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The contribution of handwriting over typing to text quality and understanding of the writing task: the role of transactional (but not transmissional) writing beliefs

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*This study is based on PhD research conducted by the first author

Introduction

The ability to produce quality writing is fundamental to the understanding of complex subject matter and critical in the communication and publication of research. Writing mode is regarded as an important variable, with studies suggesting an advantage in participants' understanding and recall for handwritten over typed texts (Crumb et al., 2022), while writing quality has been found to be relatively similar under each mode (Feng et al., 2017). Recent research supports a dual process account of writing engagement, with implicit transactional and transmissional writing beliefs playing a role in writing strategy, text quality and development of understanding (e.g., Baaijen & Galbraith, 2018; Hall & Galbraith, 2023). Transactional beliefs are process-focused, while transmissional beliefs focus on content. Transactional beliefs show a stronger relationship to writing quality. To date, research has not addressed the relationship between writing beliefs and writing quality as a function of writing mode i.e., handwritten or typed/ word processed. The current study examined writing beliefs, and the use of technology in the writing process, for first year undergraduate students. The relationship between participants' writing beliefs and self-efficacy beliefs, social media usage, attitudes to writing and technology, understanding and writing quality was examined. The hypotheses were (1) that there would be a positive correlation between writing quality and transactional beliefs, in both modes; (2) that there would be a difference in understanding between handwritten and typed samples.

Methodology

Thirty-four first year university undergraduates (26 females, 7 males and 1 non-binary) took part in the study. All participants were 18 years old or over, English was their first language, and none had availed of a reader or scribe for learning or assessment purposes. Participants completed two short writing samples and the following measures via a Qualtrics survey conducted in person under supervision: 1. Writing Beliefs Inventory (White and Bruning, 2005); 2. The Daly-Miller Test, (1975, as measured in Limpo, 2018); 3. A Short Computer Anxiety Scale (Lester et al., 2005); 5. Social Media Engagement Questionnaire (Przybylski et al., 2013); 6. Measures of self-reported understanding on a single item scale; 7. Generalised Self-efficacy Scale (Schwarzer and Jerusalem, 1995). The two writing topics were 'My thoughts on climate change' and 'My thoughts on Covid 19'. These were completed using a word processor or in longhand, with order and topic counterbalanced. Writing time for each article was 15 minutes with an extra 3 minutes added to complete a seven-point Likert scale, where participants were asked to indicate their understanding of the topic prior to and immediately after writing. Text quality was rated, and a holistic score was agreed by two independent assessors on a 9-point scale, considering the following: overall coherence of the article; originality and orientation of writing to an audience. This followed the method used by Baaijen et al. (2014). Participants were coded as being STEM or non-STEM students based on their subjects, to take account of possible experiential differences.

Results

As there were no differences either in writing quality or in beliefs for the STEM and non-STEM groups, the data were analysed together. Correlational analysis showed that there was a strong positive relationship between transactional writing beliefs and writing quality, but only for handwritten samples. In addition, for written samples, there was a strong negative correlation between transactional beliefs and self-rated understanding. There was no correlation between transmissional beliefs and the other measures. For typed writing samples, there was a positive correlation with both word count and social media usage, but no relationship to writing beliefs. There was no relationship between writing beliefs and any of the other scales e.g., computer anxiety, self-efficacy, and writing apprehension. Correlations are shown in Table 1. Paired samples t tests showed no difference between handwritten and typed text quality nor between self-rated understanding in the two conditions.

Correlations

		Word Count Written	Word Count Typed	Mean Written Score	Mean Typed Score	Difference in Understanding after Typed	Difference in Understanding after Written	Transmissional Beliefs	Transactional Beliefs	Writing Beliefs
Word Count Written	Pearson Correlation	1	.543**	.250	.234	.068	−.243	.204	.197	.243
	Sig. (2-tailed)		<.001	.154	.183	.703	.166	.247	.263	.165
	N	34	34	34	34	34	34	34	34	34
Word Count Typed	Pearson Correlation	.543**	1	.078	.460**	−.050	−.409*	.073	.325	.287
	Sig. (2-tailed)	<.001		.660	.006	.777	.016	.680	.060	.100
	N	34	34	34	34	34	34	34	34	34
Mean Written Score	Pearson Correlation	.250	.078	1	.191	−.208	−.274	.050	.492**	.407*
	Sig. (2-tailed)	.154	.660		.279	.238	.117	.779	.003	.017
	N	34	34	34	34	34	34	34	34	34
Mean Typed Score	Pearson Correlation	.234	.460**	.191	1	.326	−.075	.261	.260	.317
	Sig. (2-tailed)	.183	.006	.279		.060	.673	.135	.137	.067
	N	34	34	34	34	34	34	34	34	34
Difference in Understanding after Typed	Pearson Correlation	.068	−.050	−.208	.326	1	.123	.202	−.193	−.063
	Sig. (2-tailed)	.703	.777	.238	.060		.489	.252	.274	.721
	N	34	34	34	34	34	34	34	34	34
Difference in Understanding after Written	Pearson Correlation	−.243	−.409*	−.274	−.075	.123	1	.006	−.372*	−.288
	Sig. (2-tailed)	.166	.016	.117	.673	.489		.972	.030	.098
	N	34	34	34	34	34	34	34	34	34
Transmissional Beliefs	Pearson Correlation	.204	.073	.050	.261	.202	.006	1	.292	.663**
	Sig. (2-tailed)	.247	.680	.779	.135	.252	.972		.094	<.001
	N	34	34	34	34	34	34	34	34	34
Transactional Beliefs	Pearson Correlation	.197	.325	.492**	.260	−.193	−.372*	.292	1	.909**
	Sig. (2-tailed)	.263	.060	.003	.137	.274	.030	.094		<.001
	N	34	34	34	34	34	34	34	34	34
Writing Beliefs	Pearson Correlation	.243	.287	.407*	.317	−.063	−.288	.663**	.909**	1
	Sig. (2-tailed)	.165	.100	.017	.067	.721	.098	<.001	<.001	
	N	34	34	34	34	34	34	34	34	34

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Discussion

The significant relationship between transactional but not transmissional beliefs and writing quality is consistent with prior research (White & Bruning, 2005); the present study expands on this literature in suggesting that this applies only to handwritten, but not typed writing samples. White and Bruning's research, which used only handwritten samples and therefore was not a comparative study of typed versus handwritten text, found a correlation between transactional beliefs and writing quality. The absence of a positive correlation between transactional beliefs and participants' subjective rating of increased understanding of the topic is contrary to findings by Baaijen and Galbraith (2018) but corresponds with results from more recent research from Hall and Galbraith (2023) which did not find that writing beliefs impacted on understanding in either a synthetic or outline planning condition. The negative correlation between transactional beliefs and self-rated understanding suggests that writers with higher transactional beliefs use the writing by hand process to reflect on their understanding of a complex topic, and this is associated with lower, or a re-appraised, understanding post-writing. There was no relationship between writing beliefs and quality for typed samples. Instead typed writing quality was associated with word count and social media use. This suggests a more instrumental and non-reflective approach when students use a computer to type their writing samples. This finding is not consistent with the literature, which shows a link between transactional beliefs and quality when writing using a word processor (e.g., Baaijen et al., 2014) and as conditions were counterbalanced, the pattern cannot be explained by an order effect. Further research would be required to replicate this finding and to examine trends in participants beyond year 1 of their studies.

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