



Self-Regulated English Language Learning in Datacasting Environment: A Case of Intermediate Public Schoolers

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Abstract: Information and communication technologies facilitated distance learning in all schools at the height of the pandemic. However, only 17.7% of Filipino households have Internet access, and only 23.8% of households have communal computers (DICT, 2019). Around 82.7% of households in the country have televisions at home, thus using datacasting technology, learning materials could be delivered to these homes. Datacasting is a broadcast technology that uses TV broadcast signals to deliver a one-way transmission of IP data to students. This mixed-method study aimed to develop and pilot intermediate English lessons and learning materials for distance learning via datacasting. The constructs that support distance learning (DL) via datacasting are interactivity and structure (Moore, 1993;2008). This study also explored the students' application of self-regulatory strategies (SRL) through the framework of Zimmerman (2000). The pilot was conducted in a public elementary school in Cavite, Philippines. Results of analyses reveal that the three categories of learners are non-autonomous, semi-autonomous, and autonomous. A slightly significant correlation exists between their SRL scores and their learning (increase in pretest-posttest writing scores). In terms of the connection between the level of autonomy to the submission rate and the quality of work, the more independence was given to a student, the better he/she performed in terms of both aspects. The more monitored students generally underperformed and submitted works with a lower quality. The results of this study recommend the optimum use of multimedia, and graphics, and better adaptation of texts for interactive multimedia language learning materials.

Key Words: self-regulated learning; datacasting; strategic learning; digital learning; MELCs

1. INTRODUCTION

The implementation of modern digital technologies in education in different types of modalities has been debated by researchers, educators, governments, and stakeholders for two decades (Willis & Aurigi, 2018). However, with the global outbreak of COVID-19, the demand for educational technology for online teaching and learning surged (Jung, 2015; Botero et al., 2018; Cervino & Vera, 2020; Haleem, et al., 2022). Undoubtedly, many educators, especially language educators, found themselves in the middle of the pandemic unprepared (Bailey & Lee, 2020) and struggled with the challenges of emergency distance education or emergency remote teaching (ERT) (Moorhouse & Kohnke, 2021). Digital learning is a prevalent area of importance because of the impact of

the pandemic on all educational settings. Digital learning refers to the effective use of technology in instruction across all academic disciplines. Personalized digital learning refers to the tailoring of learning activities to individual students and the level of control that the student has in making learning decisions (Drexter, 2018). Self-regulated learners plan, decide, and use learning strategies in the digital learning space. Digital teaching offers many affordances that can sustain language skills development (Tuncer & Karatas, 2022). The accessibility to digital resources is a lingering issue confronting most Filipino students and teachers who contend with challenges brought by the digital divide. The digital divide refers to the gap between people who have the means to access modern ICTs (information and communication technologies) like mobile phones and Wi-Fi and those that don't have or

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have limited access. Many students still lack resources to engage in online learning and less than ¼ of households have computers (DICT, 2019; Madrona, 2020). Fortunately, most Filipino households have televisions at home. This paper focuses on low-cost datacasting technology which refers to the process of delivering computer data over a traditional broadcast signal. This paper assumes that datacasting learning materials promote self-regulated language learning.

Review of Related Literature

Educational technologies may be categorized as input technologies, interactive technologies, and portable technologies (Carrier, 2017). Interactive tools are devices and software for interaction with materials and the production of written or spoken artifacts. Smartphone apps proved to be effective tools for academic purposes and not just a distraction to high school students (Clayton & Murphy, 2016). Moreover, less expensive mobile technology benefited academically elementary to college students (Islam & Doyle, 2008; Zhai, 2021). The use of a learning management system (LMS) such as Google Classroom and open educational resources (OERs) such as video-recorded lectures, web-based textual materials, and YouTube clips during online asynchronous classes enabled students in low-resource schools to engage with learning materials at their own pace (Oraif & Elyas, 2021; Alqahtani, 2021). These previous studies echo the need for learning materials with digestible outcomes-based tasks. Regarding synchronous teaching, there are studies that investigated the use of synchronous online language lessons (SOLLS) via video conferencing software (VCS). The break-out rooms of VCS are useful in developing the communicative competence of elementary students in group work that encouraged multimodal responses (Cheung, 2021). In this post-pandemic era, many schools still rely on such platforms as Zoom, Microsoft Teams, etc. providing students with regular real-time student-teacher interaction. Research on interactive technologies for primary and secondary students is scanty (Oraif & Elyas, 2021; Chew & Ng, 2020; Budianto & Yudhi, 2021; Cheung, 2021). The literature reviewed by the researcher calls for investigations on self-regulation of basic education students using interactive technologies. Datacasting is not well studied in the literature, and datacasting learning materials for Filipino students have not been

explored locally. This research aims to answer the following questions:

1. What are the levels of autonomy of the students?
2. Do the datacasting materials that revolve around intermediate English learning competencies produce self-regulated learners?

2. METHODOLOGY

2.1 Research Design

This mixed-method investigation introduces datacasting learning materials and aims to examine the materials' impact on the language learning of intermediate students.

2.2 Participants

Purposive sampling was employed in this study. A group of Grade 6 students in a resource-challenged public school in Cavite participated in the piloting of the materials that cover quarter 3 and quarter 4 of the school year 2021 – 2022.

2.3 Instruments

The researcher co-wrote the lesson plans that were transformed into datacasting materials by a team of information technology (IT) experts from De La Salle University. The learning materials were designed following the principle of the seamless interplay between structure and high interactivity using graphics and animation. The materials developed address these competencies: present a coherent, comprehensive report on differing viewpoints on an issue (EN10LC-IIIId-3.18); evaluate narratives based on how the author developed the elements (EN6RC-Ig-2.24.1-2.24.2); compose clear and coherent sentences using appropriate grammatical structures (verb tenses, conjunctions, adverbs) (EN6G-Ig-4.4.1) and compose a persuasive essay on a self-selected topic (EN6WC-IVb-2.2). Lastly, this study also used SRL (self-regulated learning) worksheets and a pretest and posttest.

2.4 Data

Data came from the SRL worksheets, posttest scores, and tables of weekly output submissions.

2.5 Limitations of the Study

This investigation focuses on the English MELCs of intermediate students only as such future investigations could study datacasting materials on the competencies of senior high school English curriculum. Another limitation concerns the



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generalizability of the results of this study. The final sample size of this study represents a group of intermediate students who qualified to stay in the project until its conclusion. Pandemic-induced attrition in the sample prompted a change in the method of statistical evaluation of the materials. Thus, a bigger sample for a future study that tackles the same research problems is suggested.

2.6 Theoretical Framework

Datacasting technology is limited by smaller bandwidth and minimal teacher-student interaction. As such, distance learning (DL) via datacasting can be situated between traditional (e.g., paper-based) DL and fully online DL (see Figure 1). The constructs in the figure are based on Michael Moore's (1993; 2018) *transactional distance theory*. *Structure* refers to how content and teaching are organized in courses and programs. On the other hand, *dialogue* refers to how teachers interact with students to construct knowledge. According to Sison (2021), traditional, paper-based DL compensates for the lack of teacher-student dialogue by having a high degree of structure: lessons, learning activities, and learning materials are designed carefully and systematically and then tested thoroughly. DL via datacasting will need to have a higher degree of structure than fully online DL but can have a higher degree of interactivity than paper-based DL, especially when one considers not only social interactions (i.e., teacher-student and student-student interactions) but also student-content interactions.



Figure 1. Distance Learning (DL) Modalities

Zimmerman's self-regulation theory also underlies this study. It posits that the outcomes of students' engagement with academic goals are influenced by their outlook on their capability to succeed, mindset, and feelings. Zimmerman believes that learners can be taught how to self-monitor and reflect as they pursue academic goals. They thrive on their knowledge of their personal strengths and weaknesses. The theory is actualized by self-monitoring and reflection while pursuing academic goals.

2.7 Data Gathering Procedure and Methods of Analysis

Primarily, the development of the materials followed an iterative procedure, consisting of these steps: 1. Select a learning competency; 2. Analyze the learning competency vis-à-vis the learner and the delivery method; 3. Design a lesson, and the learning materials for the lesson, for the competency, using the framework for distance and remote learning via datacasting; 4. Evaluate the design; 5. Develop the lesson and learning materials, and 6. Evaluate the lesson and learning materials. The deployment included training of the students, orientation for teachers and parents of the children, and provision of tablets. The students took photos of their worksheets and sent them back through their tablets. They accessed weekly the lessons through tablets that served as the datacasting technology, answered the pretest and posttest, and accomplished the SRL worksheets at the end of the lessons. Pearson correlation coefficient was applied to the SRL scores, while qualitative analysis was the lens used with the data on their weekly output submission.

3. RESULTS AND DISCUSSION

The research questions and their answers are presented in this section. Research question number 1. What are the levels of autonomy of the students? Table 1 shows the number of artifacts submitted, worksheet submission rate, and level of autonomy of the students who were still included in the final phase of the study. The word artifact means a page or an image. Although looking at the number of artifacts submitted by each student has some value, it should not be used as the main indicator of the student's worksheet submission rate, given that some students submitted several images just for one worksheet. In

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contrast, others only submitted one image per worksheet or combined several worksheets or items in one image submitted. Looking closely, it is interesting to note that the more autonomous or independent students generally had an overall higher rate of submission when compared to the students who were non-autonomous or were monitored and aided by their parents or guardians. Student IES 0037, the only student who worked on the modules independently, had a submission rate of 70% of all the worksheets used in this analysis. Meanwhile, the six students who worked on the modules semi-independently had an average submission rate of 62.8% for all worksheets used in the analysis. Regarding the completeness of each worksheet submitted, the six students had an average of 76.9% of all submissions coded as 'Complete'. Finally, the two students who worked under the close supervision of an adult both had an average worksheet submission rate of 18.3%. Then, in terms of the completeness of each worksheet submitted, the two students had an average of 89.29% of all submissions coded as 'Complete'. For the sole student who answered the worksheets provided autonomously, 74.2% of the student's submissions were coded under 'Accurate', which meant that the student got all the answers correctly for these submissions. The six students who worked on the modules semi-autonomously garnered an average of 62.7% of all their submissions coded as 'Accurate'. Lastly, the two students who were closely monitored by their parents or guardians throughout the study garnered an average of 85.71% of all submissions coded as 'Accurate'.

Table 1
Worksheet Submission Rate and Level of Autonomy

Student No.	No. of Artifacts Submitted	No. of Worksheets Submitted	Worksheet Submission Rate	Level of Autonomy
IES 0017	7	5	16.67%	Non-autonomous
IES 0025	11 (1 video)	8	43.33%	Semi-autonomous
IES 0027	14	6	20%	Non-autonomous
IES 0028	9 (1 video)	10	33.33%	N/A
IES 0034	8	5	16.67%	N/A
IES 0035	2	4	13.33%	N/A
IES 0037	28 (1 video)	21	70%	Autonomous

IES 0039	17 (1 video)	13	43.33%	Semi-autonomous
IES 0046	4	2	6.67%	N/A
IES 0047	27	19	63.33%	Semi-autonomous
IES 0048	28 (3 videos)	17	56.67%	Semi-autonomous
IES 0049	27 (1 video)	26	86.67%	Non-autonomous
IES 0051	39 (2 videos)	25	83.33%	Semi-autonomous
TOTAL:		MAX: 30		
		221		

Table 2 shows the number of artifacts and test types in the lessons. Of all the artifacts gathered for the analysis, 'Answering Questions' was by far the most numerous test type utilized across all worksheets in the modules. This test type comprised approximately 58.82% of all artifacts that were gathered for this analysis. Under the code category for 'Content', artifacts were coded by both completeness and accuracy. Regarding completeness, approximately 83.64% of all submissions for this test type were coded as 'Complete', while roughly 60.84% were coded as 'Accurate'. Plagiarism was also under the code category for Accuracy, and for this test type, around 10.49% of all artifacts were coded as 'Plagiarized'. As for the 'Language' code category, most submissions were coded as 'Error-Free'. The error types were also coded based on the type committed, and the order of occurrences from most to least common was grammatical errors (32.35%), spelling errors (19.41%), capitalization errors (4.71%), and lastly, punctuation errors (1.18%).

Table 2
Number of Artifacts per Lesson and Worksheet Test Types

Lesson No.	No. of Artifacts	Test Type/s
E608	37	W01: Answering questions W03: Completing the information gathering grid; writing a report
E609	31 (10 videos)	W01: Answering questions W02: Writing an outline W03: Answering questions + making a video presentation
E610	29	W01: Answering questions W02: Answering questions W03: Answering questions

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		W04: Answering questions
E611	7	W03: Completing a table
E612	10	W03: Writing a persuasive essay
E613	11	W02: Answering questions W03: Writing a persuasive essay
E614	5	W05: Writing a persuasive essay
TOTAL	130	

Research question number 2. Do the learning materials that revolve around the learning competencies (MELCs) produce self-regulated learners? Table 3 presents the correlation between the students' SRL scores and learning (pretest-posttest writing scores). Pearson correlation shows that the SRL scores are moderately correlated ($p=.198$; $p=.210$) with their learning. Even though this is only slightly significant, this finding implies that the enabling activities of the lessons were motivating. Moreover, regardless of the levels of autonomy and reading proficiency of the students, it could be inferred that the enabling writing activities of the lessons enhanced their writing skills and that the SRL activities also afforded them a chance to exercise their metacognitive skills by way of doing self-evaluation. Table 4 lists the meanings of the coefficients, while Table 5 shows a sample unedited SRL worksheet accomplished by one of the learners.

Table 3
Correlation between SRL Score and Learning (Posttest - Pretest (Writing only))

Pretest Score	Posttest Score	SRL Score	Correlation
17	2	2	$r=.198$
25	2	2	$r=.210$
27	3	2	
28	-	3	
31	-	-	
35	-	-	
37	3	3	
39	3	-	
47	-	3	
48	2	3	
49	3	2	
51	1	5	

Table 4
Interpretation of correlation coefficients

Correlation	Interpretation
0.0-0.29	Very slight to low (correlation of .03 would be defined as "no correlation")
0.30-0.49	Low
0.50-0.69	Moderate
0.70-0.89	Highly significant
0.90-1.00	Very high (a correlation of 1.00 would be defined as a "perfect correlation")

Table 5
Sample SRL Worksheet (Worksheet #2)

1. I think 10. Yes, because it's well support, well written and it has logic
2. None
- 3.

Criteria	Score	Explanation
Content	5	because the essay discussed the advantages of video games
Development	5	It expresses a complete ideas
Language	5	words that were used are easy to understand

4. CONCLUSIONS

In this research, the researcher argued that datacasting materials could potentially develop self-regulated language learners. The findings of this study align with those of previous studies on the power of digital language lessons to develop self-regulated learners (Rivers, Vallance, & Nakamura, 2021; Oraif & Elyas, 2021) but are in contrast with the finding of Xu, Li, & Yang (2021) about the relative discomfort experienced by their sample in the multimedia network environment. Based on the results of this study, it can be inferred that the enabling worksheet activities afforded the students the scaffolding needed for meeting the writing demands of the lessons. They were digitally literate visual learners who probably found the graphic organizers and sample texts in the lessons useful in developing critical and creative thinking through digital writing. The instructional implication of the results of this study is for language teachers to use ICTs judiciously in their classes to develop activities that are anchored on learning outcomes. Another implication is for educational technologists and teachers to use optimally appropriate graphics and animation in online language lessons so that the digital space will effectively be conducive to language learning and effective teaching.

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5. ACKNOWLEDGMENT

The researcher thanks Kenneth Filbert Chan Bona for lending his expertise in formatting this paper.

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