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The Relations among Undergraduate Students' Sourcing, Anxiety, and Perceived Trustworthiness of Online Information

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Abstract: The present study aimed to understand how undergraduates' sourcing of online information related to their anxiety and perceived trustworthiness of online information. A total of 378 undergraduates participated in the present study that adapted three questionnaires to explore their sourcing, anxiety, and perceived trustworthiness of online information. Exploratory factor analysis and confirmatory factor analysis were employed to ensure the reliability and validity of these three instruments. The Structural Equational Modelling analysis was conducted to investigate the relationships among undergraduate students' sourcing, anxiety, and perceived trustworthiness of online information. The research findings indicated that sourcing online information by personal and multiple evaluation relates to metacognitive online searching strategies, and sourcing online information by authority evaluation relates to behavioral online searching strategy that relates to less anxiety and more perceived trustworthiness of online information. Based on the research findings, theoretical and practical suggestions for future research are provided.

Keywords: Sourcing of online information, Anxiety of online information, Perceived Trustworthiness of online information

1. Introduction

Prior studies have invested a lot of efforts in investigation of students' sourcing of online information which includes evaluating and using available or accessible information about the sources on the Internet. As the Internet has become an important knowledge resource for learning activities, Tsai (2004) proposed that the use of the Internet could be referred as epistemic, metacognitive, and cognitive learning tools. However, few studies have examined students' sourcing of online information from the above three-level (i.e., epistemic, metacognitive, and cognitive) perspective, simultaneously. To fill this gap, the purpose of this study was to develop and validate a new questionnaire based on the three-level perspective to understand students' sourcing of online information. Besides, researchers suggested that how student' evaluate and search information may relate to their anxiety (e.g., Erfanmanesh, Abrizah, & Karim, 2014) and trustworthiness of online information. This study also intended to understand the relations among students' sourcing of online information and their perceived anxiety, and trustworthiness of online information.

2. Methods

2.1 Participants

378 undergraduates with average age of 19.93-year-old in Taiwan participated in the present study. All of the participants were unpaid volunteers, and they were invited to complete the three instruments, regarding the preference of students' sourcing, anxiety, and perceived trustworthiness of online information. These questionnaires addressed this study's aim and importance, and informed the students of their right to withdraw.

2.2 Instruments

The present study validated three questionnaires to explore undergraduates' sourcing, anxiety, and perceived trustworthiness of online information. All of these instruments were assessed by means of a 5-point Likert scale ranging from 1, *strongly disagree*, to 5, *strongly agree*.

Firstly, the sourcing of online information questionnaire adapted the Internet-Specific Epistemic Justification Inventory (Bråten, Brandmo, & Kammerer, 2018) which measured the epistemic justification of online information and the Online Information Searching Strategy Inventory (Tsai, 2009) which measures the metacognitive and cognitive level of sourcing of online information to explore undergraduates' preference of sourcing of online information. The sourcing of online information questionnaire consists of six constructs. The detailed definition and a sample item of the six constructs are presented below:

(1) Personal: measuring the participants' addressed the strategy to justify knowledge claims on the Internet through reasoning and the use of prior knowledge. A sample item is 'When I read about the science topic on the Internet, I evaluate whether this information is consistent with what I already know about this topic.'
(2) Multiple: measuring the participants' addressed the strategy to check knowledge claims on the Internet by cross-checking and corroborating across multiple sources. A sample item is 'To determine whether the information I find about the science topic on the Internet is trustworthy, I compare information from multiple sources.'
(3) Authority: measuring the participants' being concerned about the authoritativeness when using the Internet. A sample item is 'To check whether information I find about the science topic on the Internet is reliable, I try to determine whether it is written by a person with a high level of competence in the area.'
(4) Metacognitive: assessing the participants' skills involved in higher-order and content-related cognitive activities on the Internet, such as purposeful thinking, select main ideas and evaluation aspect strategies. A sample item is 'When searching for science-related information, I look through titles or hyperlinks in a web in order to catch major information.'
(5) Procedural: measuring the participants' content-general searching approaches on the Internet, included trial & error and problem-solving aspect strategies. A sample item is 'I try some possible entrance websites when I cannot find enough about science-related information.'
(6) Behavioral: measuring the participants' skills required for basic Internet manipulation and navigation. A sample item is 'I know how to use a web browser when I search for science-related information, like IE or Chrome.'

Moreover, the current study adapted five items of the Information Seeking Anxiety Scale by Erfanmanesh et al. (2014) to understand students' anxiety of online information (a sample item: I feel anxious when resources found during information seeking process are irrelevant).

Furthermore, the current study developed three items to explore students' perceived self-efficacy toward the trustworthiness of online information (sample item: I think the science-related web information that I use to solve the problem is trustworthy).

2.3 Data analysis and procedure

The purposes of the current study were to understand undergraduates' perception of sourcing, anxiety, and trustworthiness of online information and explore the relations among sourcing, anxiety, and trustworthiness of online information. Thus, three questionnaires were validated to achieve the research purposes.

In the current study, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were employed to ensure the reliability and validity of the instruments. Moreover, the Structural Equational Modelling analysis (SEM) was conducted to investigate the relations among undergraduate students' sourcing, anxiety, and perceived trustworthiness of online information.

3. Results and Discussion

3.1 Factor analysis of students' sourcing, anxiety and perceived trustworthiness of online information

This study utilized exploratory factor analysis to validate the factors of sourcing, anxiety and perceived trustworthiness of online information questionnaires. To validate the three questionnaires, this research adopted the principal component analysis and the oblimin rotation method to clarify the factors of the items. The result of EFA was presented in Table 1.

According to Table 1, the value of factor loading of sourcing of online information questionnaire ranged from .54-.88, and those of anxiety, and trustworthiness of online information ranged from .74-.88, and .80-.88, respectively. Moreover, the Cronbach's alpha coefficients of sourcing of online information ranged from .82-.88, and those of the Cronbach's alpha coefficients of anxiety, and trustworthiness were .85, and .79, respectively. Based on those descriptions above, the results of EFA revealed that these three questionnaires indicated satisfactory reliability.

Additionally, confirmatory factor analysis was conducted to ensure the validity. According to Table 2, the values of factor loading, and t- value were acceptable. Moreover, the fit indices (the ratio of chi-square to degrees of freedom = 2.22, CFI = .95, RMSEA = .062, NFI = .92, NNFI = .94, GFI=.80) showed that the measurement model provided a satisfactory fit to the data. Furthermore, average variance extracted (AVE), and composite reliability (CR) are suggested to evaluate the convergent *validity of the constructs (Hair, Black, Babin, Anderson, & Tatham, 2006; Pedhazur, 1997). The CFA results indicated that all of the loading values of the measured items were significant and higher than 0.5. Compared with the cut-off value of 0.60, the CR values of all factors ranging from 0.82 to 0.90 indicated acceptable reliability of the factors (Bagozzi & Yi, 1988). Moreover, the AVE values ranging from 0.47 to 0.70 revealed adequate convergent validity of the factors.*

Table 1
The EFA result for the sourcing, anxiety, and trustworthiness of online information questionnaires

Factor		*Number of items*	*EFA factor loading*	*Reliability coefficients*
Sourcing	*Personal*	*4*	*.54-.79*	*.86*
	Multiple	*4*	*.57-.68*	*.87*
	Authority	*4*	*.72-.85*	*.86*
	Metacognitive	*5*	*.62-.76*	*.82*
	Procedural	*4*	*.59-.66*	*.83*
	Behavioral	*4*	*.62-.85*	*.88*
Anxiety	*Anxiety*	*5*	*.74-.88*	*.85*
Trustworthiness	*Trustworthiness*	*3*	*.80-.88*	*.79*

Note: Sourcing of online information: Total variance explained: 66.88%, overall α = 0.93

Table 2

The CFA result for the sourcing of online information questionnaire

						Subscale score	
Scale	Number of items	Factor loading	*t*- value	AVE	CR	*Mean*	*SD*
Personal	4	0.68-0.76	$9.83^{*} – 11.40^{*}$	0.53	0.82	4.23	0.53
Multiple	4	0.70-0.85	$10.25^{*} – 13.47^{*}$	0.60	0.86	4.20	0.62
Authority	4	0.74-0.93	$11.28^{*} – 16.09^{*}$	0.70	0.90	3.53	0.86
Metacognitive	5	0.56-0.73	$7.71^{*} – 10.74^{*}$	0.47	0.81	4.02	0.57
Behavioral	4	0.63-0.88	$9.09^{*} – 14.55^{*}$	0.64	0.88	4.18	0.68
Procedural	4	0.72-0.88	$10.69^{*} – 13.11^{*}$	0.63	0.87	4.32	0.56

* $p < 0.05$, RMSEA= 0.062, CFI = 0.95, NFI = 0.92, NNFI = 0.94, GFI = 0.80

CR: Composite reliability

AVE: Average variance extracted

3.2 Structural Equation modelling analysis results

To explore the relations among sourcing, anxiety, and trustworthiness, structural equation modelling analysis was conducted. The path coefficients of the structural model that specified the relationships between the latent constructs (factors) are presented in Figure 1. The fit
indices of the structural model show that the model has an acceptable fit (the ratio of chi-square to degrees of freedom = 2.22, CFI = .95, RMSEA = .062, NFI = .92, NNFI = .94, GFI=.80).

According to Figure 2, 'Personal' had a positive relation with 'Metacognitive,' and 'Procedural' (γ = .47, and .32, $p < .05$). 'Multiple' also had a positive relation with 'Metacognitive.' In addition, 'Authority' positively related to 'Behavioral (γ = .16, $p < .05$),' which positively related to 'Trustworthiness ($\beta = 0.27$, $p < .05$),' and negatively 'Anxiety ($\beta = -0.24$, $p < .05$).'

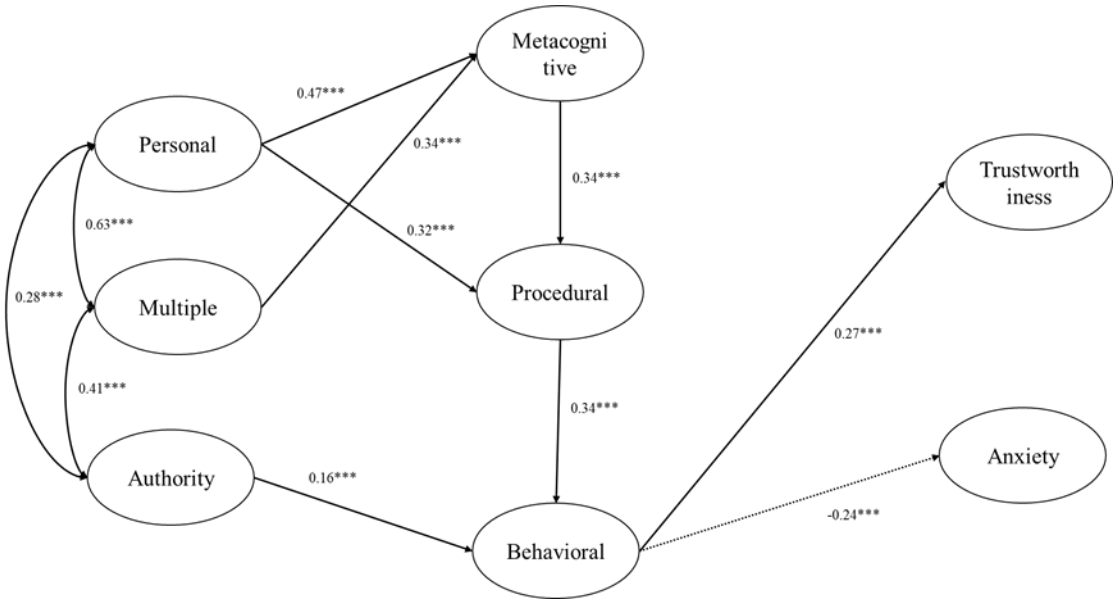

Figure 1. The Structural Equation modelling analysis results indicated that students' sourcing of online information related to their anxiety and perceived trustworthiness of online information

4. Conclusion

The purpose of the present study was to understand the relations among undergraduates' sourcing, anxiety, and trustworthiness. According to the result of SEM, students' sourcing of online information related to their anxiety and perceived trustworthiness of online information.

More specially, students who justified online information by their personal understanding tended to embrace metacognitive and procedural searching strategies. Besides, students who justified online information by multiple sources tended to draw on metacognitive searching strategy. Furthermore, students who justified online information by authority had a tendency toward behavioral searching strategy. In this way, students who justified the online sources by authority through the behavioral searching strategies seem to have less anxiety and much more perceived trustworthiness of online information.

In conclusion, the preliminary results obtained from the current study may provide feedback and future directions to educators and researchers to improve the quality of sourcing of online information.

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