed, contemporary religion at times reduces God to a purely materialist view as our all-powerful servant healing us from our diseases, granting us our wishes for wealth and happiness, providing our hearts' desires — all material in nature: granite countertops, stainless appliances, cashmere socks. The original materialist perspective among the ancient Greeks would wend its way through Epicurus, Lucretius, Hume, Rousseau, Mills, Carlyle, Thoreau, Emerson, Nietzsche, Santayana, and William James, to name a few principal heirs. This unrelenting notion that pragmatic thought is emotionally and psychologically neutral, hard, cold, objective, while the reasoning conscience is emotional, psychological, and the ruling force of the weak-minded are the two persisting conditions between which we teeter today. William James characterized the two quintessential Americans: the one, "tough-minded" — the rationalist, given over to notions of facts, proofs, bottom lines— and the other, "the tender-minded" — the emotional, the feminized, the caring, the faithful. James knew we needed both (as cited in Durant 1926, p. 385), and we know it, too, for reason is comprised of both analytics and the holistic sense of things as they are. Nietzsche despised Judeo-Christianity as a "slave" morality. It could prove nothing, and thus appealed to the conscience, not to "facts."

Yet, that appeal changed the way the world turned and is continuing to turn.

Bringing Back Mystery/Wisdom Under Investigation

Durant (1926), in his introduction to the exquisitely presented *Story of Philosophy*, argued on behalf of humanistic understanding:

> Science seems always to advance, while philosophy seems always to lose ground. Yet this is only because philosophy accepts the hard and hazardous tasks of dealing with problems not always open to methods of science—problems like good and evil, beauty and ugliness, order and freedom, life and death. (p. 2)

Science and technology have given us the means of prolonging life and of ending it on unimaginable scales. As Durant implored, "only wisdom can help us to understand when and why we ought to heal or kill" (p. 2).

The current education-as-a-business paradigm, pervasive in nearly all institutions of "higher" learning, consistently shaves away the value and necessity of a deeply studied humanistic understanding of the world. Nussbaum (2009) observed that, "education is often discussed in low-level utilitarian terms" and worries that "other abilities—abilities crucial both to the health of democracy and to the creation of a decent world culture and a robust type of global citizenship—are at risk of getting lost in the competitive flurry" (p. 6). She believed that such education is intent on creating a society of technologists and business elites. In the relativistic, low-level utilitarian conception, such a society makes the only sense, except for the nagging observation that the deep limitations of economics cannot be understood by only studying economics nor by spending money, for that matter, and the deep limitations of genetics or evolutionary biology cannot be uncovered by only studying genetics or evolutionary biology. To see the limitations of a discipline, any discipline, requires a perspective developed at least partly outside of that discipline (Schwartz, 2013, para. 9). That is why historians, writers, political scientists, psychologists, visual and musical artists are necessary to technologists and biological and earth scientists. For matters of morality, justice, goodness, and beauty are at stake along with the dialogic imagination and competing concepts of truth.

To prevent creative minds from having the opportunity to learn what role they might play, whether as leaders, followers, or those who stand out of the way is a great disservice. Nussbaum (2009) pointed out that "all over the world, programs in arts and humanities, at all levels, are being cut away in favor of the cultivation of the technical" (p. 8). She argued that humanistic study is not merely devalued, it is *feared*. Why would this be so? Economic enrichment is not a bad goal. But when economic enrichment occurs at the cost of diminished human understanding of the past, our human ideas, mistakes, wrong turns taken, inequities, suffering, enslavement, evil, the scorning of beauty, truth, justice, and the savaging of all that makes us noble and virtuous, keeping us isolated in collective ignorance, then we must, if we have a shred of courage, go back to that turn in the road when we first lost our way. Indeed, MacIntyre (1981) correlated the

disorder and fall of our moral discourse as directly commensurate with the rise of utilitarianism and its unconscious emotivism present in our dedicated reliance on "experts," forms, and interpretations of data "facts" (p. 11). Educators must continue to press for courses and programs wherein our most intellectually talented students are offered training in leadership, history, politics, literature, and the arts. Our students, our society, cry out for opportunities to create, lead, and think beyond mere improved-wage status. Public intellectuals are needed more than ever before because they are so very scarce.

Society has been overly engaged in processes and methodologies of teaching. Nussbaum (2009) reasoned, "Understanding of the world will promote human development only if it is itself infused by searching critical thinking that focuses on differences of power and opportunity" (p. 11). But, in reality, higher education currently perpetuates the limited thinking of post-enlightenment anti-intellectualism, not just for a few who have no higher capabilities, but for vast populations, and not just in America, in the world. As Brodhead and Rowe (2013) reported, education in the humanities is integral to the fabric of American society, that our very strength once depended on broad education in liberal arts, which just as other countries seek to emulate this model, Americans are all too ready to abandon what once made its educational system so great (p. 10).

Education that undermines the lessons of philosophy, history, literature, art, music, and religion, that does not allow sufficient time for students to both cast a broad net and follow up with a deep immersive drill, cripples our students' critical faculties. Education must address the mind, heart, and spirit of students if society is to move positively forward. Such an education takes time and immersion to affect the mind and wit of our students in order to elevate them and our society.

True literacy is not merely the ability to read and write. True literacy is a way of interpreting the world consciously. Illiteracy (even when accompanied by the ability to read and write low-level college papers) is defined and illustrated by a lack of competency with ideas, illustrated by its unoriginality and the reflexive/reactive expressions of its hatred, fear, and arrogance of beliefs. Our goal ought to be, as Frye (1963) argued, not to teach merely admiration of great literature or works of art, but rather to truly impart the "power of utterance" to our students (p. 47). Educators must

nourish virtue in the education of the heart, spirit, and a reasoning conscience. For there has been great harm done and more harm to come in failing to educate students in the moral maturity required in the control of material desire and an otherwise unconstrained

technological dynamo. The way is through grounding in the humanities, in art, music, dance, history, literature, through acts of creation that defy patterns of expectation.

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Toward an Understanding of Scholarly Writing

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Abstract

The term *scholarly writing* has been defined by its purpose (Aitchison & Lee, 2006; Shulman, 1998; Shannon, 2011), goals (Modern Language Association, 2007), and criteria (Boyer, 1990; Caffarella & Barnett, 2000; Diamond, 1999; Glassick, Huber, & Maerof, 1997; Mehta, 2000). A new synthesized definition, exceeding the sum of all others, is proposed in this paper. *Scholarly writing* must (a) make a unique, timely contribution in knowledge, practice, teaching, or learning in a particular field; (b) position itself in the context of published literature in the field; (c) attribute wording and/or ideas correctly, according to a standard documentation style; and (d) permit sharing that is open to peer-reviewed feedback. Whether writing is *scholarly* or purely *academic* is also discussed, followed by final thoughts about nurturing scholarship.

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Toward an Understanding of Scholarly Writing

In The Handbook of Scholarly Writing and Publishing, Rocco (2011) recounts a certain doctoral student who shared a statistic on the value of a scholarly article from a 1982 study:

> *An article published in a major journal early in a career could be worth about $25,000 in pay and benefits. A quality article in an important journal can mean a better job, higher pay over a long career with increased retirement and other benefits…in hard cash, the average scholarly publication would be worth about $200 a year for every year you work. (p. 4)*

At first blush, $200 a year, or $25,000 over the lifespan of a career is not especially impressive, but that amount, in 1982 dollars, has doubled in the last three decades. Faculty are not motivated merely by financial rewards: Some are motivated to write for the pure academic exercise, the challenge, even the elitism that comes with knowing that they are a part of a select few known as published authors. Others view writing to publish as job security, or are motivated to write for purely altruistic reasons: to share knowledge or to disseminate information that people should learn and benefit from. Still others wonder: What the heck have I been doing for over ten years?

Scholarly activity, defined by conferences and publication, is crucial at many institutions; and the "publish or perish" adage is as true today as it was when it became current in the mid-twentieth century. Scholarly activity profoundly influences promotion and tenure decisions at many institutions. Universities that don't publish scholarly research on a regular basis may face budget cuts, which translates into lost jobs; this results in a rush to publish writing of dubious

quality (McBeath, 2013) coupled with predatory open-access journals that charge authors exorbitant fees, as high as $1950, to get published (Truth, 2012). The onus on faculty to publish remains high worldwide, particularly in the US, Canada, United Kingdom, and Australia; although a publication record positively affects career advancement, excessive publishing dilutes quality and the chance that articles are actually read (Van Dalen & Henkens, 2012).

Authors often cannot draw upon training in their graduate school years to help them, as requiring students to write to a publishable standard is often overlooked (Rose & McClafferty, 2001). Giving and receiving feedback can be a difficult process, since writing is so personal; even as students, many authors are not accustomed to receiving criticism of their work (Nielsen & Rocco, 2002). Authors may not have been required to write papers that met a scholarly standard in graduate school; encouraging scholarship through conference presentations and co-authored papers may not have been prioritized. Starting professional relationships early in a career — and staying connected to like-minded authors — takes a back seat to degree completion. Doctoral students do not develop their skills in scholarly writing until the dissertation stage (Caffarella & Barnett, 2000). This is too late, as Carlson, Irons, and Monk (2010) found: doctoral students are highly confident of their writing skills, but faculty felt their confidence was unfounded, given their weaknesses in critical areas. Increased support would help, especially given lackluster job prospects that currently exist in higher education (Simpson, 2013). Leaving graduate student writers on a vast scale to persist in what may well be bad habits of composition, poor style, and a lack of eloquence ultimately dilutes the quality of a generation of writers, who suffer from an elevated sense of scholarship.

Graduate students are found to be anxious, stressed, confused, and thus likely to procrastinate in attempting high-stakes writing (Nielsen & Rocco, 2002), and faculty are no different. In addition to having a heavy workload and lack of support from their institutions, new faculty members are hindered by lack of confidence in their ability to write well (Hemmings, Rushbrook, & Smith, 2007). They harbor misperceptions regarding who and what gets published (Plakhotnik & Rocco, 2009) and the fear of failure can undermine their chances for success (Nackoney, Munn & Fernandez, 2011). Administrators do not have an easier time: developing policies and standards for tenure and promotion is complicated by contrasting definitions of scholarly writing and publishing (Albers, 2007). The high rejection rate of many journals, and confusion over what constitutes scholarly writing among faculty and administrators, only adds to the challenges. This is further complicated by disciplines whose styles and approaches to scholarship widely vary.

Thus, the purpose of this paper is to help authors write scholarly papers by defining *scholarly writing*, first taking into the account several traditional definitions and their orientations: (a) purpose, (b) goals, and (c) criteria. Each of these definitions will be presented below, along with a new definition that synthesizes the best of them, is inclusive of all disciplines, and highlights an important distinction between types of papers that are *scholarly* and those that are *academic*. The paper will conclude with some final thoughts about approaching and nurturing scholarly writing.

Scholarly Writing: Purpose

What differentiates scholarly writing from other types of writing is that *scholarly* writing has a purpose for a specific audience; it is not always intended for general consumption. Scholarly writing has the specific purpose of disseminating ideas in a precise and objective manner to like-minded people (Shannon, 2011). Writing that is seen as "knowledge-creating rather than merely as knowledge-recording" (Aitchison & Lee, 2006, p. 270) shifts the emphasis from repeating or summarizing the ideas of others to originating new ideas. The language in such writing always has the audience foremost in mind: an educated reader, one who is already familiar with the technical language of a discipline, and is actively seeking information that adds to the current body of knowledge. It's the difference between writing a paper on grammatical errors versus writing one on the average student errors in English. Colleagues may be in shock and awe of an author's catalog-like command of jargon and syntax, but people in the discipline of English already know this information; everything sounds familiar. On the other hand, to determine that college students average 2.45 errors per 100 words, authors need to conduct and publish this research, ground their findings in past literature, and disseminate this knowledge (see Lunsford & Lunsford, 2008 on their update of Connors & Lunsford's 1988 study).

Until it is shared, research is incomplete (American Psychological Association [APA], 2010, p. 9). Scholarly research leads to scholarly writing for the express purpose of sharing with the community. It only becomes scholarly when it is shared—and that also means open to critique. Shulman (1998) states that scholarly writing "can be cited, refuted, built upon, and shared among members of that community. Scholarly writing properly communicated and critiqued serves as the building block for knowledge growth in the field" (p. 5). Scholarly writing can and must be public for those in a community who are willing

to serve as disseminators of this new knowledge. Shannon (2011) views the purpose of scholarly writing as "extending, challenging, or expanding" current knowledge or beliefs (p. 2). Whereas the purpose of academic writing is for writers to show their mastery of content and skills necessary in their fields, such as to complete course requirements (Shannon, 2011), scholarly writing aims to map our new territory in the knowledge of a particular field.

Scholarly Writing: Goals

Scholarly writing can also be defined in terms of its goals; one of several goals of scholarly writing is re-interpretation of ideas. The distinction between the purpose of scholarly writing and its goals is that writers should never have as their primary purpose the re-interpretation of existing ideas; rather, re-interpretation should be a by-product of their research and writing. The Modern Language Association (2007) focuses on scholarly writing that emphasizes the *re-*: "reinterpretation, an analysis or critique that calls for a revision or reconfiguring of what has previously been thought...and that enters into conversation with those other scholars and interpretations" (p. 26). Noting the increased demand for scholarly productivity at many institutions in the last few years, the Task Force of Modern Language Association (2007) calls for an expanded definition of scholarship, to include annotated translations, edited articles, critical editions, and the like. Each of these types of scholarship requires the writer to reinterpret or reconfigure previous ideas or previously-held translations and interpretations, and writing in the service of that goal is sufficient to be classified as *scholarly*. Scholars must continually question the status quo, and never be too afraid or intimidated to insert their voice into the conversation. As Nackoney et al. (2011) put it succinctly, "If what has already been written and published could never be challenged, eventually the scholarly flame would be extinguished" (p. 39).

Scholarly Writing: Criteria

The work of several researchers speaks to a criterial — a rules-based — orientation in their definitions of scholarly writing. Boyer (1990) campaigned for scholarship that helped solve problems of communities that schools should serve, and contended that scholarship has four domains: discovery, integration, application, and teaching. For Boyer, scholarly writing was less about purpose and goals than about service to others and problem solving using set criteria that transcend disciplines. Scholarly writing can discover new knowledge, integrate new knowledge with existing ideas, apply new knowledge to solving real-life problems, and involve teaching and learning to a broader audience.

This type of scholarship of engagement is about an institution's connection and commitment to being active partners to their communities (Cox, 2010). This very inclusive vision of scholarship was clarified by Glassick, Huber, and Maerof (1997), who delineated six criteria that writing activities must meet or exceed to be considered scholarly: "clear goals, adequate preparation, appropriate methods, significant results, effective presentation, and reflective critique" (p. 25). These criteria present scholarly writers with a tall order to fulfill, as they must determine whether precise goals have been developed, sufficient preparation has taken place, adequate methods have been used, robust results have occurred and have been shared with a larger audience, and implications have been advanced. The focus is on the process, as scholarly writing necessitates attention to what can be characterized as milestones in the journey of developing and publishing scholarly research. These six process-oriented criteria also correlate to specific parts of a paper that Glassick et al. (1997) were alluding to. A high-quality empirical paper states goals in terms of research questions in the beginning, and "grounds" itself in context using relevant research. A method section includes information on how the study or research was conducted, and results are reported in detail. For Glassick et al. (1997), a discussion or interpretation of results must exist, followed by take-aways or implications and limitations of research.

Similarly, Caffarella and Barnett (2000) studied scholarly writing among graduate students and found three elements common to what they considered scholarly writing: content, process, and critique. Scholarly writing involved criteria for each element: content included "an argument for a specific thesis that was grounded in literature and/or empirical research," process involved a recursive practice of writing and revising, and content meant receiving and addressing feedback (p. 41). The collaborative nature of writing is stressed by these authors. Writing for students or professors often does not take place in a vacuum; writers get feedback from peers before they submit their work — and revise accordingly.

Taking the criteria-oriented stance to scholarly writing in a different direction, Diamond (1999) focused on the product of scholarly work, which "requires a high level of discipline-related expertise; breaks new ground or is innovative; can be replicated, documented, and peer-reviewed; and has significance or impact" (p. 8). Glassick et al. (1997) specify these criteria definitively. Expertise, defined by skill and experience, for example, did not exist in Diamond's (1999) definition. The second quality of innovation similarly adheres to a more defined standard of breaking new ground. And impact is also given a

measure: the external citations of the scholarly document (in which the number of citations required to constitute "impact" is subjective.

Mehta (2000) added to the criteria previously cited for scholarly writing by focusing on authority and credibility: "the use of authoritative information, the use of correct citation style, and the continued availability of the cited sources for the purpose of authentication and verification" (p. 52). This definition focuses on credibility and transparency in a way not found in previous definitions. According to these criteria for scholarly writing, the information that an author builds upon must itself be credible; otherwise, research being produced is not scholarly. Credibility extends to the use of currently available sources, particularly in the reference list, as cited sources that are out of print and thus cannot be accessed and verified may negatively affect the writer's credibility.

Scholarly Writing: A New Definition

Some of the definitions noted above apply to one field, and are not appropriate for others, or apply to only one type of scholarly writing. For example, Glassick et al. (1997) offer criteria more appropriate to empirical papers; a theoretical article would not have a method section, for example. Diamond (1999) has high standards for innovation and impact more appropriate for scientific papers. Considering the breadth of scholarship, from arts and sciences to education, business, engineering, and health sciences, not all criteria were considered appropriate for a new definition of *scholarly* writing advanced in this paper. But some common criteria appear in most of the definitions above: to be considered scholarly, papers should adhere to four criteria. *Scholarly writing* must (a) make a unique, timely contribution in knowledge, practice, teaching, or learning in a particular field; (b) position itself in the context of published literature in the field; (c) attribute wording and/or ideas correctly, according to a standard documentation style; and (d) permit sharing that is open to peer-reviewed feedback. Each of these criteria will be discussed below.

Make a Unique, Timely Contribution

A contribution does not mean lectures, best practices, "what works for me," and the like. Academic writing parrots knowledge in a field, whereas scholarly writing contributes something new; whether it's a new theory or teaching practice, a contribution re-envisions knowledge through a different lens. It means that writers should take previous knowledge and add their own two cents' worth — or more correctly in today's currency, two hundred- or thousand cents' worth, in proportion to the impact the contribution should make to the field. Timeliness is important, as research quickly becomes dated. Also, scholarly writing is tailored to the audience of a particular field, so including implications is critically important.

Position Itself in the Context of Published Literature

Originality is a relative term these days; unless the author is named Shakespeare, ideas do not arise from aery nothing and magically find a local habitation and a name. Ideas come from somewhere, and that origin needs to exist in a paper, allowing authors to put their ideas in context and show that they are taking up where others have left off. Information should come from credible sources, as new ideas built upon erroneous or flawed sources will not stand the test of time.

Attribute Wording and/or Ideas Correctly

Scholars use the citation style of their field, or the journal they wish to become published in; whether it's APA, MLA, or Chicago, adhering to a consistent set of rules to cite sources is a benefit for both writers and readers. The same holds true for ideas and wording. Copied-and-pasted wording should be enclosed in quotation marks, and summaries and paraphrases should accurately reflect the source's ideas. Authors should expect strong negative reaction to their manuscripts if research and documentation rules are not correctly applied. For example, Onwuegbuzie, Combs, Slate, and Frels (2009) found that a high number of APA errors is a strong predictor of rejection by journal editors. Importantly, readers should be able to track down sources cited in scholarly writing, and feel free to read these sources to ensure they are being properly interpreted and assessed. Transparency of the process is important; particularly for literature reviews. Readers should be given the tools and direction to conduct the same research and come to the same conclusions as the author.

Permit Sharing that is Open to Peer-reviewed Feedback

Here is where authors should tread carefully, especially those who self-publish. If the writing goes straight from the author's computer to the Internet, it may be worthy of consideration in terms of scholarship, but without a review process involving peers in his or her field, it should not be considered scholarly. Feedback is critical to the process of writing and revision for students, and the same holds true for professors. This is especially true for selective journals with high rejection rates; rare is the paper that gets a free pass to publication. Careful scrutiny and shaping

of ideas and results ensures a degree of quality, and it also conveys to the audience that the information they are reading is accurate, reliable, and significant.

Scholarly or Academic Writing?

Performance evaluations include activities that may be classified as either *scholarly* or *academic*, depending on the type of activity or product. The following forms of professional activities will be discussed below: (a) journal articles and book chapters, (b) conference presentations, (c) theses or dissertations, (d) scholarly feedback, and (e) literature and book reviews.

Journal Articles and Book Chapters

Clearly, publishing an article in a scholarly journal constitutes scholarly writing.

Writing a book or book chapter is also considered scholarly, whether it's self-published or uses a publisher. The exceptions are curriculum materials, coursework, or textbooks. Generally, writing textbooks or course/curriculum material is academic writing, as this type of writing does not fulfill the criteria noted above. Although they are unsung heroes, curriculum writers focus less on generating new knowledge than on facilitating information to make it palatable to students' and publishers' tastes. This type of academic writing must be given great weight, though, in any evaluation.

Empirical papers, whether published in journals or in books, are the traditional-type of paper: authors research a particular topic, phenomenon, or practice, and report on it. The report contains a research question or questions, indicates what current literature exists on the subject and where the present paper adds to this body of literature, and details the method, results, discussion, and implications. For research involving human subjects, an IRB (Institutional Review Board) approval is required. These papers may be action research-oriented, wherein the author investigates a problem with which he or she is personally involved. Papers may use qualitative, quantitative, or mixed-method designs. Papers may also be literature reviews, theoretical articles, methodological articles, or case studies (APA, 2010, pp. 10-11). These papers advance new ideas on research issues or methods, or propose theories or analyses of current topics. All of these papers fulfill the criteria for scholarly writing.

Papers that are literary in nature, involving original works of the writer in poetry, fiction, or essays, are academic writing—or more accurately, creative writing. In terms of originality, scholarly writing is positioned halfway between textbook/curriculum writing and literary writing: textbook or curriculum writing involves heavy borrowing of current knowledge in a field, whereas literary writing involves little to no borrowing of knowledge in the field. Scholarly writing takes up the middle position, drawing upon knowledge while adding its own contributions. A play written in the style of Shakespeare is not scholarly writing; a literary analysis using a deconstructionist approach to *Hamlet* to prove he wishes both "to be/and not to be" is scholarly writing.

Conference Presentations

A presentation at a conference or symposium is not scholarly writing per se, unless the presentation includes a paper that is published in the conference's proceedings. At that point, a proceedings paper is considered scholarly, as generally, it would not be accepted if it were purely academic. Choosing to present at conferences that include published proceedings is a good way to ensure that authors get credit for scholarly writing. Additionally, feedback received during the presentation can be subsequently incorporated into the paper. But authors should be warned to choose wisely: a presentation on emerging trade markets is interesting to many, but is academic if it only contains common-knowledge or common-sense ideas. Reliance on Wikipedia or Internet knowledge markets, such as Answers.com, leads at best in the most generous consideration to academic rather than scholarly writing.

Theses or Dissertations

A thesis or dissertation is considered scholarly writing. The thesis or dissertation committee serves as the reviewers to ensure quality of the document. If the paper is long enough, several shorter papers can be extracted from a dissertation or thesis. Submitting these shorter papers gives authors good practice in determining the most appropriate ideas for sub-mission, and allows for multiple sites of feedback.

Scholarly Feedback

Scholarly feedback, as in peer reviewing, is academic writing, as it does not advance innovation, create new knowledge, is not tied to style sheets, and requires no more than expressing an opinion (informed as that opinion might be). However, authors wishing to become published should consider becoming a reviewer of manuscripts for refereed journals, to learn to imitate the strengths of the papers they review, and compare their evaluation of a paper to those of their fellow reviewers (Donmoyer, 2011). It is a very important professional activity, as without reviewers, the quality of journals would be highly suspect.

Literature and Book Reviews

Literature and book reviews can be quite different; a literature review, properly organized and thoroughly researched, is scholarly writing that merits a detailed explanation in the *Publication Manual* (APA, 2010, p. 10). Scholarly literature reviews assimilate current thinking on a particular topic, and extract common themes. A book review can be scholarly writing, but often due to space constraints, becomes little more than an advertisement for the book being reviewed. Properly done, book reviews summarize key points, but also evaluate the strengths and weaknesses of the book. Reviews that lack an evaluation risk being regarded as academic rather than scholarly.

Final Thoughts

Scholarly writing in its purest form should be altruistic; that is, not written solely to advance an author's career, impress a supervisor, or fulfill a wish on a bucket list. We should write about topics that we are intimately involved with and truly want to share with others in our disciplines. The belief that writing is "my life, my work, my dreams" (as cited in Nielsen & Rocco, 2002, p. 311) resonates with scholars of any age. Of far less concern should be financial rewards and career benefits. Extrinsic rewards of advancement and financial gain may provide an initial motivation; but in the long run, the satisfaction of contributing in a meaningful way to the knowledge bank greatly outweighs materialistic concerns.

The new definition of *scholarly writing* proposed in this paper is meant to help clarify for writers and universities the criteria for this kind of writing, so that across disciplines, writers understand that scholarly writing requires more research and focused articulation of ideas compared to academic writing. Writers are at liberty to bridge disciplines and forge connections with other scholars when exploring their areas of interest. Fostering professional relationships can be critical: building a scholarly network, collaborating with others on a paper, and working with mentors all help emerging as well as seasoned scholars (Nackoney et al., 2011). University administrators can also do their part by allowing authors some flexibility in their workload to conduct research, as balancing research and writing with other professional duties is a constant struggle. Creating and nurturing a culture of scholarship is critical for all stakeholders.

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DEVRY UNIVERSITY JOURNAL OF SCHOLARLY RESEARCH
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For the second issue of the journal, we continue to solicit scholarly articles (3000 to 5000 words) that have not been published elsewhere, but are "working papers."

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– Guide to APA Research Writing & Formatting Template Revised Nov 2013

– Guide to APA Research Writing and Formatting Revised Nov 2013

– DVU APA Handbook

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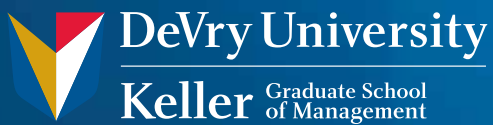
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