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# The Digital Migration of Research Dissemination in Aviation Psychology Disciplines

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THE DIGITAL MIGRATION OF RESEARCH DISSEMINATION IN  
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Innovations in research dissemination have emerged over the last decade in the movement toward on-line digital materials and distribution by increasingly environmentally-friendly processes. The access to scholarship has often been limited to major research organizations capable of funding subscriptions that have escalated to prohibitive values. Demonstrated herein is a model for world-wide Open Access to the latest contributions to the foundations of our discipline. The development of a systemic process to cross boundaries so that overall progress can result through the integration of research and industry practice at the individual level is provided. The foundational relationships and targeted outcomes are represented in an open conceptual design construct with intent to disseminate and transfer new knowledge resulting from research worldwide. The Open Access model is applied and represented in this paper.

Development of aviation as an academic discipline hinges on the ability of scholars to collaborate, discuss, and publicize the results of developmental and scientific research. Historically, the aviation discipline has struggled to find appropriate outlets that serve these purposes and provide a high level of scholarly support for those who seek to expand aviation science and technology (see Truitt & Kaps, 1995 for an early review of these issues). A forthcoming article by Bowen, Dyrenfurth, and van Epps provides an updated review of scholarly outlets in the aviation disciplines, and preliminary findings suggest that progress in the ability of aviation researchers to engage in high-quality knowledge sharing has not progressed as far as Truitt and Kaps would have anticipated by this time.

One significant challenge facing scholars in aviation and aviation-related disciplines is the high level of both scientists and practitioners achieving progress in the field. Unlike more traditional scientific endeavors which may rely heavily on an established body of academic-based researchers, aviation relies on active collaboration between a vast, globally dispersed collection of collegiate flight administrators/educators, commercial aviation industry leaders

and employees, general aviation industry leaders and enthusiasts, and government/regulatory entities. This dispersion inhibits collective knowledge-sharing on a large scale, and means that gains by a particular agency, program, or industry collaborative may not be shared with others for many years (in this discussion we are of course excluding the gains of knowledge for competitive-advantage, and focusing on knowledge driven for safety, training, or developmental gains). For example, aviation industry leaders attending the fourth Safety Across High-Consequence Industries conference in 2008 jointly agreed to the ideal that “we do not compete on safety” (Bowen & Bigda-Peyton, 2011); however, safety information gains from this and similar meetings may be shared in only limited fashion and with limited accessibility to those not immediately connected to these types of groups.

### **Background on the Development of Aviation Refereed Scholarship**

The University Aviation Association (UAA), a professional organization that promotes aviation education as a collegiate academic discipline, initially presented scholarly papers at the association’s Fall Educational Meeting. These papers were peer-reviewed for the first time in the mid-1980s by members of the publication committee and then appeared in the *Proceedings*. By approximately 1996, the *Proceedings* had evolved into *The Collegiate Aviation Review* (CAR), a refereed journal sponsored by UAA; the CAR is published twice annually in CD format and is still composed of papers from the fall meeting.

In 1989, a referred journal with multiple annual issues was conceptualized and launched at Embry-Riddle Aeronautical University (ERAU) in Daytona Beach, FL. With Henry R. Lehrer, a faculty member in the Aeronautical Science Department as the founding editor, *The Journal of Aviation/Aerospace Education & Research* (JAAER) published its first issue in April 1990. JAAER, a scholarly publication for educators and researchers as well as for professionals in the aviation and aerospace industry, had a primary focus on how the educational process influences various segments of the aviation and aerospace community and how education affects the industry. The *Journal* has been in continuous publication since the founding date with three issues per year.

*The Journal of Air Transportation Worldwide* (JATWW) was founded by Brent D. Bowen at the Aviation Institute of the University of Nebraska at Omaha in 1996; initial funding for this publication was through a grant from the NASA Space Grant. The JATWW, published three times annually, was established to be the preeminent scholarly journal in the aeronautical aspects of transportation. With an international and interdisciplinary emphasis, the journal focused on articles in all areas of aviation and space transportation research, theory, case study, practice, and issues. In addition, a key concentration of journal articles was in aviation administration and policy. JATWW, which was later re-named the *Journal of Air Transportation*, has not been published for several years.

### **Rationale for the Journal of Aviation Technology and Engineering (JATE)**

Aviation is a growing industry, particularly in under-developed regions of the world. The International Air Transportation Association (2011) predicts that by 2014, the number of air passengers will increase from 2.5 billion to 3.3 billion; about half of these new passengers are expected to come from Asia Pacific countries, primarily China. Asia Pacific overtook North America this year as the largest aviation market and is expected to increase in size to 30% of global traffic by 2014. The Middle East, Africa, and Asia Pacific are the fastest growing markets for international travel currently. As these markets continue to expand at a rapid rate, the infrastructure and support systems necessary to handle them will need a corresponding increase. According to the International Civil Aviation Organization (2010), the world-wide annual demand for pilots is just under 50,000 while there is an annual training capacity for 47,000. This difference becomes striking in Africa, where 1,600 pilots are needed annually, but there exists the training capacity for only 175 in that continent. Latin America needs 3,600 pilots, but can only train slightly over 1,000 pilots annually.

The sudden increase in the demand for air travel stems from increasing economic development, an increasingly mobile population, and a more open political climate. The ability to travel large distances by air is still a relatively new phenomenon in certain parts of the world. As the viability of such modes of transportation increases and they become more commonplace, the cost of doing business in aviation should decrease, due in part to more competition and an increased focus on sustainability initiatives, opening up air travel to an even larger demographic (Cambridge & Whitelegg, 2008).

The purpose of the present paper is to outline a strategy currently in process for the creation of an Open Access, all-digital format for disseminating research in aviation and aviation-related disciplines. The global dispersion of aviation researchers, practitioners, and stakeholders, the high degree of variation in accessibility to print-format scholarly journals (with their concomitant cost concerns for many non-academics), and the growing need to share safety and performance gains in aviation from more developed to under-developed parts of the world who are interested in aviation all drive the critical need for this new journal.

### **Strategic Advantage of Open-Access Format**

While a consensus on what actually constitutes an Open Access publication has been elusive, it is safe to say in the context of this paper that Open Access means that information published in the Journal of Aviation Technology and Engineering (JATE) is freely available online throughout the world, for readers to read, download, copy, distribute, and use (with attribution) any way they wish. The costs of production are incurred by the producer rather than the user. A 2011 assessment of the landscape of Open Access publishing estimated that there are probably just under 3,000 active, fully Open Access English-language journals, publishing almost 120,000 journal articles per year. This means that about 8-10% of all journal articles published in 2010 were first published in Open Access format. Many more become Open Access after an embargo period. Chemistry, physics, and technology journals (the category that would include JATE) account for 28% of the total number of Open Access articles published (Dallmeier-Tiessen, et al., 2011).

Open Access publication strategies are particularly effective when the information published is international in relevance, interdisciplinary in character, and of relevance to practitioners as well as academics. Because aviation technology is a field which exhibits these three characteristics, an Open Access approach to publishing JATE seemed particularly attractive.

These three features are worth examining in more detail:

When compared to subscription-based journals, Open Access titles extend the global impact of published research, especially to under-developed countries such as Brazil and China where most universities cannot afford subscriptions (Evans & Reimer, 2009). As a recent study of citation patterns by country by information scientist Yanjun Zhang shows, “Open Access could effectively improve the articles’ impact in developing countries and contribute to decreasing the academic gap between developing countries and developed countries,” (Zhang, 2006, p. 155). Since aviation is an international industry, and authoritative information on issues in areas such as aviation safety is as much (perhaps even more) crucial in the developing as the developed world, Open Access publication seems an especially appropriate strategy. While the tracking period is too short so far to produce statistically significant numbers, the top ten sources for visitors to JATE’s online publishing platform ([www.jateonline.org](http://www.jateonline.org)) have come from the USA, Australia, Latvia, China, India, the Philippines, Barbados, Brazil, France, and Ethiopia. It is encouraging that seven of these ten countries are classified by the World Bank as “low income” and this pattern of interest suggests that JATE will achieve its goal of extending access to “must have” literature beyond the privileged few.

A journal such as JATE publishes articles of interest to many different disciplinary communities, from psychologists to engineers, from experts in human factors research to transportation analysts. Each group has their own disciplinary journals, to which they and (more often nowadays) their institutions subscribe. However, it is often difficult to discover and read information published outside the immediate field of study; this leads to disciplinary silos. By making content openly accessible, immediately available full-text from a Google Scholar search, serendipitous discovery is facilitated and broader-based knowledge is advanced.

Open Access titles also extend the reach of scholarly information to practitioners, educators, and entrepreneurs outside the major universities or large corporations that can afford to pay for subscription access to a large number of journals for their employees. The positive impact of Open Access literature on professional communities has been shown through an analysis of the increased citation of Open Access vs. subscription-based literature in professional and trade publications (Zhang, 2006). This increase in citations is, again, a relevant finding for the field of aviation technology, which is characterized by the participation of a diverse community of professionals from a range of different sizes and types of organization.

Despite these benefits, two particular challenges face journals that adopt an Open Access publishing strategy; in the areas of respectability and sustainability. The perception that Open Access journals are of a lower quality is gradually fading. Many established journal publishers now offer both full Open Access journals and an Open Access option to authors who want to disseminate their work more widely than a subscription-based journal might otherwise allow. Springer and Oxford University Press are two established publishers producing academic resources in a wide range of subjects who have particularly well-articulated policies (<http://www.springer.com/open+access> and <http://www.oxfordjournals.org/oxfordopen>). Newer publishers, particularly in the biomedical sciences, have established a number of journals with high and growing impact factors over the last five years. Two notable examples are BioMed Central and Hindawi. While it does not endorse impact factors, PLOS (the Public Library of Sciences) is another highly regarded “all Open Access” publisher, and is responsible for possibly the largest journal in the world, PLoS One, which published 6,749 articles in 2010.

After the three year “proving period” that Thomson Reuters imposes on all journals that aim to be included in the best known citation indices, JATE will apply to be included and will hopefully receive an impact factor. Until then, the journal must clearly communicate a commitment to quality through a transparent, double-blind, peer review process, a distinguished editorial board, a professional appearance, and association with a publisher of proven quality. With this aim, the Journal has formed a publishing partnership with Purdue University Press, a small but highly-regarded scholarly publisher with extensive experience in publishing Open Access titles. In return for a modest fee, PUP provides access to manuscript management and publishing software, copyediting, typesetting, marketing, and publishing advice. JATE staff, meanwhile, project-manage the publication. The emphasis throughout is on a streamlined workflow and low overhead costs.

Because they lack subscription income, most Open Access journals operate on an “author pays” model, often expressed through page charges. Since JATE aims to not only appeal to users from developing countries but also to welcome their insights and contributions, this approach was not acceptable to the editors. JATE currently, therefore, adopts a sponsorship or “affinity” model, drawing on support from the Raisbeck Foundation and the College of Technology at Purdue University. As a journal publishing much applied research of interest to practitioners, this form of support is much more feasible than in many other disciplines. It requires, however, a clear understanding of the importance of editorial independence by the sponsor, and close adherence to best practices (Crow, 2009).

### **Research Dissemination through Creation of a Multi-National Journal**

JATE, published by the Purdue University Press, is a biannual, Open Access, refereed publication serving the needs of collegiate and industrial scholars and researchers in the multidisciplinary fields of aviation technology and engineering. The Journal is primarily available to its readership electronically through a professional online publishing system, <http://www.jateonline.org>, although hard copies of individual issues can be printed on-demand. JATE is partially supported by a gift from the James D. and Sherry L. Raisbeck Endowment at Purdue University (Lehrer & Mott, 2010).

The Raisbeck Engineering Distinguished Professorship for Engineering and Technology Integration was established in 1999 by James Raisbeck, founder of Raisbeck Engineering, Inc. and Purdue alumnus, within the Purdue School of Aeronautics and Astronautics. The goal of that professorship is “to bridge the School of Aeronautics and Astronautics and the Department of Aviation Technology to teach graduate and undergraduate students the art and science of mixing theory and application in the design, build, and test process” (Purdue, n.d.).

Raisbeck’s belief is that students need to be able to not only develop theories, but also to create solutions based upon these theories and test them. As Gery (2001) notes, Raisbeck’s view is that computers should serve as tools, but should not substitute for concrete applications. According to Raisbeck, his company doesn’t work on any kind of engineering problem without an end product in mind. The professorship is designed to allow the students to do the same kind of thing. That’s where the rubber meets the road. [Students] need to have something to hold in their hands and say, “I built this.” (p. 2)

In keeping with these goals, a key focus of JATE is the promotion of the bridging of these fields by publishing scholarly articles related to the integration of theory and application within the design, build, and test process. This process generally consists of various constituencies working toward a common goal of an end product which is properly designed through theory and made practical through application (Lehrer & Mott, 2010).

JATE publishes both quantitative and qualitative research articles. Topics on which the Journal focuses include the technological and operational aspects of air carriers, general aviation businesses and airports, issues related to aviation maintenance and engineering, and aviation human factors and applied training research. Significant developmental and historical topics related to these focus areas are of relevance, as well (Lehrer & Mott, 2010).

### **Establishing a Formal Network Structure for a Journal-Based Collaborative**

Originating as an informal grouping of concerned parties, a collaborative community of scholars is evolving to be built around the more structured, technologically-based networking solution that an all-digital, Open Access scholarly journal provides. By placing the network structure within the context of a scholarly journal, relationships and advantages that have been built through previous generations of ad hoc collaboration may be formalized and shared with a wider audience.

As described previously by Metz (2007) and Bowen and Lu (2004), collaborative networks are formed to bring together synergistic relationships for the purpose of provisioning an optimal foundation from which to pursue common goals. Collaborative networks often begin through ad hoc information sharing; for example, the Safety Across High-Consequence Industries (SAHI) conference program sponsored by Saint Louis University grew from such ad hoc and informal sharing (Bowen, Block, & Patankar, 2009). Bowen and Block (2008) then proposed a virtual organizational structure to support sustainable collaboration for the SAHI contributors.

What is missing from these preliminary attempts at network collaboration, though, have been the application of existing scholarly constructs to the new, virtually-mediated environment. The present program in development takes a concept familiar to both aviation academics and industry leaders/stakeholders, that of the scholarly, peer-reviewed research journal, and re-imagines it to provide grounding for the evolution of a new method of scholarly communication. The economic feasibility of Open Access scholarly publication enables the JATE to initiate an optimal forum for a sustainable and long-term collaborative network. The constructs for collaborative network building include common tenets for the establishment of communication channels not only within the network but for constituencies external to the network. These constituencies are beneficiaries of the resulting knowledge which emerges and is disseminated.

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\*E. E. Block is now E. E. Bowen and has published scholarly articles in the aviation and psychology literature under both names.

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