Does gender play a role in the acceptance of e-textbooks by students?

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ABSTRACT

Research into the adoption and satisfaction level of academic electronic textbooks (e-textbooks) by students continues to proliferate as e-textbooks become more commonplace. To date this research has indicated that either students prefer print textbooks to e-textbooks or the results are inconclusive. Prior research on the overall acceptance of technology suggested that females are significantly less interested and less accepting of technology as compared to males. Would this continue to be true regarding e-textbooks? In this study a survey of the use and satisfaction with e-textbooks was administered to a group of 250 male and female undergraduate students who had used e-textbooks in one or more of their courses at a regionally accredited Mid-South university. The results of this study indicate there is a significant difference between genders in the likelihood of a student to select an e-textbook over a printed textbook in a future class: males are more likely to choose e-textbooks than females. Yet there were no significant differences between females and males regarding satisfaction, usefulness, and ease of use. However, female students made more extensive use of the interactive features of an e-textbook than did male students. This suggests that both publishers and faculty should clearly demonstrate how to use the different features of an e-textbook in order to increase student acceptance.

Keywords: e-textbooks, gender, acceptance, student satisfaction

INTRODUCTION

The use of academic electronic textbooks (e-textbooks) continues to grow across schools at all levels and of all sizes. Yet students have not always demonstrated a high level of excitement about e-textbooks. How do different populations of students use and perceive e-textbooks? Can the acceptance or rejection of e-textbooks be attributed to different groups? Is there one population of students who find e-textbooks more beneficial and desirable? Are those who use the unique features of an e-textbook more likely to be satisfied with it?

This study examines the role that gender plays in a student's adoption of e-textbooks. By surveying students at a regionally accredited Mid-South university who had prior experience using e-textbooks, this study specifically seeks to determine if gender impacts a student's satisfaction and perception of usefulness with e-textbooks, as well as, his/her reuse of e-textbooks in future classes.

LITERATURE REVIEW

Technology Adoption Models

The reasons why users either embrace or shun new technologies has been widely studied. One body of research, by Huff and Munro (1989), Lind and Zmud (1991), and Zmud (1982) among others has examined the social, organizational, environmental, and technology factors that influence technology adoption. Kwon and Zmud (1987) identified five major forces: individual factors, structural factors, technological factors, task-related factors, and environmental factors.

Long (1999) stated that one dimension of research focuses on the organization as the innovating entity while the other explores the individual as the innovator. Rogers (2003) researched the organizational factors that influence adoption. He called this "diffusion" and defined it as the process by which an innovation is communicated through certain channels over time among the members of a social system. Surry (1997) said that diffusion research, in its simplest form, investigates how major factors interact to facilitate or impede the adoption of a specific product or practice among members of a particular adopter group. Rogers' (2003) definition included four elements that are present in the diffusion of innovation process. They are innovation, or the idea, practices, or objects that that are perceived as new by an individual or other unit of adoption; communication channels, which are the means by which the messages are sent and received from one individual to another; time, defined as the time involved in the diffusion process, including innovation-decision process time, the relative time with which an innovation is adopted by an individual or group, and the time of the innovation's rate of adoption; and social system, or the set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

The Theory of Reasoned Action (TRA) was formulated by Ajzen and Fishbein (1980) as they tried to estimate the discrepancy between behavior and attitude. TRA defines the relationships among behavior, beliefs, attitudes, norms, and intentions. In terms of technology adoption the use or rejection of new innovations is determined by the individual's intention to perform the behavior, and this behavior is then influenced by the person's attitude and subjective norm. TRA suggests that attitudes toward a behavior are determined by the beliefs about the consequences of that behavior (Mathieson, 1991).

When behavior appeared to be completely involuntary and not under control, Ajzen (1988) then proposed the Theory of Planned Behavior (TpB) which attempted to predict deliberate behavior. According to TpB, human action is guided by three elements: behavioral beliefs, which are beliefs about the likely consequences of the behavior; normative beliefs, which are beliefs about the expectations of others; and control beliefs, or beliefs about the presence of factors that may facilitate or impede performance of the behavior. TpB, which has been used in a variety of industries including the travel industry, advertising, and value-based management, demonstrates that increasing knowledge alone does not help to significantly change behavior. Rather, the organization attempts to convince individuals to change their intention to change by giving attention to the consequences of their behavior, the expectations of others, and their perception of their performance. TpB can be used to examine how diversity impacts IT acceptance. Diversity refers to differences in demographic attributes such as race, ethnicity, gender, age, or sexual orientation. Another way to look at differences is that there are differences in kind (innate differences such as gender or race) or differences in degree, such as economic status (Sofo, 2000).

An extension of TRA-TpB is the technology acceptance model (TAM), which provides a means by which to examine how individuals perceive new technology. A benefit of TAM is that it can provide a framework to investigate the effects of external variables, such as age or gender. TAM predicts that user acceptance of any technology is determined by two factors: perceived usefulness and perceived ease of use. Perceived usefulness is defined as the extent to which a person believes that using the system will enhance their job performance, while perceived ease of use is the extent to which a person believes that using the system will be free of effort (Hong, Thong, Wong, & Tam, 2002).

According to Gefen and Straub (1997) two important elements that have received little attention in the context of TAM are social influence and gender. These may be critical to understanding user acceptance since they have the potential to play a key role in determining how users make their decisions about adopting and using new technologies, and even beyond areas of technology (Venkatesh & Morris, 2000).

Reasons Why Female Technology Acceptance Is Low

Research has consistently shown that females' acceptance of technology is lower than that of males. Females have been negatively associated with technology acceptance and are likely to be more anxious about technology than men (Jehn, Northcraft, & Neale, 1999). Studies of gender and motivation found that females had lower expectations for success, even underestimating their abilities in vague circumstances. While in developed countries this trend has shown some moderation, in developing countries where women are likely to have fewer chances to adopt and use new technologies. Nash and Moroz (1997) note that older females were less likely than younger women to be afraid of computers, while older men were more likely than younger men to be afraid. There are at least seven different reasons provided by researchers as reasons for this low acceptance rate of technology by females.

First, females' lack of participation has been attributed to school curriculum content that is biased toward males' interests (Sanders, Koch, & Urso, 1997). This is one of the key problems confronting educators in the SMET disciplines (science, mathematics, engineering, and technology), as there is a disproportionate lack of involvement of females (Weber & Custer, 2005). Given the historically disproportionate involvement of males in industrial arts and

technology education, male perspectives and interests tend to pervade the technology education curriculum (Welty, 1996). Technology has typically been viewed as a masculine topic: boys tend to be socialized towards an affinity for technology, whereas girls have been directed towards the use of technology (Bush, Henle, Cohen, Jenkins, & Kossy, 2002). A study of the interest patterns of middle school students found that socially relevant topics were more appealing to girls, in contrast to boys who were more interested in how things work. In addition, girls were more interested in topics related to the environment, people, and the application of this knowledge to social conditions than were males (Shroyer, Backe, & Powell, 1995).

Eccles (1987) noted that "student, teacher, and parental attitudes discourage girls from pursuing science and math despite the fact that females, in general, get better grades in math and science than males" (p. 30). Li (1999) observed that the math capabilities of male students were frequently overrated and girls' abilities were underrated by their teachers. Whereas female students may be encouraged to explore creative interests through the use of technology, males were encouraged to take risks and discover how technology works. From a very early age, females have been taught to be passive users of technology, not creators and controllers of technology. This lack of encouragement discourages females from considering careers in information technology.

These expectations have been slow to change in the primary grades since the vast majority of elementary school teachers that have not been adequately trained in not only the instructional use of technology, but also in addressing the differences in how male and female students learn technology (Barker & Aspray, 2006). Researchers (Shroyer, Backe & Powell, 1995) have also attributed females' lack of interest to pedagogical approaches as well (Shroyer, Backe, & Powell, 1995).

Second, there is culturally-grounded gender stereotyping that impacts a female's decision on the adoption of technology. In a wide variety of ways different elements of society--the media, peers, and adults--communicate and reinforce gender-based stereotypes (Martin, Eisenbud, & Rose, 1995). For example, toys have a powerful influence on what children perceive as appropriate for boys and girls. Toys designed for boys tend to be highly manipulative or electronic whereas girls' toys are less likely to be manipulative or have interchangeable parts (Sanders, 1997). Girls' toys, such as dolls, also tend to feature interpersonal interaction that encourages the development of social skills and relationships (Caleb, 2000). Girls who are not exposed to toys that encourage scientific, mathematical or technological thinking are less likely to develop an interest in related subject areas at school (Sanders, Koch, & Urso, 1997). Additionally, fathers were more likely to engage their sons in activities that involved experimenting with computers than they were with daughters (Barker & Aspray, 2006). This has a substantial influence from an early age on a child's self-concepts (Witts, 1997) and impacts how females view technology.

Third, overall female interests may play a role in their decision-making regarding technology. Chapman (2000), Fiore (1999), Rosser (1985) and others note that females prefer collaboration over competition. Females' interest in technology increases if the computer is used as a tool to create something like a multimedia presentation, but not if the focus is on learning how to program computers (Brunner & Bennett, 1998). A study by Weber and Custer (2005) examined 348 middle school students and 311 high school students who were enrolled in middle school and exploratory level high school technology education classes in Wisconsin to identify activities that appeal and do not appeal to males and females. The top five activities rated interesting by females generally focused in the areas of communication or design. Females were

interested in activities that support and facilitate communication and which are of social relevance (Weber & Custer, 2005). This is consistent with research indicating that females are interested in technology topics that are socially relevant (Caleb, 2000).

Fourth, gender roles can impact decisions about adopting new technology. Venkatesh et al. (2003) researched performance expectancy and found that task-oriented accomplishment was more prominent towards men and found this to stem from gender roles and socialization. This is consistent with other studies by Bem (1981), Bem and Allen (1974), Motowidlo (1982), Kirchmeyer (1997), Lubinski et al. (1983), and Lynott and McCandless (2000). Barnett and Marshall (1981) noted that women experience change more and accept change more readily, perhaps because women tend to be more sensitive to others' opinions and thus are more salient when forming an intention to use new technology (Miller, 1976).

Fifth, stereotyping has proven to be a disincentive for females. The negative stereotypes of individuals who work in information technology are stereotyped into popular culture and fueled by characters in movies, sitcoms and children's programming. Barker and Aspray (2006) analyzed television and magazine advertisements and have noted that they have been shown to support stereotypes: media frequently portrays females as the helpless users of technology, while the males are presented as technological intellectuals rescuing the damsels in distress. The image of the "computer nerd" or "computer geek" may turn females away from pursuing degrees and careers in information technology, according to Bush et al. (2002) and Kekelis et al. (2005).

Sixth, the perception of the IT workplace has proven to be a barrier for females to more readily embrace technology. Kekelis et al. (2005) found that females anticipated that IT work would be boring since it would entail looking at a computer screen all day in a little cubicle. Females were also put off by the perception that IT work requires long hours at the office and would interfere with family aspirations or obligations (Bush, Henle, Cohen, Jenkins, & Kossy, 2002). Even for some female IT professionals, there was the fear that if they leave work early, or even on time, that they would be negatively branded as "Mommy" (Nobel, 2007). In many economic sectors in order to be successful in IT one has to prove his or her "professional fortitude" and command respect from peers and management by successfully completing a major project. In addition to the difficulty of the task, the women interviewed by Nobel noted that these projects typically occurred during the times of their lives that they were starting or had young families (2007). Because the burden of child care that is placed on females it has proven to be a disincentive for pursuing a career in IT and diminished the interest in technology.

Seventh, gaming has also been identified as a factor that deters females from involvement in technology (Barker & Aspray, 2006). Traditionally, computer games have been designed and marketed for males, with competitiveness and violence as a mainstay. The socialized affinity boys have towards such characteristics has drawn males into gaming while turning away females. Although by itself this does not serve as a barrier to using technology being actively involved in computer gaming increases the likelihood that the person will learn about the technology on which game is being played (Tillberg & Cohoon, 2005). Active computer gamers are likely to engage in research into the computer components that will enhance their gaming experience. With a low proportion of females engaged in computer gaming, their experiences and comfort with technology are likely to lag behind those of males.

E-Textbooks

The popularity of consumer-based electronic books (e-books) that are read on e-readers such as the Kindle and Nook continues to increase. Over 21 percent of Americans read an e-book in 2011-2012, and sales of e-books in 2012 increased 188 percent over the previous year (Bradley, 2012). Conventional wisdom would suggest that in the same way consumer e-books are increasing in popularity that academic electronic textbooks (e-textbooks) will likewise be warmly embraced by today's students as a more convenient means of accessing course materials. In addition, textbook publishers who create and distribute e-textbooks will be able to reduce their costs and better compete with free textbooks and textbook rental sites, address concerns regarding book prices, and ameliorate the used textbook market.

However, the acceptance of e-textbooks by students and faculty has so far been limited (Nicholas & Lewis, 2007). A study from the National Association of College Stores indicated that a significant difference in the sales of e-textbooks compared to printed textbooks still exists. This study found that only 2-3 percent of course material sales at member stores were accounted for by e-textbooks in 2009 (National Association of College Stores, 2010), while other studies place the penetration of e-textbooks at approximately 9 percent of total textbook purchases (Abutaleb, 2012). The textbook rental organization Chegg.com has elected not to enter the e-textbook market because, according to their predictions, that market will remain small for the near future (Levi, 2012)

Researchers have looked extensively into the adoption of e-textbooks by students and faculty and their satisfaction with e-textbooks. Studies by Gregory (2008), Wilson et al., (2003), Carlock and Perry (2008) and others indicated that students prefer print textbooks to e-textbooks. Ciampa et al. (2013) examined the acceptance or rejection of e-textbooks by different groups and found that non-business students are more satisfied with an e-textbook than business majors. For non-business students, both e-textbook features and student age are significant, indicating that if a feature is used by a student then the student is more satisfied with the e-textbook and that satisfaction seems to increase with student age. Also, non-business students are more satisfied with the ease of use of the e-textbook if they have used at least one of its features. Non-business students were found to be more satisfied with the usefulness of the e-textbooks when compared to business majors. And non-business students were more likely to use an e-textbook again in the future than a business major. Although there is no significant difference between the two groups for the price they are willing to pay for an e-textbook, the non-business student on average is willing to pay a higher price for a printed textbook

Hage (2005) examined the usage level of professionals using e-book technology between genders and found that there is no difference in the usage level of professionals using e-book technology between genders. However, this study only examined responses of 374 participants on three online e-book user forums in 2005. It did not examine educational e-textbooks.

METHODOLOGY

Research Question

Prior research on the acceptance of technology suggested that females are significantly less interested in and less accepting of technology than males. The exception to these findings seems to be centered on the idea of technology for creativity and collaboration, in which case

females are likely to embrace technology. This would suggest that females are less likely to choose technologies for personal productivity than are males.

Why do females accept e-textbooks at a lower rate than males? Because males tend to use technology more regularly than females, is there is a bias towards e-textbooks by males? As females become more acclimated to technology will they use technology--and e-textbooks--more frequently? Is it unnecessary for males to have the prior exposure to technology that females may require?

This study examines potential differences across male and female students with regard to satisfaction with e-textbooks. Is the acceptance or rejection of e-textbooks gender-specific? Does one gender find e-textbooks more beneficial and desirable than the other? Using a sample from a regionally accredited Mid-South university, this study examines the differences across male and female students. The research question for this study asks if there is a difference in how male and female students perceive an e-textbook used in a college course.

This study used the following research hypotheses:

$H_0 1$ – There is no difference in the satisfaction level of male and female students using an e-textbook.

$H_1 1$ – There is a difference in the satisfaction level of male and female students using an e-textbook.

$H_0 2$ – There is no difference in the perceived level of ease of use of an e-textbook between male and female students.

$H_1 2$ – There is a difference in the perceived level of ease of use of an e-textbook between male and female students.

$H_0 3$ – There is no difference in the perceived usefulness of an e-textbook between male and female students.

$H_1 3$ – There is a difference in the perceived usefulness of an e-textbook between male and female students.

$H_0 4$ – There is no difference in the likelihood to reuse an e-textbook between male and female students.

$H_1 4$ – There is a difference in the likelihood to reuse an e-textbook between male and female students.

Data Collection

A survey consisting of questions related to the use of and satisfaction with an e-textbook was administered to a group consisting of undergraduate students at a regionally accredited Mid-South university. All students surveyed used e-textbooks in one or more of their courses. Included in the survey were 30 questions on basic demographics, the usage of the e-textbook, and satisfaction with the use of the e-textbook. A total of 250 valid responses were received. Reponses from 8 incomplete surveys were rejected.

Analysis and Results

An ANOVA test was generated on the male and female students to identify potential demographic differences in the responses between the two groups as indicated in Table 1 (Appendix). There is no significant difference in the age, the year of high school graduation, and the number of hours worked in a week between the two groups. These results indicated that

additional bias has not been introduced into the results because of significant demographic differences other than gender.

To determine support for Hypotheses 1, 2 and 3 the results of the ANOVA were examined. In addition, a linear regression was used to determine if certain facets of satisfaction played a role in general satisfaction with the e-textbook. Specifically, the correlation to general satisfaction with the e-textbook was assessed for usefulness, ease-of-use, prior use, and features.

When examining the results between male students as indicated in Table 2 (Appendix) and female students as indicated in Table 3 (Appendix), there is no significant difference in general satisfaction with the e-textbook ($H_0 1$). However, the results of the regression show that usefulness is significantly positively correlated with general satisfaction for male students, while both usefulness and satisfaction with the features of the e-textbook are significantly positively correlated with general satisfaction for the female students. Interestingly, the results revealed that male students used the search feature most frequently, followed by the ability to print. Female students also used the search feature most frequently, but the ability to highlight text was the next most popular feature. Thus, the results suggest that female students made more extensive use of the interactive features of an e-textbook than did male students.

The result of the ANOVA examining e-textbook ease of use between male students as indicated in Table 4 (Appendix) and female students as indicated in Table 5 (Appendix) indicates that there is no significant difference in the perceived level of ease of use between male and female students. Therefore, the test provides support for $H_0 2$. The results for the regression for each group showed the use of features to be significant for both male and female students. This indicates that students were more satisfied with the ease of use of the e-textbook if they used at least one of the features.

$H_0 3$ was supported by the results of the ANOVA test, indicating no significant difference across male and female students with regard to satisfaction with the usefulness of e-textbooks. However, the regression showed that for both male and female students, as indicated in Tables 6 (Appendix) and 7 (Appendix), respectfully, the use of features played a significant role in how useful the student found the e-textbook. Similar to $H_0 2$, the students seem more likely to find the e-textbook useful if they have used at least one feature.

The ANOVA test did not support $H_0 4$: there is a significant difference between the two groups as to whether or not they would use an e-textbook again in the future. The male students, as indicated in Table 8 (Appendix), were more likely to use an e-textbook again than the female students, as indicated in Table 9 (Appendix). Another regression was generated to examine satisfaction, usefulness, and ease of use as they impacted the two groups' likelihood to use an e-textbook again in the future. The results of the regression showed that usefulness was significant for male students, while general satisfaction was significant for female students. Thus, males who found the e-textbook useful and females who were generally satisfied with the e-textbook were more likely to use an e-textbook again in the future.

CONCLUSIONS

The results of this study indicate there is a significant difference between genders in the likelihood of a student to reuse an e-textbook. This is consistent with the research that indicates that females' acceptance of technology is lower than that of males. Males are more likely to reuse an e-textbook than a female. And when males found the e-textbook to be useful, they are more likely to choose an e-textbook in the future. Females are also likely to choose again an e-

textbook when they are more satisfied with it. Both usefulness for males and satisfaction for females correlated to the use of at least one of the features. Even though males are more likely than females to reuse an e-textbook, the study suggests that female students made more extensive use of the interactive features of an e-textbook than did male students. Finally, there were no significant differences between females and males for satisfaction, usefulness, and ease of use. One of the main indications of the results is to increase the adoption of e-textbook, faculty and publishers should demonstrate how to use the different features of the e-textbook.

The results of this study lead to more questions that may be addressed in future research. Features play an important role in the adoption of e-textbooks; however, there is not a set of standard features used in all e-textbooks. One question to be addressed is whether or not the lack of standard features across e-textbooks negatively impacts students' satisfaction with e-textbooks. In addition, it has been shown that gender does impact the adoption and use of technology. A follow-up study may investigate if a student's preferences related to the adoption and use of new technology play a role in their adoption of e-textbooks. Finally, the access to e-textbooks varies based on the implementation of digital rights management. For example, some e-textbooks only allow access when the user is online while other e-textbooks will allow users to download and access the book offline. Future studies may look into determining if the difference in access to e-textbooks plays a role in the adoption levels.

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APPENDIX

Table 1: Significance results from ANOVA tests

Variable	Significance	Male Students	Female Students
Year Born	.237	1987.08	1988.46
Year Graduated	.275	2005.45	2006.73
Hours worked	.939	23.80	23.99
Max Pay for Hardcopy	.265	73.19	79.86
E-Text reuse	.000	5.00	4.11
Usage Per week	.090	1.96	1.72
General Satisfaction	.563	5.20	5.10
Usefulness	.760	5.17	5.11
Max Pay for E-Text	.491	43.61	41.00
Ease of Use	.258	5.30	5.09
Features	.960	5.18	5.17

Table 2: Results of regression on general satisfaction by male students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.777	.284		2.736	.007
	Have you used an E-Textbook prior to the current semester?	-.154	.103	-.061	-1.495	.138
	How satisfied were you with the following?-Usefulness of the E- Textbook	.700	.085	.714	8.280	.000
	How satisfied were you with the following?-Ease of use of the E-Textbook	.137	.075	.146	1.828	.070
	How satisfied were you with the following?-Features of the E-Textbook	.061	.077	.063	.800	.425

Table 3: Results of regression on general satisfaction by female students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.292	.343		.850	.397
	Have you used an E-Textbook prior to the current semester?	.023	.129	.008	.182	.856

How satisfied were you with the following?- Usefulness of the E- Textbook	.909	.096	.894	9.425	.000
How satisfied were you with the following?-Ease of use of the E- Textbook	-.262	.091	-.253	-2.886	.005
How satisfied were you with the following?- Features of the E- Textbook	.281	.078	.259	3.588	.000

Table 4: Results of regression on ease of use by male students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.954	.308		3.101	.002
	How satisfied were you with the following?- Features of the E- Textbook	.839	.058	.804	14.550	.000

Table 5: Results of regression on ease of use by female students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.777	.301		2.577	.011
	How satisfied were you with the following?- Features of the E- Textbook	.835	.056	.795	14.852	.000

Table 6: Results of regression on usefulness by male students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.862	.273		3.153	.002
	How satisfied were you with the following?-Features of the E-Textbook	.832	.051	.833	16.235	.000

Table 7: Results of regression on usefulness by female students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.604	.289		2.090	.039
	How satisfied were you with the following?-Features of the E-Textbook	.874	.054	.820	16.216	.000

Table 8: ANOVA results on reuse by male students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.340	.550		.619	.537
	How satisfied were you with the following?-E-Textbook	.303	.228	.219	1.329	.187
	How satisfied were you with the following?-Usefulness of the E- Textbook	.581	.247	.429	2.347	.021

How satisfied were you with the following?-Ease of use of the E-Textbook	.016	.177	.013	.093	.926

Table 9: ANOVA results on reuse by female students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.515	.624		2.429	.017
	How satisfied were you with the following?-E-Textbook	.545	.232	.407	2.346	.021
	How satisfied were you with the following?-Usefulness of the E- Textbook	.191	.335	.140	.570	.569
	How satisfied were you with the following?-Ease of use of the E-Textbook	-.229	.238	-.165	-.959	.339