EFFECTS OF DIGITAL MEDIA INTEGRATED RECIPROCAL TEACHING ON STUDENTS' READING ABILITY AND MOTIVATION

Zhenlong CHU

expert projects
publishing

Effects of Digital Media Integrated Reciprocal Teaching on Students' Reading Ability and Motivation

Zhenlong CHU[1]

Abstract

The 21st century is the knowledge economic era decided by brains. Reading is the sole tactic to rapidly accumulate knowledge and effectively absorb others' research results. The level of reading ability is closely related to individual future learning and employment and even economic development. A competitive nation nowadays would invest large amount of resources and plans in reading. Students could broadly absorb distinct knowledge through reading to make up inadequate teaching hours of teachers, i.e. entering the time, space, and culture in books through reading, without which people could merely live in personal time and space. With experimental design model to precede the quasi-experimental study, total 216 elementary school students in Jiangsu, as the research objects, are preceded the 16-week (3 hours per week for total 48 hours) digital media integrated reciprocal teaching. The research results show that digital media integrated reciprocal teaching would affect reading ability, digital media integrated reciprocal teaching would affect reading motivation, and reading ability reveals significantly positive effects on reading motivation. According to the results, suggestions are proposed, expecting to apply previously mentioned reciprocal teaching principles to readers' animation design, to cultivate students' learning strategy through "man"-"machine" interaction, and to enhance reading comprehension.

Keywords: digital media, reciprocal teaching, reading ability, reading motivation.

Introduction

Language is an important bridge for interpersonal communication. Along with the approach of "global village", an internationally common language presents the essence. A nation requires foreign languages as the communication tool to create diplomacy and promote economy, trade and cultural exchange. Foreign language learning could assist individuals in mental development, expanding cultural vision

---

[1] College of Arts, Shandong Management University, 3500 Dingxiang Road, Changqing District, Jinan, CHINA. E-mail: chuzhenlong2020@outlook.com

and cultivating personality by explaining customs, norms, thinking styles, and literature works of other nations, as well as communicating with other language users. Accordingly, it plays important role in diplomacy, politics, and technology. The 21st century is the knowledge economic era decided by brains. Reading is the sole tactic to rapidly accumulate knowledge and effectively absorb others' research results. The level of reading ability is closely related to individual future learning and employment, and even economic development. Competitive nations nowadays would invest large amount of resources and plans in reading. Students could broadly absorb distinct knowledge through reading to make up inadequate teaching hours of teachers, i.e. entering the time, space, and culture in books through reading, without which people merely live in personal time and space. It does not simply understand literal data for reading, but readers have to grasp article structure and key points as well as organize and sum up sentences to comprehend the primary information. A common phenomenon in the world is that children and youngsters are reducing the interests in reading; reading foreign languages has nothing to do with "fun". Nevertheless, reading is everywhere in life; people could benefit from reading. Research also supports that people with large reading could become better and more confident readers and show better writing skills, listening comprehension, and even richer vocabulary to develop better language learning attitudes and enhance language learning motivation.

Multimedia provide learning interface with high affinity, on which learners, with deep impression, present better memory processing than on text media. With the combination of multimedia, hypermedia, and network technology, they provide rich data and excellent interactivity. In this case, the application of media to learn any foreign languages is not a problem, as it becomes a consensus that the application of media could benefit language learning; the point is "how" to use media. Especially, the lack of natural and authentic language situations and communication objects would require various audio-visual media for assisting in learning to make up learners insufficiently contact with language environment. As a result, this study tends to discuss the effect of digital media integrated reciprocal teaching on reading ability and motivation, expecting to apply abovementioned reciprocal teaching principles to readers' animation design, cultivate students' learning strategy through "man"-"machine" interaction, and enhance reading comprehension.

Literature review

Reciprocal teaching: Chu *et al.* (2019) indicated that reciprocal teaching was designed mainly integrating three concepts of "proximal development", "proleptic teaching", and "expert scaffolding".

1) Proximal development: Proximal development referred to the distance between "individual actual level of development to independently solve problems" and

"potential level of development to solve problem through the guide of adults or cooperation with peers with better capability". The proximal development theory, the most emphasized concept in Vygotsky's cognitive development theory, exceeded actual development through social interaction learning (MacLeod *et al.*, 2018).

2) Proleptic teaching: Proleptic teaching, originated from Vygotsky's development theory, expected student ability, provided social support situation in teaching, and encouraged novices participating in various club activities before being able to independently complete tasks. In the teaching situation, novices merely completed simple parts of tasks in the beginning and gradually acquired high-level performance through the observation and imitation of experts (Okkinga *et al.*, 2018).

3) Expert scaffolding: "Scaffolding", originated from Vygotsky's emphasis on the importance of language in cognitive development, guided and stimulated students' thinking by adults designing organized dialogue contents and through dialogues between adults and children to gradually enhance students' development. Scherer, Siddiq, & Tondeur (2019) regarded "scaffolding" as an adjustable and temporary supporting system. On one hand, students learned through teachers' demonstration to enhance personal development ability. On the other hand, teachers judged the appropriateness of provided scaffolding and monitored whether students could enhance the ability through scaffolding (Lopes & Soares, 2018).

Cheng, Sun, & Chen *et al.* (2018) pointed out following steps in the reciprocal teaching process: (1) To have students understand the meaning and importance of four reading comprehension strategies before reading activity; (2) To have students read article title and then teachers encourage students to predict the article content with prior knowledge; (3) Teachers, according to students' conditions, decided to silently read or read out the first paragraph of the article; (4) After silent reading, teachers first demonstrated how to apply above four strategies to comprehend reading; (5) Teachers and students collaboratively applied four strategies to the dialogue, and students made comments according to article content; (6) To abstract key points from the article content, propose questions and clarify unclear parts, and predict the follow-up article content; (7) When students were able to flexibly apply four reading strategies, the responsibility for reading comprehension was transferred to students, and teachers provided feedback and assistance (Mershad & Wakim, 2018).

Research hypothesis

Chan, Othman, & Razak (2017) studied the effect of reciprocal teaching on high-grade elementary pupils' reading comprehension ability, meta-cognition ability, and reading attitude and revealed: (1) no immediate and continuous

effect on selection-mode or question-answer mode reading comprehension of narrative articles, but immediate and continuous effects on abstracting from narrative articles; (2) immediate and continuous effects on enhancing students' meta-cognition ability, (3) immediate and continuous effects on students' reading attitudes, and (4) immediate and continuous effects on learning strategies and the enhancement of reading comprehension of explanatory articles. AlJarrah, Thomas, & Shehab (2018) studied the effect of reciprocal teaching on G6 students' Chinese reading comprehension, meta-cognition, and self-efficacy and discovered that the experimental group outperformed the control group on "key point abstracting test" and "self-questioning test", but did not appear remarkable differences from the control group in "selection-mode reading comprehension test" and the experimental group outperformed the control group on "reading meta-cognition evaluation" and "reading learning efficacy". Elfeky (2019) studied the effect of reciprocal teaching on three G4 students with reading comprehension difficulty and discovered that: (1) reciprocal teaching showed instructional effectiveness and retention effect on the reading comprehension of students with reading comprehension difficulty; (2) students made progress on "explicit questions in articles" and "hidden questions in articles and questions involving in personal experience"; (3) students made progress on the posttest of "Chinese reading comprehension", and (4) students often used strategies of abstracting, clarifying, and asking questions, but less predicting. Zhang & You (2020) studied G4 and G7 students with good decoding ability but worse comprehension ability and discovered that students in the experimental group with reciprocal teaching outperformed those in the control group on daily evaluation articles and standardized reading tests, while vocabulary test did not appear notable difference between two groups. Accordingly, the following hypothesis is proposed in this study.

H1: Digital media integrated reciprocal teaching would affect reading ability.

With qualitative research, Lin & Hwang (2018) studied the change of G6 students receiving reciprocal teaching and discovered that 1.teacher-student interaction changed with the development at different stages of reciprocal teaching, 2.teachers slowly reduced the guide, and 3.students' peer interaction gradually grew and became active (Neumann & Kopcha, 2019). Taking G7 students with good decoding ability but worse comprehension ability as the research objects, Anderson & Dron (2017) found out 1.the improving quality of abstracting and asking questions as well as the comprehension test performance of students in the experimental group with reciprocal teaching and 2.the continuous and transfer effect on comprehension test. Chandramohan *et al.* (2017) observed and interviewed students taught by three teachers adopting reciprocal teaching and concluded the enhancing participation in team discussion and reading comprehension of students. Taking G4, G5, and G6 students as the objects, Hao, Bouzouane, & Gaboury (2019) discovered that students in the experimental group improved the comprehension test performance, the performance of G4 and G6 students in the experimental

group showed continuous effect, and students in the experimental group obviously changed the performance on abstracting. Consequently, the following hypothesis is proposed in this study.

H2: Digital media integrated reciprocal teaching would affect reading motivation.

According to Chun-Hsiang Chang' definition of motivation, Lin (2019) defined reading motivation as the inner process to induce individual reading activity, maintain the induced reading activity, and enhance the reading activity towards the goal of reading comprehension. Koch & Sporer (2017) considered that reading motivation was internal movement, but motivation might be induced by inner curiosity and thirst for knowledge or exogenous educational rewards and punishment. It involved in individual cognition for pupils choosing reading from various activities. Belpoliti & Gironzetti (2017) interviewed middle-grade elementary pupils and found out four important factors in the reading motivation, including: (1) opportunity to access books; (2) power for self-selecting books; (3) familiarity with story content, and 4.interpersonal interaction of communicating and exchanging experience with others as well as acquiring affirmation in the reading process. Ilter (2019) investigated the reading motivation of adolescents in countryside and found out the reasons for adolescents reading as entertainment, looking for good job, understanding what happened in the world, and making more successful life. However, some adolescents read for escaping from the reality or satisfying curiosity. Yang *et al.* (2018) concluded the reading motivation of students in Taipei Municipal Jianguo High School, including 1.stimulating motivation: as external and unexpected motivation, with weak strength, small pressure, and easily forming reading fun and 2.purposive motivation: with expectation, stronger motivation larger pressure, and easily getting tired. The following hypotheses are therefore proposed in this study.

H3: Reading ability reveals significantly positive effects on value component of reading motivation.

H4: Reading ability shows remarkably positive effects on expectation component of reading motivation.

H5: Reading ability appears notably positive effects on affective component of reading motivation.

Methodology

Measurement of research variable

Reading ability: Referring to Tsai (2019), reading ability contains three dimensions in this study.

Literal comprehension: It is an automatic skill, without recognition with pronunciation or guess but directly searching text meanings from long-term memory when reading written texts, and decoding through pronunciation to search the definition from long-term memory.

Discourse comprehension: Literal acquisition is the process of readers activating long-term memory about the meaning of words after decoding character form or pronunciation. Syntactic analysis refers to readers properly assembling words according to syntax rules to form meaningful concept.

Inferential comprehension: Integration refers to the casual connection of two or more than two sentences in an article or concept representation. Abstract refers to readers presenting holistic structure of major concepts in an article and making generalization after reading. Elaboration refers to readers connecting new information to familiar old knowledge for later extraction to enhance the possibility of knowledge transfer.

Reading motivation: Referring to Lin & Hwang (2019), the following variables are contained in this study.

1) *Value component*: as the reason of learners engaging in learning work and the belief in the importance and value of the work, including students' goal orientation and work value.
2) *Expectation component*, including learners' locus of control, the expectation of successfully completing certain work, and the belief in self-efficacy.
3) *Affective component*: covering students' emotional responses to learning and the self-appraisal through self-value or self-respect.

Research object and sampling data

With experimental design model, total 216 elementary school students in Jiangsu, as the research objects, are preceded the 16-week (3 hours per week for total 48 hours) quasi-experimental study with digital media integrated reciprocal teaching. The retrieved questionnaire is analyzed with SPSS, and factor analysis, reliability analysis, regression analysis, and analysis of variance are applied to test various hypotheses.

Analysis method

Analysis of variance is used in this study for discussing the effects of digital media integrated reciprocal teaching on reading ability and reading motivation, and regression analysis is further applied to understand the relations between reading ability and reading motivation.

Results

Reliability and validity analysis

With factor analysis, reading ability in this study is extracted three factors and reading motivation is extracted 3 factors.

Table 1. Factor analysis

variable	dimension	eigenvalue	α	cumulative variance explained
reading ability	literal comprehension	2.183	0.84	74.155
	discourse comprehension	1.679	0.86	
	inferential comprehension	2.866	0.87	
reading motivation	value component	1.571	0.88	77.631
	expectation component	1.994	0.85	
	affective component	2.753	0.86	

Effects of learning approach on reading ability and reading motivation

Variance analysis of learning approach on reading ability: Analysis of variance is utilized in this study for discussing the effect of learning approach on reading ability, i.e. analyses of explanations of digital media integrated reciprocal teaching and general traditional teaching. From *Table 2*, digital media integrated reciprocal teaching shows higher literal comprehension, discourse comprehension, and inferential comprehension than general traditional learning that H1 is supported.

Table 2. Variance analysis of digital media integrated reciprocal teaching on reading ability

variable		F	P	Scheffe post hoc
digital media integrated reciprocal teaching	literal comprehension	16.277	0.000**	digital reciprocal teaching> general traditional teaching
	discourse comprehension	31.583	0.000**	digital reciprocal teaching> general traditional teaching
	inferential comprehension	24.438	0.000**	digital reciprocal teaching> general traditional teaching

Note: * stands for $p<0.05$, ** for $p<0.01$.

Variance analysis of learning approach on reading motivation: Using analysis of variance for discussing the effect of learning approach on reading motivation, i.e. analyses and explanations of digital media integrated reciprocal teaching and general traditional teaching. *Table 3* reveals that digital media integrated reciprocal teaching presents higher value component, expectation component, and affective component than general traditional learning. As a result, H2 is supported.

Table 3. Variance analysis of digital media integrated reciprocal teaching on reading motivation

variable		F	P	Scheffe post hoc
digital media integrated reciprocal teaching	value component	21.588	0.000**	digital reciprocal teaching> general traditional teaching
	expectation component	42.167	0.000**	digital reciprocal teaching> general traditional teaching
	affective component	33.521	0.000**	digital reciprocal teaching> general traditional teaching

Note: * stands for $p<0.05$, ** for $p<0.01$.

Correlation analysis of reading ability and reading motivation

Correlation analysis of reading ability and value component: To test H3, the analysis result, *Table 4*, reveals significant effects of literal comprehension (β=2.135**), discourse comprehension (β=2.583**), and inferential comprehension (β=2.271**) on value component that H3 is supported.

Correlation analysis of reading ability and expectation component: To test H4, the analysis result, Table 4, shows remarkable effects of literal comprehension (β=2.042**), discourse comprehension (β=2.684**), and inferential comprehension (β=2.316**) on expectation component that H4 is supported.

Correlation analysis of reading ability and affective component: To test H5, the analysis result, *Table 4*, appears notable effects of literal comprehension (β=2.188**), discourse comprehension (β=2.753**), and inferential comprehension (β=2.546**) on affective component. H5 is therefore supported.

Table 4. Analysis of reading ability to reading motivation

Dependent variable→	reading motivation					
Independent variable↓	value component		expectation component		affective component	
reading ability	β	P	β	P	β	P
literal comprehension	2.135**	0.000	2.042**	0.000	2.188**	0.000
discourse comprehension	2.583**	0.000	2.684**	0.000	2.753**	0.000
inferential comprehension	2.271**	0.000	2.316**	0.000	2.546**	0.000
F	27.622		32.562		41.894	
significance	0.000***		0.000***		0.000***	
R2	0.237		0.288		0.346	
Adjusted R2	0.211		0.263		0.321	

Note: * stands for p<0.05, ** for p<0.01.
Data source: self-organized in this study.

Discussion

Students are novices in reading learning. It requires large amount of text decoding process for reading that it would consume lots of efforts and is dull. The application of digital media could integrate perception, comprehension, and application as well as change complication into simplicity, abstract into specific, and dull into vivid. Assisted with the characteristics of Internet, students could precede online reading, exercise, and feedback. It changes students' cognition process, the principles of traditional teaching, and the relationship between teachers and students in the teaching process. Although reading ability and skills cannot be largely progressed in short period, proper reading strategies could enhance students' reading speed and comprehension as well as increase the quantity of vocabulary and familiarize grammar structure. The research result also reveals that students in

the experimental group with digital media integrated reciprocal teaching present higher performance on reading comprehension and reading motivation, showing the value of digital media integrated reciprocal teaching.

Conclusion

The research findings show that students with digital media integrated reciprocal teaching present differences from those with general teaching model in reading ability and motivation. Digital media integrated reciprocal teaching outperforms general teaching model on reading ability and motivation; in other words, the use of digital media integrated reciprocal teaching could better enhance students' reading ability and motivation than general teaching model. Apparently, digital media integrated reciprocal teaching is convenient and easy to operate, shows active and beautiful animation with clear sound, and presents interactivity. Abstracting key points from articles, participating in test practice, or predicting the development of story allow students investing in efforts that digital media integrated reciprocal teaching could enhance students' reading ability and reading motivation. Traditional books and computer assisted teaching mainly use texts, which could not induce learning motivation and interest. Digital media, on the other hand, link other media, e.g. books, animations, sound, and films, in addition to texts. Animation technology is not simply a drawing tool in education, but the media for interaction and communication to inspire visual experience and wisdom as well as affect the interaction relationship among people through media. When designing reading with digital media integrated reciprocal teaching, the points are the operation of learners' cognition system and the application of strategies to help students' comprehension. An effective technology deepening learning with digital media would present language information with audio and visual forms simultaneously.

Recommendations

Aiming at above research results, the following suggestions are proposed in this study:

1) Teachers are suggested to stress on interactive dialogues with reciprocal teaching and guide students, with digital media integrated reciprocal teaching, to comprehend articles with reading comprehension strategies so as to enhance students' motivation and interests in actively participating in reading.

2) Learning process could become more active by animation. Before planning digital media integrated reciprocal teaching, a team organization is necessary to definitely divide the work of teaching content experts, script editors, graphic designers, and animation producers, have collaborative discussion among experts in various fields, and grasp the design principles of digital media integrat-

ed reciprocal teaching materials in order to design the digital media integrated reciprocal teaching materials meeting learners' needs and learning content.

3) Regarding curriculum design, teachers should pay attention to the cognitive load caused by too much complicated information delivery. Rich audio and video effects could effectively attract students' attention, but could not necessarily achieve the expected learning goal. For this reason, it is worth making efforts to design simple digital media materials which could attract students' attention and achieve learning goals.

4) After completely establishing digital media, teachers totally rely on rich and multiple contents of electronic texts and simply operate buttons on electronic whiteboards to become operators of digital materials. Each learning field presents the characteristics. Without flexibly changing teaching content and selecting proper teaching media according to people, affairs, time, locations, and objects, but simply relying on digital media, teachers could not present the professional ability; and perhaps, a terrible digital disaster might appear.

References

AlJarrah, A., Thomas, M.K., & Shehab, M. (2018). Investigating temporal access in a flipped classroom: procrastination persists. *International Journal of Educational Technology in Higher Education*, *15*(1), 1. DOI: 10.1186/s41239-017-0083-9.

Anderson, T., & Dron, J. (2017). Integrating learning management and social networking systems. Italian *Journal of Educational Technology*, *25*(3), 5-19.

Belpoliti, F. & Gironzetti, E. (2017). Metaknowledge and Metalinguistic Strategies in the Spanish for Heritage Learners Classroom: A Curriculum Redesign. *Hispanic Studies Review*, *2*(1), 45-72.

Chan, E.K.F., Othman, M.A., & Razak, M.A. (2017). Iot based smart classroom system. *Journal of Telecommunication, Electronic and Computer Engineering (JTEC), 9*(3-9), 95-101.

Chandramohan, J., Nagarajan, R., Satheeshkumar, K., Ajithkumar, N., Gopinath, P.A., & Ranjithkumar, S. (2017). Intelligent smart home automation and security system using Arduino and Wi-Fi. International *Journal of Engineering and Computer Science (IJECS)*, *6*(3), 20694-20698. DOI: 10.18535/ijecs/v6i3.53.

Cheng, Y.W., Sun, P.C., & Chen, N.S. (2018). The essential applications of educational robot: Requirement analysis from the perspectives of experts, researchers and instructors. *Computers & Education*, *126*, 399-416. DOI: 10.1016/j.compedu.2018.07.020.

Chu, H.C., Chen, J.M., Hwang, G.J., & Chen, T.W. (2019). Effects of formative assessment in an augmented reality approach to conducting ubiquitous learning activities for architecture courses. *Universal Access in the Information Society*, *18*(2), 221 - 230. DOI: 10.1007/s10209-017-0588-y.

Elfeky, A.I.M. (2019). The effect of personal learning environments on participants' higher order thinking skills and satisfaction. *Innovations in Education and Teaching International*, *56*(4), 505-516. DOI: 10.1080/14703297.2018.1534601.

Hao, J., Bouzouane, A., & Gaboury, S. (2019). An incremental learning method based on formal concept analysis for pattern recognition in nonstationary sensor-based smart environments. *Pervasive and Mobile Computing*, *59*, 101045. DOI: 10.1016/j. pmcj.2019.101045.

Ilter, I. (2019). The Efficacy of ContextClue Strategy Instruction on Middle Grades Students' Vocabulary *Development. RMLE Online*, *42*(1), 1-15. DOI: 10.1080/19404476.2018.1554522.

Koch, H., & Sporer, N. (2017). Students Improve in Reading Comprehension by Learning How to Teach Reading Strategies: An Evidence-based approach for teacher education. *Psychology Learning & Teaching*, *16*(2), 197-211. DOI: 10.1177/1475725717700525.

Lin, C.J., & Hwang, G.J. (2018). A learning analytics approach to investigating factors affecting EFL students' oral performance in a flipped classroom. *Educational Technology & Society*, *21*(2), 205-219.

Lin, H.C., & Hwang, G.J. (2019). Research trends of flipped classroom studies for medical courses: A review of journal publications from 2008 to 2017 based on the technology-enhanced learning model. *Interactive Learning Environments*, *27*(8), 1011-1027. DOI:10.1080/10494820.2018.1467462.

Lin, Y.T. (2019). Impacts of a flipped classroom with a smart learning diagnosis system on students' learning performance, perception, and problem solving ability in a software engineering course. *Computers in Human Behavior*, *95*, 187-196. DOI: 10.1016/j.chb.2018.11.036.

Lopes, A.P., & Soares, F. (2018). Perception and performance in a flipped Financial Mathematics classroom. *The International Journal of Management Education*, *16*(1), 105-113. DOI: 10.1016/j.ijme.2018.01.001.

MacLeod, J., Yang, H.H., Zhu, S., & Li, Y. (2018). Understanding students' preferences toward the smart classroom learning environment: Development and validation of an instrument. *Computers & Education*, *122*, 80-91. DOI: 10.1016/j. compedu.2018.03.015.

Mershad, K., & Wakim, P. (2018). A Learning Management System Enhanced with Internet of Things Applications. *Journal of Education and Learning*, *7*(3), 23-40. DOI: 10.5539/jel.v7n3p23.

Neumann, K.L. & Kopcha, T.J. (2019). Using Google Docs for Peer-then-Teacher Review on Middle School Students' Writing. *Computers and Composition*, *54*, 102524. DOI: 10.1016/j.compcom.2019.102524.

Okkinga, M., van Steensel, R., van Gelderen, A.J., & Sleegers, P.J. (2018). Effects of reciprocal teaching on reading comprehension of lower-achieving adolescents. The importance of specific teacher skills. *Journal of Research in Reading*, *41*(1), 20-41. DOI: 10.1111/1467-9817.12082.

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education*, *128*, 13-35. DOI: 10.1016/j.compedu.2018.09.009.

Tsai, C.Y. (2019). Improving students' understanding of basic programming concepts through visual programming language: The role of self-efficacy. *Computers in Human Behavior*, *95*, 224-232. DOI:10.1016/j.chb.2018.11.038.

Yang, J., Pan, H., Zhou, W., & Huang, R. (2018). Evaluation of smart classroom from the perspective of infusing technology into pedagogy. *Smart Learning Environments*, *5*(1), 1-11. DOI: 10.1186/s40561-018-0070-1.

Zhang, H., & You, L. (2020). Effects of Personal Just World Belief on Professional Growth and Well-Being of Preschool Teachers. *Revista de Cercetare si Interventie Sociala*, *69*, 273-282. DOI: 10.33788/rcis.69.17.