

Mechanisms Linking ICT Attitudes to Digital Reading Literacy: Motivation, Metacognition, and Reading Purposes among Adolescents in Hong Kong, Macao, and Chinese Taipei

Research Overview

Analyses of PISA 2018 data from Hong Kong, Macao, and Chinese Taipei examined whether ICT attitudes predict adolescents' digital reading literacy directly and indirectly through intrinsic reading motivation and metacognitive strategies, and whether leisure and academic reading purposes moderate these pathways. Results showed robust mediation, selective moderation, and regional consistency.

Purpose of Study

Digital reading literacy (DRL) is a core competence for adolescents in digitally mediated societies and involves not only understanding digital texts, but also evaluating, integrating, and using information effectively (OECD, 2019a). While self-regulated Learning (SRL) emphasises learners' regulation of cognition, motivation, and strategy use in complex reading environments (Bandura, 1986; Pintrich, 2000), self-determination Theory (SDT) highlights the role of autonomy, competence, and intrinsic motivation in sustaining engagement and achievement (Ryan & Deci, 2000, 2020). In digital reading contexts, these frameworks suggest that students' ICT attitudes may shape both motivation and strategic engagement with texts (Hahnel et al., 2016; Naumann & Salmerón, 2016).

Yet, digital reading purposes may not be uniformly beneficial. Leisure reading may support engagement and literacy development because it is often more self-directed (Jerrim & Moss, 2019; Sun et al., 2020). However, some leisure-oriented activities, like online chatting, may also be fragmented and potentially weaken deeper processing (Chen et al., 2021; Liu et al., 2017). Academic reading, by contrast, is more closely tied to school demands and learning goals but may reduce intrinsic motivation and enjoyment (Sutter & Campbell, 2022). Against this background, the present study addressed three research questions: 1. How are ICT attitudes, reading motivation,

metacognitive strategies, and digital reading purposes associated with DRL? 2. Do reading motivation and metacognitive strategies mediate the association between ICT attitudes and DRL, and do reading purposes moderate these indirect associations? 3. How do these patterns differ across Hong Kong, Macao, and Chinese Taipei?

Research Methods

This study used data from the Programme for International Student Assessment (PISA) 2018, which foregrounded digital reading and included detailed measures of ICT familiarity. The analytic sample comprised 15,462 15-year-old students from Hong Kong, Macao, and Chinese Taipei.

DRL was measured using PISA's computer-based assessment and analysed with plausible values (OECD, 2009; Rubin, 1987). ICT attitudes were modelled as a latent construct indicated by interest in ICT, perceived ICT competence, and ICT autonomy. Intrinsic reading motivation was represented by reading enjoyment, and metacognitive strategies by understanding and remembering, summarising, and evaluating credibility. Leisure and academic reading purposes were included as moderators, while gender and economic, social, and cultural status were control variables.

Analyses were conducted using multi-group structural equation modelling in Mplus. Confirmatory factor analysis validated the measurement model, with partial scalar invariance across the three regions. Subsequent models examined direct, indirect, and latent interaction effects. Cluster-robust standard errors, sampling weights, and robust maximum likelihood estimation were applied.

Results and Discussion

ICT attitudes, reading motivation, and metacognitive strategies were all significant positive predictors of DRL. ICT attitudes also positively predicted reading motivation and metacognitive strategies, indicating that students with more positive ICT attitudes were more motivated to read and more likely to engage strategically with digital texts. Leisure reading was positively associated with DRL, whereas academic reading

showed a negative direct association. Female students and those from higher socioeconomic backgrounds also performed better in DRL.

Both reading motivation and metacognitive strategies significantly mediated the association between ICT attitudes and DRL, with metacognitive strategies showing the stronger mediating role. This finding is consistent with research suggesting that strategic processing plays a central role in digital reading performance (Bu & Chen, 2023; Xie & Huang, 2024). It also suggests that positive ICT attitudes contribute to DRL not only by supporting students' reading motivation, but even more strongly by fostering strategic, self-regulated engagement with digital texts (Borgonovi & Pokropek, 2021; Peng et al., 2023).

Moderation analyses revealed two main patterns. First, the positive association between intrinsic motivation and DRL was stronger among students with lower levels of leisure reading. This pattern may be understood through marginal utility theory (Marshall, 2013): when leisure reading is already high, its additional motivational benefit for DRL may diminish, whereas students with lower leisure reading may gain more from intrinsic motivation. Second, the positive association between metacognitive strategies and DRL was stronger among students with higher levels of academic reading. These findings suggest that motivational and strategic pathways to DRL are conditional and depend partly on why students engage in digital reading.

Cross-regional analyses showed consistent structural associations across Hong Kong, Macao, and Chinese Taipei, despite mean-level differences. This suggests that the mechanisms linking these factors to DRL are robust and supports the broader relevance of the study's implications for Chinese-speaking educational contexts.

Keywords

Digital reading literacy; ICT attitudes; Metacognitive strategies; Reading motivation; Reading purposes

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