

# Gender Differences in IS: A literature Review

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## Recommended Citation

Lin, Xiaolin; Califf, Christopher; and Featherman, Mauricio, "Gender Differences in IS: A literature Review" (2012). *AMCIS 2012 Proceedings*. 20.

<http://aisel.aisnet.org/amcis2012/proceedings/SocialIssues/20>

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# Gender Differences in IS: A literature Review

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## ABSTRACT

Gender focused research has been published in IS journals since the mid-1990s. In this paper, we conduct a literature review of this research stream by analyzing the academic, crossover, and practitioner IS literature that focuses on gender issues. Our search revealed 44 total gender focused IS journal articles, all of which are concerned with identifying and attempting to explain gender differences. These articles were analyzed and systematically grouped them into four main categories: IT workforce, behavioral, prescriptive/guidance, and education. These main categories were then split into subcategory clusters. We examined publication trends over time in regards to journal outlets, main categories, and the subcategories. As a result of this effort gaps in the gender literature are identified. Recommendations to guide future research efforts of both academicians and practitioners are provided.

## KEYWORDS

Gender, gender differences, literature review, information systems

## INTRODUCTION

Gender research has been published in Information Systems (IS) journals since the mid-1990s (Baroudi and Igbaria 1994; Igbaria and Baroudi 1995; Truman and Baroudi 1994). This early gender research motivated subsequent widely read research (e.g., Gefen and Straub 1997; Venkatesh and Morris 2000) of gender effects in various research contexts. Based on the framing of the prior literature, gender remains a prime individual difference variable. As such, gender persists as an important attribute for researchers and practitioners to study. The analysis of the root causes of gender-based differences in IS-related contexts is under-researched in information systems research and more specifically in IS-based decision making research.

Most published research purporting to examine gender, reports differences in measured variables and path weights; however, it does not deeply explain any gender variant findings. Gender then may be a proxy for other phenomenon. Our research stream aims to unpack the influence of gender in IT settings. We begin with a literature review and classification, in an attempt to identify and categorize the existing research to facilitate subsequent gender-based research efforts.

IS scholars continue to note that a focus on gender and its effects is scarce and most importantly in our opinion, under-theorized (Adam 2002; Howcroft and Trauth 2008). In responding to this claim, one may reference the history of IS and conclude that this may be caused by problems with (1) a lack of research direction and (2) existence of the dominant positivist paradigm. First, since its inception, the field of IS has been somewhat confused about the reference disciplines from which it should borrow. In his classic paper, Keen (1980) noted that IS lacks clear-cut reference disciplines, as it meshes many schools of thought into one. Thus, the desultory nature of borrowing theory from countless reference disciplines may have generated research that covers a wide range of phenomenon while neglecting to explain gender effects. Even when controlling for other individual difference variables the study of gender is complex and findings of gender variance on measured variables can be hard to explain.

Second, after much research has materialized in the discipline, Orlikowski and Baroudi (1991) shed some light on the major philosophical assumptions present in IS research. The authors found that 96.8% of articles published in Information Systems Research utilized positivist methodologies. Since many IS researchers remain in the positivist tradition (Nandhakumar and Jones 1997), gender therefore may have been narrowly investigated as just a dichotomous variable. In a similar vein, Adam (2002; p.60) states:

*“Given that at least part of the genealogy of IS lies in the social sciences it is not so easy to see why gender as an explanatory category... should be so poorly represented.”*

For practitioners, gender differences are of utmost concern. Gary Beach, Publisher Emeritus at CIO, expressed his unease about the IT workforce gender gap, which, if narrowed, will encourage broader perspectives and higher levels of innovation. Similarly, Brian Fonseca, a journalist at Computerworld, attributed the high number of women leaving the IS/IT field, in part due to a male dominated IT culture. Indeed, a better understanding of gender differences could motivate IS/IT practitioners to reflect on gender-based issues present in their own workplace or perhaps inspire them to incorporate findings into their own product and/or website designs.

Therefore, our objectives of this initial briefing are to:

- Summarize and categorize the existing IS literature on gender differences.
- Provide direction for researchers interested in investigating gender differences.
- Present relevant insight to practitioners regarding gender differences.

In this article, we aggregate and review academic, crossover, and practitioner based IS literature that focuses on gender effects and gender differences. In doing so, we hope to provide a baseline of current and prior research, to shape future research in gender differences, and to provide practitioners with a further insight into an important topic. Our interest lies in papers that regard gender differences as essential. While more detailed explication of our search process follows, using the keyword “gender” we searched through 11 Information Systems journals, four crossover journals, and two practitioner outlets for articles that contained “gender” in the title and/or abstract. While the search term gender differences was not specifically utilized, the literature search revealed only articles (N = 44) that were amply concerned with gender differences. Plausibly in an attempt to explain other phenomenon, prior research focuses gender research on one sub-category, gender differences.

The paper proceeds as follows. In the next section, we discuss our methodology, which includes journal selection, the search for relevant articles, and coding procedures. Next, a detailed analysis of the results is presented. A discussion of the findings is provided followed by recommendations for both researchers and practitioners. The paper closes with a summary and conclusion.

## RESEARCH METHOD

The purpose of this manuscript was to review the IS literature that investigates gender effects in information systems contexts. The inductive categorization method (Dubé and Paré 2003), was utilized and provided an empirical guide to reviewing the gender focused IS literature. In the following subsections, we discuss how we (1) selected publication outlets, (2) searched for relevant articles, (3) categorized the articles, and (4) analyzed the categorized articles.

### Selection of Publication Outlets

Outlet selection was undertaken with careful consideration and utilized three categories: academic, crossover, and practitioner. The recent IS journal rankings literature (Adams and Johnson 2008; Rainer Jr and Miller 2005) was utilized to guide the determination of the academic journals to be reviewed. Moreover, in 2007, the members of Senior Scholars Consortium listed a basket of six journals, plus the Journal of Strategic Information Systems and the Journal of Information Technology, both of which are considered to publish high quality research. Next we added three other journals also of high quality. In addition, we included four “crossover” publication outlets which lie at the intersection between academia and practice. For completeness, we considered practitioner outlets with a high number of subscribers and that publish articles that provide relevant insight to industry professionals. Thus, the final list of selected journals is as follows:

Academic Outlets (26 Total Manuscripts)	Crossover Outlets (12 Total Manuscripts)	Practitioner Outlets (6 total Manuscripts)
Decision Support Systems (DSS) - 2 European Journal of IS (EJIS) - 6 Information & Management (I&M) - 2 International Journal of E-Commerce (IJECE) - 1 Information Systems Research (ISR) - 1 Information Systems Journal (ISJ) - 2 Journal of Information Technology (JIT) - 3 Journal of Management IS (JMIS) - 3 Journal of Strategic Information Systems (JSIS) - 0 Journal of the Association for IS (JAIS) - 0 MIS Quarterly (MISQ) - 6	Communications of the ACM (CACM) - 8  Communications of the Association for Information Systems (CAIS) - 4  IEEE Software (IEEE.com) - 0  MIS Quarterly Executive (MISQE)- 0	CIO Magazine (CIO.com) - 2  Computerworld Magazine (CW - ComputerWorld.com) - 4

Table 1. Journal List

### Searching Relevant Articles

First, keywords were identified to yield papers with an exclusive focus on gender and gender differences. These keywords included *gender*, *sex*, *male*, *female*, *man*, *woman*, *men*, *women*, *boy*, *girl*, *boys* and *girls*. The specific term “gender differences” was not utilized as a search term. Next, we searched each outlet for articles using all the identified keywords in both in article titles, abstracts, and keyword sections. In addition, we did not restrict our search to a specific time period, and we tried to find all the available articles across different outlets. To do so, we searched the EBSCO Business Source Complete and Google Scholar academic databases. We retrieved all the articles based on the aforementioned search terms. Next, we evaluated all articles to ensure that they were in fact gender-focused IS research. One article was an obvious false match, and thus omitted. Interestingly, all manuscripts identified were focused on investigating and reporting gender differences, across many contexts.

After performing careful search and examination, a total of 44 papers were identified, including 26 Academic, 12 Crossover, and 6 Practitioner. Table 1 lists the number of papers found in each outlet.

In sum, academic, crossover, and practitioner outlets provided the sampling population for our literature review on gender research. Eleven IS journals, four crossover journals, and two practitioner outlets channeled our search, which revealed a total of 44 articles ( $N = 44$ ) amply concerned with gender differences. Next, we dive deeper into our search results by analyzing and categorizing each article.

## ANALYSIS AND RECOMMENDATION

### Article categorization

To ensure that we classified the articles correctly, the articles were initially categorized separately by the first author. Afterwards, the articles were cross-referenced by the remaining authors, who finalized the categorization scheme by placing each of the 44 papers into suitable categories (clusters). Some of the articles were rich and in-depth, therefore multiple categories were allowed for each article. Therefore we decided that an article can be filed under a Main Category (e.g., Behavioral), and subsequently be placed into the subcategories of IT Usage and Adoption/Post-Adoption (e.g., Ahuja and Thatcher 2005), so that the content can best analyzed. However, this assignment to multiple sub-categories only applied to a few papers. The use of sub-categories allowed the articles to be investigated at a deep level of analysis.

Four main categories emerged: 1) Prescriptive/Guidance, 2) IT workforce, 3) Behavioral, and 4) Education. Each main category also has at least one sub-category (see Table 2). Notable papers for each research category are identified. Table 2 provides details of the categorization.

1) Prescriptive/guidance papers were written to inform researchers about uncultivated, *theoretical* approaches to gender research, and to steer subsequent research in that direction (e.g., Adam 2002; Howcroft et al. 2008)

2) Articles about the IT workforce are concerned with gender issues in the workplace. The subcategories if IT workforce are *career advancement* (e.g., Baroudi et al. 1994; Igarria et al. 1995; Truman et al. 1994) *diversity* (Lamp 2007), and *general characteristics of workers and their environment* (i.e., Reid, Allen, Armstrong, and Riemenschneider 2010; Trauth, Quesenberry, and Huang 2009).

3) Gender-based behavioral research explores how gender differences affect *perceptions* of information technology (IT) (e.g., Gattiker and Kelley 1999; Gefen et al. 1997; Reid et al. 2010), individual's *decision-making* processes (e.g., Djasasbi and Loiacono 2008; Hess, Fuller and Mathew 2006), *IT adoption/post-adoption* (e.g., Awad and Ragowsky 2008; Venkatesh et al. 2000) and *IT usage* (e.g., Dattero and Galup 2004; Fedorowicz, Vilovsky and Golibersuch 2010).

4) Education-focused articles represent those written about a school setting and explored issues related to *students* (e.g., Heinze and Hu 2009) and *pedagogical* matters (e.g., Lang, Meyer, Niner, McKay, and Lewis 2009).

Main Category	Sub-category	Description
Prescriptive /guidance	Theory	Introduces a theory that could be used to research gender differences in different contexts
IT workforce	Career advancement	Gender differences in factors that contribute to career development, such as salary and promotion in IT positions or IT industries
	Diversity	Gender differences in the diversity of IT positions or in IT industries
	Multiple /General	Gender differences in general characteristics of IT workers and IT work environments. Research includes work/life balance, work roles, and identity.
Behavioral	IT Usage	Gender differences in the usage of related computer skills and information technologies
	Perceptions	Gender differences in the perceptions of IT related behavior and technologies
	(Post) Adoption	Gender differences in adoption and post-adoption of IT technologies
	Decision making	Gender differences in decision-making processes and choices related to IT topics
Education	Students	Gender differences of students in IT settings
	Pedagogical	Gender differences in teaching styles of IT

**Table 2. Gender Differences Topic Classification Scheme**

Next, we analyzed the data to identify trends of the gender-focused research. Analysis included examining the distribution over time by focusing on journal type, publication outlet, and category topics based on the search results (44 articles) and categorization scheme (4 categories) defined above.

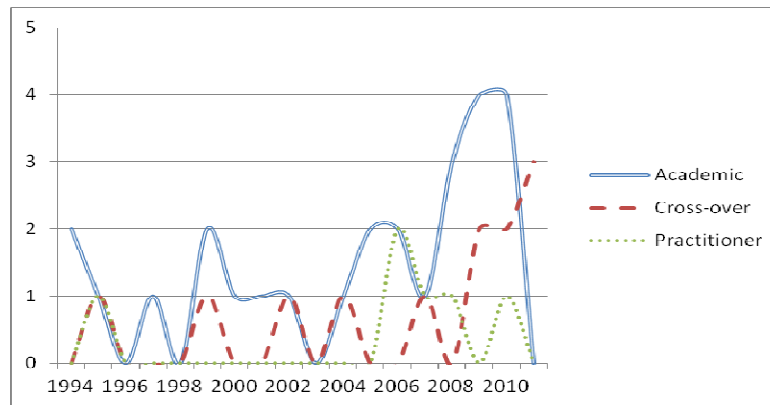
### Analysis of Distribution and Trends

#### *Analysis of distribution of published articles over time by journal type*

To examine the trend of *publication activity over time by journal type*, we separate the articles published in each journal type by year of publication, as shown in Table 3. Results indicate that the earliest articles matching our criteria were published in

1994 (Baroudi et al. 1994; Truman et al. 1994), both of which are academic papers. Gender difference topics first emerged in crossover and practitioner outlets a year later in 1995. Since then, gender difference research has gained minimal attention in the IS literature, as noted by the small number of articles published each year. In 1996, 1998, and 2004 there were no papers published in the journals reviewed. Interestingly, 2009 and 2010 showed a sharp increase in popularity, with six papers published in 2009 and seven papers in 2010. However in 2011 this activity abated with only three articles published.

To give a comprehensive view of *publication history* and to compare across the three types of outlets, we provide a graphical representation of distributions over time (Figure 1). Comparing the research popularity across different type of journals over time, academic outlets have experienced the most activity, with a peak in 2009 and 2010. Conversely, practitioner outlets have the least activity.



**Figure 1. Distribution of Articles Overtime Across Journal Types**

#### *Analysis of distribution over time by publication outlet*

To examine the trend of *publication activity in outlets over time*, we separate the articles by outlet and year of publication, as shown in Table 3. The earliest two papers were published in *JMIS* and *MISQ* in 1994, both of which introduce the topic to IS literature. Moreover, Table 3 reveals that *EJIS* and *MISQ* are the journals that have taken the lead to publish gender focused research most often. *CACM* has the most research popularity in crossover outlets and is the only outlet that published gender difference articles in 2011 (3 papers).

	Outlet	Number of Articles Over Time															
		1994	1995	1997	1999	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010	2011	Total
Academic	DSS	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
	EJIS	0	0	0	1	0	0	0	0	0	2	0	0	2	1	0	6
	I&M	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
	ISR	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	ISJ	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2
	JIT	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	3
	JMIS	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	3
	MISQ	1	1	1	0	1	0	0	0	1	0	0	0	0	1	0	6
	IJEE	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Subtotal		2	1	1	2	1	1	1	1	2	2	1	3	4	4	0	26
Crossover	CACM	0	1	0	1	0	0	1	1	0	0	0	0	1	0	3	8
	CAIS	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	4
Subtotal		0	1	0	1	0	0	1	1	0	0	1	0	2	2	3	12
Practitioner	CIO	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2
	CW	0	1	0	0	0	0	0	0	0	2	1	0	0	0	0	4
Subtotal		0	1	0	0	0	0	0	0	0	2	1	1	0	1	0	6
Total		2	3	1	3	1	1	2	2	2	4	3	4	6	7	3	44

Table 3. Distribution of articles overtime by publication outlet

*Analysis of categories over time*

To examine the trend of categories activity over time, we illustrate the year-by-year trends in various categories and sub-categories for all the articles (Table 4). A few quite in-depth articles covered more than 1 subcategory and were recorded twice. Therefore the 44 total manuscripts grew to 50 when allowing for sub-categories. The years that carried no publications are not shown (e.g., 1996, 1998, 2003). Table 4 identifies that gender difference research began in 1994 with two papers, which are categorized as career advancement. Table 4 also reports that the IT Workforce and Behavioral categories have received far more attention than the other two categories. Indeed, publications in the IT Workforce category peaked in 2006 at 5. Likewise, research in the Behavioral category peaked at five articles in 2010, however dropped to one publication the following year. The other two main categories – Prescriptive/guidance and Education – only claim a total of three articles respectively.

Examining further the IT Workforce category, we can see that the *multiple/general* subcategory has received greater focus than the other two sub-categories, but has only seen one or two papers, if any, published each year. In the Behavior category, all the sub-categories seemed to receive equal efforts with the exception of *decision-making*, which only saw 3 publications.

Category	Number of Articles Over Time															
	1994	1995	1997	1999	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010	2011	Total
<b>Prescriptive/ guidance</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>
Theory	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	3
<b>IT Workforce</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>22</b>
Career advancement	2	2	0	0	0	0	0	0	0	2	0	0	0	0	0	6
Diversity	0	0	0	0	0	0	0	0	0	1	1	0	1	1	2	6
Multiple /general	0	1	0	1	0	1	0	0	0	2	2	1	1	1	0	10
<b>Behavior</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>22</b>
IT Usage	0	0	1	0	0	0	0	1	1	0	0	0	1	1	1	6
Perceptions	0	0	1	1	0	0	1	0	0	0	0	0	1	2	0	6
Adoption /post-adoption	0	0	1	0	1	0	0	0	1	0	0	1	1	2	0	7
Decision making	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	3
<b>Education</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>3</b>
Students	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
Pedagogical	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<b>Total</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>8</b>	<b>7</b>	<b>3</b>	<b>50</b>

Table 4. Distribution of Topics Over Time

To better compare publications of categories over time, we provide a graph view of the results, as shown in Figure 2.

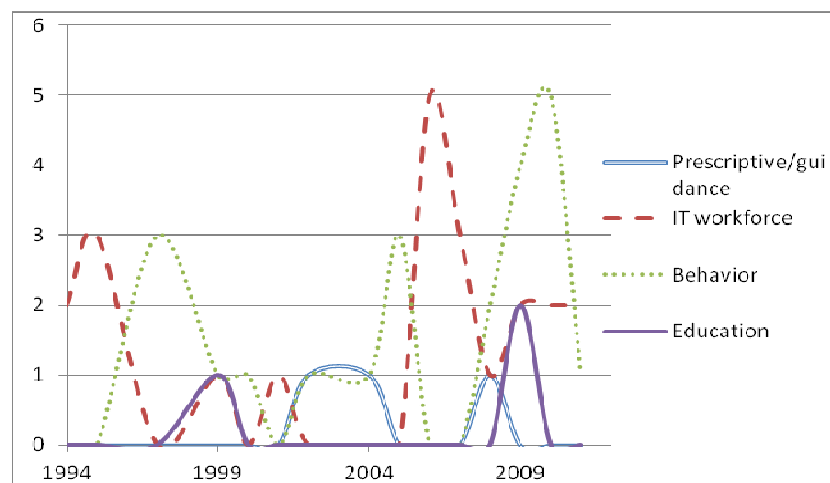


Figure 2. Distributions of Articles Overtime by Category



Easily, we find that IT Workforce and Behavior have the highest research activity among the categories. The Behavior category seems to have various spurts of activity, with the highest in 2009 and 2010. Moreover, research on gender differences in behavior increased from 2007 until 2010, but declined in 2011. The mid-1990s and mid-2000s were the most productive years in the IT Workforce category. Prescriptive/guidance articles were published, 2002, and 2004 and in 2008. Like Prescriptive/guidance, Education experienced limited activity – one article in 1999 and one in 2009. Still, only three articles have been published in either category for the 1994-2011 timeframe.

#### *Analysis of distribution of topics by subcategory and journal type*

In this analysis, we examine the distribution of topics by subcategory and combine them with the three types of outlets. This will provide a comprehensive understanding of topic activities and will compare the topics that were investigated in each journal type. Table 5 displays the bulk of these comparisons. Categories are arranged down the left most column, and are organized by Main Category. Article counts and percentages are then listed, including the percentages of articles in each category and the percentage of total articles in all main categories.

Category	Subcategory			Academic		Crossover		Practitioner	
	Count	% of Category	% of Total	Count	% of Category	Count	% of Category	Count	% of Category
<b>Perspective/guidance</b>									
Theory	3	100%	6.0%	3	100%	0	0.0%	0	0.0%
<b>Sub-total</b>	<b>3</b>	<b>100%</b>	<b>6.0%</b>	<b>3</b>	<b>100%</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>	<b>0.0%</b>
<b>IT workforce</b>									
Career advancement	6	27.3%	12.0%	3	13.6%	1	4.5%	2	9.1%
Diversity	6	27.3%	12.0%	0	0.0%	4	18.2%	2	9.1%
Multiple/general	10	45.5%	20.0%	7	31.8%	0	0.0%	3	13.6%
<b>Sub-total</b>	<b>22</b>	<b>100%</b>	<b>44.0%</b>	<b>10</b>	<b>45.5%</b>	<b>5</b>	<b>22.7%</b>	<b>7</b>	<b>31.8%</b>
<b>Behavior</b>									
IT Usage	6	27.3%	12.0%	3	13.6%	3	13.6%	0	0.0%
Perceptions	6	27.3%	12.0%	5	22.7%	1	4.5%	0	0.0%
Adoption/Post-adoption	7	31.8%	14.0%	6	27.3%	1	4.5%	0	0.0%
Decision making	3	13.6%	6.0%	3	13.6%	0	0.0%	0	0.0%
<b>Sub-total</b>	<b>22</b>	<b>100%</b>	<b>44.0%</b>	<b>17</b>	<b>77.3%</b>	<b>5</b>	<b>22.7%</b>	<b>0</b>	<b>0.0%</b>
<b>Education</b>									
Students	2	66.7%	4.0%	1	33.3%	1	33.3%	0	0.0%
Pedagogical	1	33.3%	2.0%	0	0.0%	1	33.3%	0	0.0%
<b>Sub-total</b>	<b>3</b>	<b>100%</b>	<b>6.0%</b>	<b>1</b>	<b>33.3%</b>	<b>2</b>	<b>66.7%</b>	<b>0</b>	<b>0.0%</b>
<b>Total</b>	<b>50</b>		<b>100%</b>	<b>31</b>	<b>62.0%</b>	<b>12</b>	<b>24.0%</b>	<b>7</b>	<b>14.0%</b>

**Table 5. Distribution of topics by subcategory and Journal type**

#### **Analysis by Main Category**

As shown in Table 5, the IT Workforce (44% of all published articles in the sample) and Behavior categories (also 44% of all published articles in the sample) account for the overwhelming majority (88%) of the published gender focused research in

the publication sample. The other two categories (Prescriptive/guidance and Education) account for 6% in each category, totaling 12% (of all published articles in the sample). This indicates a historically unbalanced activity of research. These under researched categories then can be viewed as underserved research areas, or topics that the editorial boards of the selected journals were deemed less important than other submissions.

When comparing each publication across different types of journals, Table 5 reveals that academic publications account for 62% of all the publications. This finding implies that academic outlets have published gender-focused research much more than crossover and/or practitioner outlets. This also holds true for each individual category except Education, which, surprisingly, seems to be published more often in crossover outlets. This suggests that IS-based academic researchers have taken the lead in studying the role and effects of gender in IS/IT contexts. This also suggests a greater need for practitioners to investigate and publish their findings and reasonings for gender based issues and gender differences across a wide variety of contexts. However, it should be noted that in our search efforts, we primarily focused on academic outlets ( $N=11$ ) and only included two practitioner-focused and four crossover outlets. Also, it is interesting to note that academic journals accounted for 77.3% of publications in the Behavioral category, while practitioners should be most interested in the behavioral issues of IS usage such as widespread adoption and effective, deep and continued usage of information systems.

### Analysis by Sub-category

An examination of the articles by subcategories uncovers that the multiple/general subcategory of IT workforce has received greater focus than all other subcategories, and accounts for 20% of the total subcategories. Adoption/Post-adoption is second with 14%, and career advancement, diversity, IT usage, and perceptions follow with 12% respectively.

In the IT Workforce category, almost half of the total subcategories (45.5%) are categorized into multiple/general. Career advancement and diversity trail with 27.3% respectively. Again, academic outlets have the highest percentage (45.5%) in all the sub-categories, with practitioner second (31.8%) and crossover third (22.7%). Moreover, it is interesting to note that seven of the ten multiple/general papers are published in academic journals, and that zero papers on gender differences in the diversity of IT positions or in IT industries are published in academic journals.

In the Behavioral category, three subcategories have nearly received equal focus with 31.8% (Adoption/Post-Adoption), 27.3% (IT Usage) and 27.3% (Perceptions). Decision-making encompasses 13.6% of the articles and thus represents the smallest category. When comparing different journal types, we find that academic journals account for 77.3% of all the Behavioral sub-categories, while 22.7% reside in crossover journals. Interestingly, no behavioral publications are found in the sampled practitioner magazines.

Three total papers were published in the Education category and were grouped into two sub-categories: students and pedagogical. The Students subcategory accounted for 66.7% of the Education category, while the Pedagogical publication comprised the remaining 33.3%. The assessment across journal types yields one paper published in an academic outlet and the other two published in crossover ones. Like Behavioral based research, gender-focused Educational research was not been published in the sampled practitioner outlets.

Theory, the single subcategory of Prescription/guidance, yielded three publications. Not surprisingly, these articles were published solely in academic outlets.

In sum, we find that academic outlets comprised articles that span the four main categories. Moreover, academic articles seem to have a vested interest in behavioral issues, with 'adoption/post-adoption' representing the highest subcategory count. This may be an artifact of the popularity of TAM research (Davis 1989). Crossover outlets tend to focus on IT workforce and Behavior, with specific interests in diversity and IT usage. Most notably, practitioner articles are only present in IT Workforce, with almost equal efforts across the three sub-categories. Discussions of these results are given in the next section, as are recommendations for researchers and practitioners.

### DISCUSSION AND RECOMMENDATIONS

The preceding analyses provide ample evidence for the following claims. First, the results show that a bulk of gender research has not considered areas involving the IT Artifact. In over 18 years, only 44 papers were published in the academic, crossover, and practitioner literature (of the sample). The majority of the identified gender-based research were fixated on IS in the workplace and on behaviors related to technology usage. If one bases one's IS research criterion on investigating phenomena that includes the IT artifact (Benbasat and Zmud 2003), then much of the IT workforce literature may be classified as 'errors of exclusion' research. In this vein, we recommend that gender difference-focused researchers more closely attend to issues related to the IT artifact (i.e., the actual systems being designed, developed, and used). For example,

if examining the IT workforce, one could inquire into how male and female managerial styles differ in influencing the design of a system, or more closely examine gender differences in usage. Therefore we recommend:

*Recommendation 1: Gender-based research should focus on gender differences related to the IT Artifact.*

The second issue discovered by these analyses is that IS researchers are not following the example of practitioners. This can be viewed both as IS researchers taking the lead to investigate a difficult to isolate phenomenon with a variety of lenses. This finding may also be a result of our limited publication sample size. As indicated by our analysis, the only category practitioners demonstrated interest in was IT workforce, not design, usage or education. It may be helpful to the ultimate audience for the IS researcher (practitioners), for the academic-oriented researchers to “look to practice to identify research topics and look to IS literature only after a commitment has been made to a specific topic” (Benbasat and Zmud 1999; p.8). This good advice can help to ensure research has relevance, however it was difficult to identify any practitioner journals that addressed gender based differences. Perhaps then in order to inform and support industry, academicians should place greater emphasis on gender-issues that affect IT workforce. Therefore, we recommend:

*Recommendation 2: Researchers should seek to increase the quantity of gender-focused IT workforce publications*

The research team also recognizes the flipside of recommendation #2– that practitioners should team with academicians to publish research results in a variety of outlets. This mutual research-focused relationship will ultimately benefit practitioners. Academicians are encouraged to carry-out gender-based research in collaboration with specific companies or consortiums, then to publish the findings (or a portion of them). Similarly practitioners are encouraged to include academicians on industry focused research, so that the larger research community can learn from practitioner-driven research and more quickly advance the understanding of gender variance in different important contexts.

*Recommendation 3: Practitioners should collaborate with academicians on gender-based research*

Fourth, our analysis shows that there are a total of seven publications in practitioner outlets, all of which are categorized in IT Workforce. This indicates that practitioners have only reported on gender differences in the industry, an act that highlights the differences between practitioners and academics. For this reason, we recommend that practitioners identify different topics related to gender differences. It is likely that gender focused IT design and usage custom research has been conducted in industry, however not packaged and published for public consumption.

Another contributing factor to the limited amount of practitioner-based gender research may be due to emerging western culture of equality between the sexes. The majority of the 44 research articles were conducted by western researchers involved western subjects. In the western culture the prevailing (perhaps feminist movement inspired) mindset is one of gender equality in knowledge-based work settings. That is, that the genders vary little, are equally capable and behave similarly. As a result, gender does not matter. Perhaps the notion of testing for gender variances may seem offensive to some. The outcome of this potential subconscious stance may be the suppression of the motivation to identify and understand a perhaps ‘taboo’ topic such as the search and testing of gender variances.

*Recommendation 4: Practitioners should be open to more topics about gender differences.*

Fifth, we find that there is a lack of research in the Prescriptive/guidance category. However, the articles found in this category (Adam 2002; Howcroft and Trauth 2008; Wilson M. 2004) include those meant to guide future research in order to promote a more diverse research stream. Accordingly, we recommend that researchers should incorporate or propose a diverse set of theoretical perspectives in their research. Moreover, we encourage the use of multiple paradigmatic schools-of-thought. Therefore we recommend:

*Recommendation 5: Gender-focused researchers should employ a diverse set of theoretical perspectives involving more than one paradigm.*

Sixth, the Education and Prescriptive/guidance categories were largely underrepresented. This is not surprising given that IT workforce and Behavior were the initial categories explored by notable IS researchers, who we expect many others to follow. Indeed, we acknowledge this gap as an opportunity to discover underdeveloped phenomena. Specifically, we encourage IS researchers to utilize the under-researched category of Education. For example, researchers could investigate gender differences in online learning styles of students, who, in this sense, we consider ‘practitioners,’ and thus follows our second recommendation. Based on the above discussion, we recommend:

*Recommendation 6: Researchers should focus on the least explored areas of research.*

## CONCLUSION

In this initial paper, we reviewed the published academic, crossover, and practitioner IS literature that investigates gender influences. Our goal was to identify the current state of gender research in information systems. In doing so, we identified four categories of gender research. We found that a majority of gender research is conducted in two research streams (IT Workforce and Behavioral outcomes). Based on our analysis, we have provided academics and practitioners with recommendations that hopefully can aid future research efforts. Like all research, our paper has some limitations. First, we narrowed our search to only include journal (not conference) papers. Second, our analysis lacks depth, as subcategories need to be further examined. Future research will expand the search parameters and conduct a more in-depth analysis. Research into the influence of gender and resultant gender-based differences related to IT phenomenon remains in its infancy.

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