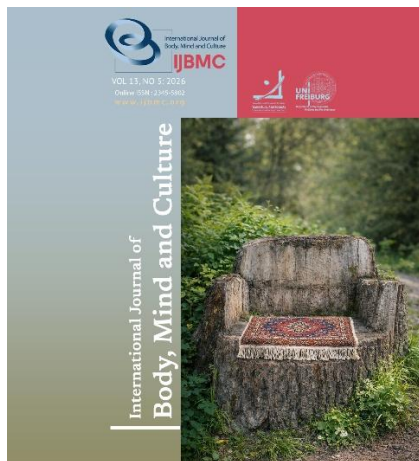


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Digital Storytelling, Communication Anxiety, and English Learning Motivation Among Indonesian EFL Students: A Pre-Post Intervention Study

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ABSTRACT

Objective: This study examined changes in communication anxiety and English-learning motivation among Indonesian university EFL students following an eight-week Toontastic-based digital storytelling intervention.

Methods and Materials: This exploratory pre-experimental study used a one-group pretest-posttest design. Participants were 60 EFL students aged 18–22 years from a private university in East Java, Indonesia, selected through convenience sampling. The intervention involved eight weeks of digital storytelling activities using Toontastic, including story exploration, brainstorming, plot development, scriptwriting, voice recording for animated characters, and digital story production. Communication anxiety and L2 motivation were measured using selected items from Peng and Woodrow's Willingness to Communicate Questionnaire. Data were analyzed using descriptive statistics, paired t-tests, and Cohen's d effect sizes.

Findings: Communication anxiety decreased across all six anxiety items after the intervention, especially in spontaneous speaking, oral presentations, and formal discussions. All anxiety changes were statistically significant ($p < 0.001$), although effect sizes were very small to small ($d = -0.09$ to -0.22). English learning motivation increased across all 12 motivation items, with all pre-post differences statistically significant ($p < 0.001$). Most motivational effects were small, while one item showed a moderate effect size ($d = 0.55$), particularly reflecting gains in identity-related and intrinsic motivation.

Conclusion: Toontastic-based digital storytelling was associated with reduced communication anxiety and increased motivation to learn English among EFL students. However, given the one-group design and small anxiety effects, findings should be interpreted as preliminary evidence.

Keywords: Motivation, Anxiety, Communication, Language, Students, Educational Technology.

Introduction

Indonesian students often experience a paradox in EFL learning. Despite years of study and adequate linguistic knowledge, they remain reluctant to speak in class, as seen in second-year students at a private university in Malang. Anxiety accounts for about 43% of students' reluctance to speak [Astuti & Chakim \(2023\)](#), reflecting psychological barriers such as fear of negative evaluation and low self-confidence rooted in teacher-centered learning and exam-focused culture. This condition creates a gap between linguistic ability and communicative confidence, causing students to remain silent or contribute minimally to classroom interactions.

The context of EFL education in Indonesia reinforces a cycle of instrumental motivation, fear of error, and accuracy-oriented learning, thereby increasing test anxiety and undermining confidence ([Astuti & Chakim, 2023](#); [Fu et al., 2022](#)). In a collective and hierarchical classroom culture, students tend to avoid communicative risk and opt for minimal participation as a self-protective strategy. This psychological environment indicates that speaking success depends not only on linguistic competence but also on emotional regulation, self-perception, and the affective conditions that accompany the learning process, making interventions targeting affective aspects important for reducing anxiety and strengthening students' readiness for communication.

Digital storytelling (DST) has emerged as a pedagogical strategy with the potential to support emotional security, creativity, and learning autonomy. DST allows students to construct narratives using text, images, and sound ([Bai & Xian, 2024](#)), while applications such as Toontastic provide a safer environment for speaking practice through animated characters, thereby reducing the performative pressure of speaking directly. Previous findings indicate that DST contributes to increased creativity, confidence, and speaking comfort ([Astuti & Chakim, 2023](#)), prompting this study to implement an eight-week Toontastic intervention as a pedagogical effort to create a psychologically safer communicative practice space for EFL students.

Although interest in affective variables in second language learning continues to grow, there remains

limited research that simultaneously examines changes in L2 motivation and communication anxiety in pre-post intervention designs using standard psychometric instruments. In addition, empirical evidence regarding the impact of DST in a single-group pre-experimental context is also relatively limited. These limitations indicate an empirical gap in understanding how technology-based interventions simultaneously affect the dynamics of motivation and communication anxiety.

Based on this gap, this study aims to describe and analyze changes in second-language learning motivation and communication anxiety among EFL students following an eight-week DST intervention. This study uses a single-group pre-post design with quantitative measurements based on standard psychometric questionnaires, including WTC measurements using the Jian-E Peng scale, with pre-post score comparison analysis, statistical significance tests, effect size calculations, and mapping of changes in motivational orientation in relation to anxiety and WTC.

Conceptually, this study does not aim to establish a strong causal relationship, but rather to provide an empirical picture of changes in affective variables following a technology-based pedagogical intervention. Thus, the results of this study are presented as pre-experimental, descriptive-analytical findings that show the dynamics of change in motivation and communication anxiety in the context of DST-based EFL learning.

Theoretically, this study makes a limited but relevant contribution to WTC research by showing that affective factors, such as motivation and communication anxiety, are dynamic and can change in the context of technology-based learning interventions. Rather than claiming a structural extension to the WTC model of [MacIntyre et al. \(1998\)](#), this study positions the findings as contextual empirical support that DST-based pedagogical interventions can function as a facilitative environment that modifies affective conditions related to communication readiness, as well as providing pre-experimental evidence regarding changes in L2 motivation and communication anxiety among Indonesian EFL students.

Methods and Materials

Study Design

This study used a one-group pretest–posttest design to describe changes in second-language (L2) learning motivation and communication anxiety among EFL students following an eight-week Digital Storytelling (DST) intervention using the Toontastic application. This design does not involve a comparison group, so it is not categorized as quasi-experimental, but rather as an exploratory pre-experimental study with limited internal validity. The choice of this design was based on pedagogical and institutional considerations: the intervention was part of a classroom learning program that all students were required to participate in, so forming a control group was not possible in the context of actual implementation.

This study explicitly acknowledges the limitations of the design, including threats to internal validity such as maturation, testing effects, regression to the mean, and history bias. These threats cannot be eliminated without a comparison group, so the research findings are treated as indicators of change rather than evidence of a strong causal relationship. Therefore, the research results are cautiously interpreted as an empirical description of changes in affective variables following the intervention, not as evidence of the DST intervention's causal effectiveness.

The research participants comprised 60 EFL students aged 18–22 years from a private university in East Java, with intermediate English proficiency. Participants were recruited via convenience sampling from a single educational institution, so the sample's representativeness and the external validity of the findings are limited. This study does not aim to generalize the population but rather to provide a contextual description of changes in L2 motivation and communication anxiety in a specific institutional context.

L2 motivation and communication anxiety were measured using Peng & Woodrow's (2010) Willingness to Communicate (WTC) Questionnaire. This instrument was used as a standard psychometric measure for affective and communicative variables in the EFL context. In this study, items 23–34 were used as indicators of second-language learning motivation, and items 11–16 as indicators of communication anxiety, with an operational approach to the observed constructs.

This study did not perform confirmatory factor analysis, so the use of these subscales was treated as a literature-based operational grouping rather than a structural validation of new factors.

The instruments were used as composite scores for each construct (motivation and anxiety), with the main analysis conducted at the subscale total score level. Interpretive categories (e.g., high, medium, low) were used descriptively to aid in mapping changes, without making normative claims about psychometric validation.

Data Collection Procedures

Data collection was carried out in three main phases in line with the pre-experimental pre-post design. Pre-test phase (week 0). Students were informed about the research objectives, research procedures, participant rights, confidentiality principles, and the voluntary nature of participation, which did not affect academic assessment. After providing informed consent, all participants completed the WTC Peng & Woodrow (2010) Questionnaire in a controlled, conducive classroom setting, with standard instructions to minimize social desirability bias and evaluative pressure.

Intervention phase (weeks 1 to 8). The Digital Storytelling (DST) intervention was implemented as part of regular classroom learning using the Toontastic application. The activity took place in a structured manner through six pedagogical stages: (1) introduction to the concept of DST and learning objectives, (2) exploration of story ideas and themes, (3) brainstorming and plot development, (4) narrative script writing, (5) voice recording through animated characters, and (6) digital story production. The activities were carried out in a learning context facilitated by lecturers/teachers as pedagogical assistants, to create a psychologically safe communicative practice environment, rather than a performance-based evaluative environment. This intervention was positioned as an integrated learning experience, rather than an isolated experimental treatment.

Post-test phase (week 9). After the intervention was completed, participants completed the same WTC Questionnaire using the same administrative procedures as on the pre-test. A time interval was provided to reduce the test–retest effect and allow for the initial stabilization of affective changes that emerged during the intervention.

This study was conducted in accordance with the principles of educational research ethics, including voluntary participation, respondent anonymity, data confidentiality, and participants' right to withdraw without academic consequences. All data were collected and analyzed in aggregate without personal identification.

Data Analysis Procedures

Data analysis was adjusted to the characteristics of a single-group pre-experimental design. Data were analyzed quantitatively using a pre-post approach, focusing on changes in composite scores.

The analysis steps included: (1) preliminary data examination (data screening), including response completeness, score distribution, and outlier identification; (2) examination of basic statistical assumptions on difference scores; (3) calculation of descriptive statistics (mean and standard deviation) for pre- and post-scores on the L2 motivation and communication anxiety constructs; (4) testing differences using a paired t-test; and (5) calculation of

effect size (Cohen's *d*) to interpret the magnitude of substantive change.

The main analysis was conducted at the composite construct score level (total motivation and total anxiety). Analysis at the item level was used exploratively and descriptively to observe patterns of change, but was not used as the main basis for statistical inference. With this approach, the analysis results were positioned as a description of empirical changes in a pre-experimental design, not as evidence of a causal relationship with the DST intervention.

Findings and Results

Anxiety in communicating was measured using six items (Items 11–16) from the Willingness to Communicate Questionnaire (Peng & Woodrow, 2010), which represent communication situations with lecturers and peers in the context of English classes. A six-point Likert scale was used (1 = not anxious at all; 6 = very anxious).

Table 1

Communication Anxiety in Language Classes (Items 11–16, Pre–Post Test)

Item	Pra (M)	Pasca (M)	ΔM	SD Pra	SD Pasca
11	3,28	3,10	-0,18	1,22	1,36
12	3,30	3,18	-0,12	1,28	1,33
13	3,23	3,08	-0,15	1,24	1,38
14	3,65	3,33	-0,32	1,44	1,42
15	3,30	3,00	-0,30	1,38	1,31
16	3,93	3,60	-0,33	1,55	1,50

Note: ΔM = post-test score – pre-test score. Changes in SD indicate variation in distribution, not the direction of psychological change.

Descriptively, all items showed a decrease in average anxiety after the digital storytelling (DST) intervention. The largest decrease occurred in situations that required spontaneous and evaluative oral production, namely speaking without preparation (Item 16, -0.33), oral

presentations (Item 14, -0.32), and formal discussions (Item 15, -0.30). However, the changes in standard deviation were relatively small, indicating that post-intervention anxiety levels still varied between individuals (Table 1).

Table 2

Paired t-test and Effect Size of Anxiety (Items 11–16)

Item	Cohen's <i>d</i>	Interpretasi	<i>p</i>
11	-0,14	Sangat kecil	< 0,001
12	-0,09	Sangat kecil	< 0,001
13	-0,11	Sangat kecil	< 0,001
14	-0,22	Kecil	< 0,001
15	-0,22	Kecil	< 0,001
16	-0,22	Kecil	< 0,001

The results of the paired t-test show that all pre-post differences are statistically significant ($p < 0.001$). However, the effect sizes range from very small to small (-0.09 to -0.22), indicating that the changes in anxiety are limited in practical terms, although consistent (Table 2).

Table 3

Motivation to Learn English (Items 23–34, Pre–Post Test)

Item	Pra (M)	Pasca (M)	ΔM	SD Pra	SD Pasca
23	3,88	4,22	0,34	1,55	1,33
24	5,00	5,08	0,08	1,16	1,11
25	4,93	5,03	0,10	1,16	1,12
26	4,55	4,90	0,35	1,25	1,00
27	4,92	5,35	0,43	1,21	1,15
28	5,25	5,40	0,15	1,05	0,91
29	4,95	5,32	0,37	1,24	1,14
30	4,75	5,20	0,45	1,11	1,02
31	4,55	4,95	0,40	1,06	1,02
32	4,40	5,00	0,60	1,12	0,97
33	4,28	4,63	0,35	1,14	1,23
34	4,37	4,82	0,45	1,22	1,10

Table 4

Paired t-test and Effect Size of Motivation (Items 23–34)

d range	Interpretation
0.07 – 0.15	Negligible–very small
0.23 – 0.40	Small
0.55	Moderate

According to Table 4, all items showed statistically significant increases ($p < 0.001$), but most effect sizes were small, with one item reaching a moderate effect (Item 32).

Discussion and Conclusion

The findings show a decrease in communication anxiety scores on all items after the digital storytelling (DST) intervention. However, the effect size was very small to small (Cohen's $d = -0.09$ to -0.22), indicating that the change was statistically moderate but practically limited. Thus, these results do not indicate a substantive reduction in anxiety, but rather a small yet consistent affective shift in students' perceptions of English communication situations.

The largest average decrease was observed in communication situations requiring spontaneous and evaluative oral production, such as speaking without preparation, oral presentations, and formal discussions. This pattern is consistent with the foreign language

Motivation was measured using 12 items (Items 23–34) from the same questionnaire, which covered the instrumental, identity, and intrinsic dimensions (Table 3).

classroom anxiety literature, which states that uncertainty, time pressure, and public evaluation are the main triggers of communication anxiety (Horwitz et al., 1986; MacIntyre et al., 1998). However, the relatively small magnitude of change indicates that DST intervention has not fully addressed structural sources of anxiety, such as concerns about linguistic errors or negative evaluation.

Minimal changes in standard deviation across most items indicate that, although average anxiety levels decreased, interindividual variation remained high and not all students experienced the same benefits. This finding reinforces the view that language anxiety is a complex construct shaped by personal, social, and contextual factors that cannot be significantly altered by a single pedagogical intervention within a limited time frame (MacIntyre & Gardner, 1991).

Theoretically, this limited but consistent decrease in anxiety can be understood within the framework of Willingness to Communicate (WTC), in which anxiety is

one of the proximal determinants of speaking readiness (Peng & Woodrow, 2010). The reduction in anxiety at the item level suggests that DST has the potential to create affective conditions that are slightly more supportive of oral participation. However, as this study did not report WTC composite scores directly, the implications for WTC improvement should be understood as conceptual inferences rather than direct empirical findings.

Furthermore, although previous literature suggests that the use of animated characters and repetitive practices can reduce affective distress (Del-Moral-Pérez et al., 2019; Fu et al., 2022), this study did not include qualitative data to confirm these psychological mechanisms. Therefore, the relationship between DST and reduced anxiety in this context should be interpreted as a statistically consistent association rather than strong causal evidence.

The results showed that motivation to learn English increased across all items after the DST intervention, with effect sizes ranging from negligible to moderate (Cohen's $d = 0.07-0.55$). However, it should be noted that at the pre-test stage, students' motivation was already relatively high, particularly in the instrumental and identity dimensions. This condition indicates a ceiling effect, which inherently limits the potential for post-intervention score increases.

Most of the observed increases were small ($\Delta M = 0.08-0.45$), which, although statistically significant, did not always indicate large practical motivational changes. These findings emphasize the importance of distinguishing between statistical and educational significance, especially in studies with moderate sample sizes that allow detection of small changes (Plonsky & Oswald, 2014).

Larger increases were observed on items related to the identity and intrinsic dimensions, such as self-perception as a multilingual speaker, personal satisfaction, curiosity, and emotional enjoyment when interacting with English. This pattern is consistent with the L2 Motivational Self System framework (Dörnyei, 2006, 2020) and Self-Determination Theory (Deci & Ryan, 2013), which emphasize that motivation becomes more sustainable when language learning is connected to personal identity and autonomous experiences. However, in this study, the connection is interpretive, as no formal testing of theoretical models, such as

mediation analysis or structural modeling, was conducted.

The decrease in standard deviation for most motivational items indicates that post-intervention motivation became more homogeneous among students, which may reflect the formation of a shared perception of the relevance and value of English language learning in the classroom context. However, this homogeneity does not necessarily indicate an increase in the quality of motivation, but rather only a higher consistency of perception at the group level.

Implications for Willingness to Communicate (WTC)

Although this study conceptually positions anxiety and motivation as predictors of WTC, the empirical findings presented do not include direct measurements of WTC in the form of pre-post composite scores. Therefore, the claim that DST increases WTC cannot be statistically confirmed, but can only be inferred indirectly through changes in related affective variables.

Within the dynamic framework of WTC, small changes in anxiety and motivation may contribute to readiness to speak in specific situations, but do not guarantee stable or long-term changes in communication behavior (MacIntyre et al., 1998). Thus, the results of this study are more appropriately understood as preliminary evidence that DST can support affective conditions that are slightly more conducive to communication, rather than as an intervention that directly improves students' speaking behavior.

Cultural Context and Interpretation

Discussions about the cultural context of classrooms in Indonesia should be approached with caution. Although previous literature describes Indonesian EFL classrooms as hierarchical and risk-averse (Sulistiyo, 2016), this study did not collect empirical cultural data such as classroom observations or student interviews. Therefore, the interpretation that DST "challenges hierarchical norms" or "reshapes learning behavior" should be viewed as a conceptual hypothesis rather than a direct finding from the data.

Nevertheless, quantitative findings showing a consistent decrease in anxiety and increase in motivation can be understood as an indication that a more collaborative and creative learning approach does not conflict with the local cultural context and has the potential to create a safer, affective space for some students.

Overall, this study shows that Toontastic-based digital storytelling is associated with a small but consistent decrease in communication anxiety and a moderate increase in several aspects of motivation, particularly those related to identity and intrinsic motivation. However, the relatively small effect size, the pre-post design without a control group, and the limitations of direct WTC measurement call for cautious interpretation. These findings are more appropriately positioned as preliminary evidence supporting the potential of DST as an affective support strategy in EFL learning, rather than as a causally proven intervention.

This study shows that an eight-week Toontastic-based Digital Storytelling (DST) intervention effectively reduces communication anxiety and increases motivation to learn English among Indonesian EFL students. Adaptation of Peng & Woodrow's (2010) WTC instrument revealed that communication anxiety, especially in spontaneous tasks, presentations, and formal discussions, decreased to a final average of 3.21, as creative and gradual narrative practice created a safer speaking space. At the same time, students' motivation, whether instrumental, identity as prospective multilinguals, or intrinsic motivation, increased with smaller interindividual variation. Overall, DST serves as a dual catalyst that reduces anxiety and increases motivation, thereby strengthening emotional readiness, perceived competence, and motivational orientation within the WTC framework. These findings confirm Toontastic's strong potential as a pedagogical approach that supports more confident oral participation, although further research is needed to expand the generalization of the results.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants.

Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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