

# Using Arcs Model to Develop Motivational Web-Based English Instructional Materials for Learning Disabilities Students in Sabah

Carlmla Freddie J Simol, Mohd Hanafi Mohd Yasin, Ahmad  
Zamri Bin Mansor

Education Faculty, National University of Malaysia (UKM), Bangi, Selangor, Malaysia

Corresponding Author Email: mhmy6365@ukm.edu.my

To Link this Article: <http://dx.doi.org/10.6007/IJARPED/v12-i3/17764>

DOI:10.6007/IJARPED/v12-i3/17764

*Published Online:* 05 September 2023

## Abstract

This research and development study aims to create effective web-based instructional materials for learning English for Communication subject, enhancing students' enjoyment. It also investigates the influence of the ARCS model on motivation and learning outcomes of Form One learning disabilities students. Following the ADDIE model, the study utilized a mixed-methods approach with participants from three national secondary schools in Sabah. The analysis revealed that satisfaction, confidence, and inertia significantly predicted students' web enjoyment experience, while attention and relevance did not show significant effects. Satisfaction had a stronger impact than confidence. Implementing the ARCS model had a significant positive effect on motivation and learning outcomes for Form One learning disabilities students. Despite challenges, students showed high task completion and a sense of accomplishment. They expressed satisfaction with well-designed web-based materials and highlighted the positive impact of the social learning environment. The study provides strong evidence for the interrelationships between web-based learning, motivation, and learning outcomes, with implications for effective motivational strategies in distance learning, particularly for learning disabilities students.

**Keywords:** Web-Based English Instructional Materials, ARCS Model, Learning Disabilities Students, Motivation, Learning Outcomes

## Introduction

The ARCS design by Keller (1987), discussed in this paper, emphasizes the importance of incorporating instructional strategies that enhance students' motivation by increasing their attention, relevance, confidence, and satisfaction. This design has been adapted to web-based instructional learning, specifically in English language education (Yantraprakorn et al., 2018). Furthermore, Marull and Kumar (2020) agree that the internet has provided valuable opportunities for learners to acquire English language skills through authentic interactions and genuine resources. While technology is being widely used for English teaching and learning, its potential as a support for students with learning disabilities (SLD) has not been

extensively explored (Lopez-Fernandez, 2021). Hurwitz et al (2021) found that each student's level of intrinsic motivation influences their perception of success and enjoyment in online learning. Additionally, Aravind & Rajasekaran (2021); Ryan & Deci (2020) found that motivation is an intrinsic desire that drives individuals to engage in an activity and can improve students' understanding and practice in the subject, including in the field of special education (Jdaitawi & Kan'an, 2022). Recent studies have shown that ICT has the potential to overcome limitations in teaching and learning for SLD (Medina-García et al., 2021; Schwartz et al., 2021). Therefore, it is crucial for SLD to acquire digital skills to navigate professional and everyday tasks effectively. Heo & Toomey's (2020) study highlights the successful development of digital skills and online instruction for special education students, emphasizing the importance of incorporating ICT competencies into the education and training of SLD (Ibrahim 2021). Well-designed web-based instructional materials can enable SLD to acquire modern education and necessary skills for the information age, as noted by (Wu, 2022; Yakubova et al., 2022). However, these students often exhibit reduced persistence in academic exercises due to a lack of motivation (Gkora & Karabatzaki 2023). Educational technology, when appropriately used, can enhance motivation, attention performance, and engagement across all disciplines (Jdaitawi et al., 2022; Liu, 2022). It has been found that student engagement intensity correlates positively with pleasure in learning, motivation, and learning outcomes (Cebi & Guyer, 2020). Agreed by Mystakidis et al (2022), motivation and learning have a reciprocal relationship in building knowledge and understanding skills, and research on motivation has been extensively conducted in traditional education settings.

To effectively support students' learning needs, there is an ongoing debate on how to integrate computer technologies into special education classrooms (Tsakiridou & Drigas, 2022; Liouni et al., 2022). However, research on motivation to learn in an online context, especially for students with SLD, is limited in both quantity and scope (Meşe & Sevilen, 2021). Nevertheless, incorporating elements that increase online learning motivation and activate engagement in virtual classrooms is essential. The attention component of the ARCS model is crucial in determining student motivation in the virtual classroom. Therefore, instructional plans should consider and incorporate motivation to enhance the appeal of courses and accommodate individual differences (Lacka & Haddoud, 2021).

### **Methodology**

This study adopted the Type 1 in Design and Development Research (DDR) methodology, which focuses on module or product development. It uses the ADDIE model. The integration of ADDIE and ARCS models in instructional design and development is crucial for ensuring the effective incorporation of technology in education. While ADDIE provides a general process for developing educational materials, the specific applications of the ARCS model can enhance motivation and engagement among learners. The ADDIE's instructional design model was applied for this study since it is based on behaviourism, an idea developed by Richey & Klein (2014) to design a learning system. Additionally, this study employs a technique called purposeful sampling to select the participants and the settings. Purposeful sampling, an anthropological approach, allowed researchers to interact directly with the participants in the study, facilitating the exploration of meaning in the research context. The participants were Form One SLD in national secondary school with Special Education Integrated Programme (SEIP) at Kota Kinabalu, Kota Belud and Penampang, Sabah. They were selected to match the criteria of the study and the goal is to develop an understanding of the situation being studied.

Data analysis involved organizing the survey responses using descriptive statistics and frequency analysis to address the research objectives. Mean scores were interpreted as a measure of participants' overall responses and based on Moidunny (2009) mean score interpretation (as shown in Table 1). This quantitative study utilized face-to-face questionnaires to gather data from Form One SLD. The data gathered from this study was analysed using the 26<sup>th</sup> version of SPSS software used for data analysis to get descriptive statistic (frequency, percentage and mean).

## Result

Table 1

*Mean Score Interpretation*

Mean Score	Interpretation
1.00 – 1.80	Very Low
1.81 – 2.60	Low
2.61 – 3.20	Medium
3.21 – 4.20	High
4.21 – 5.00	Very High

Source : Moidunny (2009)

Table 2

*Demographic Background of Respondents.*

		Frequency	Percentage, %
Gender	Male	54	54.0
	Female	46	46.0
Age	13 years old	100	100.0
Ethnic	Malay	6	6.0
	Chinese	14	13.0
	Indian	3	1.0
	Sabah native	77	80.0
Learning disabilities	Down syndrome	2	2.0
	ADHD	11	11.0
	Autism	14	17.0
	Cerebral palsy	7	7.0
	Inertia (slow learner)	19	20.0
	Dyslexia	3	3.0
	Various disabilities	39	41.0

This paper provides a general view of the characteristics of respondents involved in this study. The respondents were mostly of male (54, 54.0%) followed by female (46, 46.0%). The age of all respondents is 13 years. Majority of the respondents are Sabah Native (77, 77.0%), followed by Chinese (14, 14.0%), and Malay (6, 6.0%) respectively. Only 3.0% (3) of respondents were Indian. In terms of learning disabilities, 39.0% (39) of the respondents had various disabilities, followed by respondents with inertia (slow learner) (19.0%, 19), autism (14.0%, 14), and ADHD (11.0%, 11). Cerebral palsy, dyslexia, and Down syndrome were represented by 7.0% (7), 3.0% (3), and 2.0% (2) of the respondents respectively.

Table 3

*Level of Attention on Web-Based English Instructional Materials (N=100)*

Variable	Item	Std. deviation	Percentage, %	Total mean	Mean interpretation
Attention	1	.733	82.0	4.22	Very high
	2	.656	91.0	4.44	Very high
	3	.684	89.0	4.42	Very high
	4	.626	93.0	4.46	Very high
	5	.601	94.0	4.61	Very high
	6	.642	92.0	4.55	Very high
	7	.685	89.0	4.43	Very high
	8	.611	94.0	4.50	Very high
	9	.565	96.0	4.62	Very high
	10	.658	91.0	4.47	Very high
	11	.627	93.0	4.53	Very high
	12	.698	88.0	4.41	Very high
	13	.673	90.0	4.46	Very high
	14	.706	86.0	4.31	Very high
	15	.674	90.0	4.47	Very high
<b>Total</b>		<b>.656</b>	<b>90.5</b>	<b>4.46</b>	<b>Very high</b>

\*\* Full details of Item 1 – Item 15 are presented in Appendix A (i)

Attention component (Table 3) is the first element of ARCS model and sets the motivational strategy for the students. This construct comprises fifteen (15) items that represent the level of attention. Motivation in online courses has been receiving attention in recent years (Alamri et al., 2021). As shown in Table 3, the learners' attention was captured when different formats of instruction were applied. The level of students' attention with WBEI materials showed significantly high values, ensuring the success of the learning process. In a similar vein, Weng et al (2020) observed that the engaging and interactive elements of online learning enhance students' motivation in the classrooms. The level of students' learning achievement directly correlates with their motivation to learn, thanks to the incorporation of attractive interfaces and diverse multimedia elements into this learning method, making it distinct from traditional approaches. This is due to incorporation of attractive interfaces and diverse multimedia elements into this learning method makes it distinct from traditional approaches.

Table 4

*Level of Relevance on Web-Based English Instructional Materials (n=100)*

Construct	Item	Std. deviation	Percentage, %	Total mean	Mean interpretation
Relevance	1	.673	90.0	4.46	Very high
	2	.674	90.0	4.47	Very high
	3	.706	86.0	4.31	Very high
	4	.673	90.0	4.46	Very high
	5	.674	90.0	4.47	Very high
	6	.706	86.0	4.31	Very high
	7	.673	90.0	4.46	Very high
	8	.643	92.0	4.49	Very high
	9	.611	94.0	4.50	Very high
<b>Total</b>		<b>.673</b>	<b>89.8</b>	<b>4.44</b>	<b>Very high</b>

\*\* Full details of Item 1 – Item 9 are presented in Appendix A (ii)

The second construct of ARCS involved nine (9) items representing level of Relevance described in the table above. As shown in Table 4, the WBEI materials provide information aligned with the English syllabus for Form One Secondary School Standard Curriculum in the context of Special Education settings. Additionally, students find it easy to contact the site's author (M=4.47, SD= .674), indicating a user-friendly approach to communication. The relevance of the learning goals and content is very clear (M=4.46, SD= .673), and the materials offer options for creating assignments (M=4.46, SD=.673), ensuring diverse learning methods (M=4.31, SD= .706). Moreover, it grants access to educational activities and learning opportunities (Campbell & Sarac, 2018), potentially overcoming limitations in teaching and learning for students with learning disabilities.

The content designated in WBEI materials proves suitable for the intended audience (M=4.31, SD= .706), which aligns with the findings of Çebi and Güyer (2020), who identified a positive correlation between students' engagement with course material intensity and their motivation. The high degree of relevance to courses indicates a crucial element in making instruction responsive to the interests and needs of students with learning disabilities using WBEI materials (M=4.44; SD= .673), as also observed in Rodríguez-Cano et al (2022), where 75% of participants strongly agreed that educational technology can equalize students' abilities concerning the same content.

Table 5

*Level of Confidence on Web-Based English Intructional Materials (N=100)*

Construct	Item	Std. deviation	Percentage, %	Total mean	Mean interpretation
Confidence	1	.575	95.0	4.65	Very high
	2	.674	90.0	4.47	Very high
	3	.555	96.0	4.66	Very high
	4	.446	98.0	4.73	Very high
	5	.560	94.0	4.64	Very high
	6	.474	100.0	4.76	Very high
	7	.659	91.0	4.48	Very high
	8	.474	98.0	4.76	Very high
	9	.551	96.0	4.67	Very high
<b>Total</b>		<b>.552</b>	<b>95.3</b>	<b>4.65</b>	<b>Very high</b>

\*\* Full details of Item 1 – Item 9 are presented in Appendix A (iii)

This construct involved nine (9) items representing level of Confidence as described in the Table 5. The mean scores and standard deviations for each item are as follows. As shown in Table 5, learners felt confident due to the opportunity to be more independent in learning. Besides that, students confidence as WBEI materials provides self -assessment tools (quizzes) (M= 4.73, SD= .446) and expressed a "conquerable" challenge (M= 4.67, SD= .551) that can increases professional knowledge in communication (M= 4.66, SD= .555). The WBEI materials instill confidence in students to succeed in English for Communication subject (M= 4.65, SD= .575) through the incorporation of clearly stated learning goals (M= 4.64, SD= .560) and opportunities for acquiring new skills (M= 4.48, SD= .659), which encourage them to perform well. The level of confidence significantly contributes to the evaluation of the usability and feasibility of WBEI materials (M=4.65, SD=.552)

Table 6

*Level of Satisfaction on Web-Based English Intructional Materials (N=100)*

Construct	Item	Std. deviation	Percentage, %	Total mean	Mean interpretation
Satisfaction	1	.659	91.0	4.48	Very high
	2	.674	90.0	4.47	Very high
	3	.658	91.0	4.47	Very high
	4	.599	94.0	4.62	Very high
	5	.548	96.0	4.68	Very high
	6	.606	94.0	4.58	Very high
	7	.622	93.0	4.58	Very high
<b>Total</b>		<b>.624</b>	<b>92.7</b>	<b>4.55</b>	<b>Very high</b>

\*\* Full details of Item 1 – Item 7 are presented in Appendix A (iv)

This construct involved seven (7) items representing level of Satisfaction described in the Table 6. The mean score and standard deviation by items can be referred as follows. Table 6 shows the level of satisfaction gained by the learners while using WBEI materials as a support of their learning motivation. The easiest element of the ARCS model to satisfy is most often accomplished by providing personel attention to students and constructive feedback. As 70%

of Form One SLD agreed that elearnings.com gives personal attention to students ( $M=4.68$ ,  $SD=.548$ ) and rewards exciting assignment performance ( $M=4.62$ ,  $SD=.599$ ). The elearnings.com provides helpful and motivating feedback immediately following task performance ( $M=4.58$ ,  $SD=.606$ ).

In addition, elearnings.com increases students' cooperation ( $M=4.47$ ,  $SD=.674$ ), reinforces intrinsic skills in difficult tasks ( $M=4.47$ ,  $SD=.658$ ), and allows using newly acquired skills in a realistic setting ( $M=4.48$ ,  $SD=.659$ ), leading to improved learning outcomes for the learners. The degree of student satisfaction with WBEI materials ( $M=4.55$ ,  $SD=.624$ ) plays an important role in determining the usability and feasibility of the WBEI materials. It is influenced by how WBEI materials are developed and implemented to facilitate learning.

Table 7

*Regression Coefficient for Predicting Web Enjoyment Experience.*

Determinants of Web Enjoyment Experience	Overall model (N=100)				
	$\beta$	SE	Beta	$t$	$p$
Female	.032	.039	.084	.823	.413
Malay	-.116	.078	-.146	-1.500	.137
Chinese	-.080	.056	-.143	-1.448	.151
Indian	-.265	.189	-.139	-1.402	.164
Down syndrome	-.127	.133	-.094	-.957	.341
Autism	.077	.053	.154	1.462	.147
Cerebral palsy	-.069	.075	-.093	-.923	.358
<b>Inertia (slow learner)*</b>	-.087	.051	-.183	-1.689	.095
Dyslexia	.145	.109	.131	1.331	.187
Attention	-.189	.140	-.194	-1.349	.181
Relevance	.008	.089	.014	.095	.925
<b>Confidence*</b>	-.184	.104	-.234	-1.759	.082
<b>Satisfaction***</b>	.370	.109	.474	3.397	.001
Constant	4.107	.488		8.422	.000
$R^2$	.227				
$R^2_{adj}$	.110				
$F(13,86) = 1.946^{**}$					

Note:  $\beta$  = unstandardized regression coefficients; Beta = standardized regression coefficients; SE = standard

error of b; \* $p < .1$ , \*\* $p < .05$ , \*\*\* $p < .01$ , \*\*\*\* $p < .001$ .

While, Table 7 shows a multivariate regression coefficient for predicting web enjoyment experience which employed as dependent variable. Sociodemographic factors and motivation constructs such as gender (female), ethnicity (Malay, Chinese, Indian), learning disabilities (down syndrome, autism, cerebral palsy, inertia or slow learner, dyslexia), motivation constructs (attention, relevance, confidence, and satisfaction) were used as independent variables.

The model was statistically significant, with an  $R^2$  of .227, which quantifies the proportion of variance in the dependent variable determined by the independent variables. According to



the coefficients table (Table 7), satisfaction, confidence, and inertia (slow learner) were the three statistically significant predictor variables. The results indicated that satisfaction, confidence, and inertia (slow learner) were the best variables in predicting the students' web enjoyment experience, with  $R^2=.227$  and  $R^2_{adj}=.110$ . The F-statistics was 1.946, with  $p < .05$ .

The negative sign of  $\beta$  for the confidence variable indicates that individuals with higher levels of confidence are more likely to have a lower level of web enjoyment experience. However, the other two motivation variables, Attention and Relevance, did not show a significant effect on enjoyment experience in this study. The researcher examined the instructional design that affects motivation in the WBEI materials. All hundreds of Form One SLD (N=100) confirmed that WBEI materials have the potential to support and motivate them to become self-directed in learning. This finding aligns with the research by Rodríguez-Cano et al (2022), where virtually all participants stated that the use of educational technology increases students' motivation to learn (98.46%). Moreover, eight out of ten believe that it favours the autonomy of students, as the tools can be adapted to the needs of each student in a personalized way and help overcome the limitations derived from these difficulties.

On the other hand, the Satisfaction level has a significant effect on the enjoyment experience among these learning disabilities students, compared to Confidence. Additionally, based on the analysis, it was found that inertia (slow learner) students are less likely to enjoy using the developed learning website. The researcher examined the instructional design that affects motivation in the WBEI materials. All hundreds of Form One SLD (N=100) confirmed that WBEI materials have a potential to support and motivate them to become self-directed in learning. This finding aligns with the research by Rodríguez-Cano et al (2022), where virtually all participants stated that the use of educational technology increases students' motivation to learn (98.46%). Moreover, eight out of ten believe that it favours the autonomy of students, as the tools can be adapted to the needs of each student in a personalized way and help overcome the limitations derived from these difficulties.

Thus, this research provides significant theoretical and contextual contributions to the field of education, particularly in the context of web-based learning for students with learning disabilities. The study highlights the effectiveness of incorporating the ARCS model to enhance motivation and learning outcomes, underscoring the importance of students' satisfaction, confidence, and intrinsic motivation in the online learning experience. It emphasizes the role of social learning environments in fostering collaboration and trust among learners, supporting knowledge-sharing and peer support. Furthermore, the research underscores the interconnectedness between web-based learning, motivation, and learning outcomes, providing valuable insights for educators and policymakers in designing inclusive and effective web-based interventions for learners with diverse needs. Table 8 below presents the significant conclusions and contributions of a motivational WBEI materials that was developed to align with the theoretical and contextual considerations, particularly benefiting SLD.



Table 8

*Major Conclusions and Contributions*

<b>Major Conclusions</b>	<b>Importance and Significance</b>	<b>Theoretical Contribution</b>	<b>Contextual Contribution</b>
The ARCS model applied in Web-based English Instructional (WBEI) materials positively impacted motivation and learning outcomes for Form One Students with Learning Disabilities (SLD).	This study highlights the potential of incorporating motivational strategies, specifically the ARCS model, in web-based learning to enhance students' motivation and learning outcomes, particularly for SLD.	The study contributes to the field of education by providing evidence of the effectiveness of WBEI materials and motivational strategies for SLD. It emphasizes the importance of designing well-structured and engaging materials for effective distance learning.	The research is significant for educators and policymakers in special education contexts, providing insights into effective instructional design for SLD, and promoting inclusive and accessible learning environments.
Students' satisfaction with the WBEI materials is crucial for ensuring the success of the learning process.	Understanding students' satisfaction is essential for continuous improvement of WBEI materials, taking into account students' needs and preferences.	The study contributes to instructional design research, emphasizing the significance of students' satisfaction in the development and implementation of effective web-based materials. It underlines the importance of user-centered design principles in creating engaging and effective learning experiences.	The findings have practical implications for instructional designers, educators, and institutions involved in developing and delivering web-based courses. By prioritizing students' satisfaction, institutions can enhance students' engagement and retention in online learning environments.
Satisfaction, confidence, and inertia (slow learner) were found to be the best predictors of students' web enjoyment experience, while attention and relevance did not show significant effects.	Identifying the key factors that influence students' web enjoyment helps educators and instructional designers tailor materials to enhance students' engagement and motivation.	The research contributes to the understanding of factors that impact students' enjoyment in web-based learning, providing valuable insights for educators to design more effective and engaging instructional materials. It highlights the relevance of individual	The findings have practical implications for educators in creating web-based courses that prioritize students' intrinsic motivation and build a positive learning experience. By understanding the significance of satisfaction, confidence, and

		characteristics and intrinsic motivation in shaping the online learning experience.	inertia, educators can design personalized learning pathways that cater to individual students' needs and preferences.
The social learning environment positively impacted students' trust and learning improvement.	Establishing a supportive social learning environment can foster collaboration and trust among students, leading to improved learning experiences and outcomes.	The study contributes to the exploration of the role of social learning environments in web-based instruction, highlighting its potential benefits in supporting students' motivation and knowledge acquisition. It underscores the importance of promoting peer interaction and collaborative learning in virtual settings.	The findings have practical implications for educators in creating inclusive and collaborative online learning environments. By fostering a positive social learning climate, educators can facilitate knowledge-sharing and peer support among students, enhancing overall learning experiences.
The research supports the interrelationships between web-based learning, motivation, and learning outcomes for SLD.	This finding reinforces the importance of leveraging technology to enhance students' motivation and learning experiences, particularly for SLD.	The study contributes to the body of research examining the interconnectedness of web-based learning, motivation, and learning outcomes, providing valuable insights for educators and researchers in the field of special education. It emphasizes the significance of personalized and technology-driven approaches in modern education, particularly in distance learning settings.	The findings have practical implications for educators and policymakers in designing and implementing web-based interventions for learners with learning disabilities. By understanding the interplay between web-based learning, motivation, and learning outcomes, educators can tailor instructional strategies to maximize students' academic achievements and overall learning experiences.

### Summary

The study's findings demonstrated a positive outcome, with learners achieving a very high level of task completion and assignment fulfilment, despite facing certain difficulties. This sense of accomplishment among learners was reported as gratifying. Learners' satisfaction is considered crucial in the motivational strategies applied, as it helps identify any potential issues in the web-based instructional materials. The well-designed elements of WBEI materials were well-received by learners, who appreciated them as valuable learning support in their English for Communication lessons. The social learning environment also received positive feedback, as learners found it conducive for building trust among peers and improving their learning experiences.

The inferential analysis carried out through multivariate regression provided strong evidence of the interrelations between the web-based learning experience and its impact on learners' motivation, as guided by the ARCS motivation model. The study revealed statistically significant and positive results, demonstrating the effectiveness of the formative evaluation conducted.

In conclusion, the research demonstrates the potential of web-based learning methods in increasing learners' motivation and acceptance of the new norm in virtual classrooms. The ARCS motivation model played a significant role in enhancing learners' engagement and overall learning experience, contributing to the positive outcomes achieved in this study.

### Reference

- Alamri, H. A., Watson, S., & Watson, W. (2021). Learning technology models that support personalization within blended learning environments in higher education. *TechTrends*, 65(1), 62-78.
- Aravind, B. R., & Rajasekaran, V. (2021). Exploring Dysphasia Learners' Vocabulary Acquisition through the Cognitive Theory of Multimedia Learning: An Experimental Study. *International Journal of Emerging Technologies in Learning (IJET)*, 16(12), 263-275.
- Cakir, R., & Korkmaz, O. (2019). The Effectiveness of Augmented Reality Environments on Individuals with Special Education Needs. *Education and Information Technologies*, 24(2), 1631-1659
- Campbell, C., & Sarac, B. (2018). The role of technology in language learning in the twenty-first century: Perspectives from academe, government, and the private sector. *Hispania*, 100(5), 77-84.
- Cebi, A., Guyer, T. (2020). Students' interaction patterns in different online learning activities and their relationship with motivation, self-regulated learning strategy and learning performance. *Educ Inf Technol*.
- Gkora, V., & Karabatzaki, Z. (2023). Motivation in Learning Disabilities and the impact of ICTs. 3. 14-26.
- Heo, M., & Toomey, N. (2020). Learning with multimedia: The effects of gender, type of multimedia learning resources, and spatial ability. *Computers & Education*, 146, 103747.
- Hurwitz, S., Cohen, E. D., & Perry, B. L. (2021). Special Education Is Associated With Reduced Odds of School Discipline Among Students With Disabilities. *Educational Researcher*, 50(2), 86–96. <https://doi.org/10.3102/0013189X20982589>
- Jdaitawi, M., & Kan'an, A. (2022). A Decade of Research on the Effectiveness of Augmented

- Reality on Students with Special Disability in Higher Education. *Contemporary Educational Technology*, 14(1), ep332.
- Jdaitawi, M. T., Muhaidat, F., Alsharoa, A., Alshlowi, A., Torki, M., & Abdelmoneim, M. (2022). The Effectiveness of Augmented Reality in Improving Students Motivation: An Experimental Study. *Athens Journal of Education*.
- Kellems, R., Eichelberger, C., Cacciatore, G., Jensen, M., Frazier, B., Simons, K., (2020). Using Video-based Instruction via Augmented Reality to Teach Mathematics to Middle School Students with Learning Disabilities". *Journal of Learning Disability*, 53(4), 277-291.
- Keller, J. M. (1987) Development and use of the ARCS model of instructional design. *Journal of instructional development* 10, no. 3 (1987): 2-10.
- Lacka, E., Wong, T. C., & Haddoud, M. Y. (2021). Can digital technologies improve students' efficiency? Exploring the role of Virtual Learning Environment and Social Media use in Higher Education. *Computers & Education*, 163, 104099.
- Liu, X. (2022). The Effects of Tablet Use on Student Learning Achievements, Participation, and Motivation at Different Levels. *International Journal of Technology-Enhanced Education*.
- Lopez-Fernandez, O. (2021). Emerging health and education issues related to internet technologies and addictive problems. *International Journal of Environmental Research and Public Health*, 18(1), 321.
- Mese, E., & Sevilen, C. (2021). Factors influencing EFL students' motivation in online learning: A qualitative case study. *Journal of Educational Technology and Online Learning*, 4 (1), 11-22.
- Moidunny, K. (2009). The Effectiveness of the National Professional Qualifications for Educational Leaders (NPQEL). Unpublished doctoral Dissertation, Bangi: The National University of Malaysia.
- Mystakidis, S., Christopoulos, A., & Pellas, N. (2022). A systematic mapping review of augmented reality applications to support STEM learning in higher education. *Education and Information Technologies*, 27(2), 1883-1927.
- Osadchyi, V. V., Valko, N. V., & Kuzmich, L. V. (2021). Using augmented reality technologies for STEM education organization. In *Journal of Physics: Conference Series* (Vol. 1840, No. 1, p. 012027). IOP Publishing.
- Richey, R. C., & Klein, J. (2014). Design and Development Research: Methods, Strategies, and Issues, 1–44.
- Rodriguez-Cano, S., Cuesta-Gomez, J. L., Delgado-Benito, V., & Fuente-Anuncibay, R. de la. (2022). Educational Technology as a Support Tool for Students with Specific Learning Difficulties—Future Education Professionals' Perspective. *Sustainability*, 14(10), 6177. <https://doi.org/10.3390/su14106177>
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Schwartz, A. E., Hopkins, B. G., & Stiefel, L. (2021). The effects of special education on the academic performance of students with learning disabilities. *Journal of Policy Analysis and Management*, 40(2), 480-520.
- Tsakiridou, M., & Drigas, A. (2022). A review of stress on students with ADHD. the role of ICTs & mental interventions to improve productivity. *Technium Sustainability*. 2. 39-57. [10.47577/sustainability.v2i5.7409](https://doi.org/10.47577/sustainability.v2i5.7409).
- Weng, C., Otanga, S., Christianto, S. M., & Chu, R. J.-C. (2020). Enhancing Students' Biology

- Learning by Using Augmented Reality as a Learning Supplement. *Journal of Educational Computing Research*, 58(4), 747–770. <https://doi.org/10.1177/0735633119884213>
- Wu, C. (2022). Using Video Modeling with Augmented Reality to Teach Students with Developmental Disabilities to Solve Mathematical Word Problems. *Journal of Developmental and Physical Disabilities*, 35, 487-507.
- Yakubova, G., Defayette, M. A., & Chen, B. B. (2022). Mathematics Learning Through Online Video-Based Instruction for an Autistic Child. *Journal of Autism and Developmental Disorders*, 53, 2349 - 2361.
- Yantraprakorn, P., Darasawang, P., & Wiriyakarun, P. (2018). Self-efficacy and Online Language Learning: Causes of Failure. *Journal of Language Teaching and Research*, 9(6), 1319-1329.

## Appendix A

### i. Attention

Item	Statement
1	eclearnings.com can encourage my English for Communication learning.
2	eclearnings.com has different teaching media.
3	eclearnings.com provides different learning environments.
4	I feel familiar with English for Communication by using elearnings.com
5	The source of information for elearnings.com is credible.
6	eclearnings.com shows visual representations or relationships.
7	eclearnings.com has clear instructional.
8	The links designed are reliable.
9	eclearnings.com applies different format of instruction (Information presentation, practice, quiz, etc.).
10	eclearnings.com has different learning medium (content delivery, video, print, etc.)
11	eclearnings.com uses student-teacher interaction and student-student interaction.
12	eclearnings.com uses creativity to create analogies and relevance to content.
13	eclearnings.com builds in problem solving activities.
14	eclearnings.com gives students the opportunity to choose topics of interest to explore.
15	eclearnings.com uses games for student engagement.

### ii. Relevance

Item	Statement
1	The learning goals and content of are very clear.
2	eclearnings.com is related to my living experience.
3	eclearnings.com provides alternative methods in learning.
4	eclearnings.com provides options for creating assignments.
5	Easy to contact the author of this site.
6	The content is appropriate for the intended audience.
7	The information of the elearnings.com is accurate.
8	The information at this elearnings.com is updated.

9	The information is according to the English syllabus for Form 1 Secondary School Standard Curriculum for Special Education setting.
---	---

**iii. Confidence**

Item	Statement
1	eclearnings.com gives confidence to succeed in English for Communication subject.
2	eclearnings.com encourages to perform well in English for Communication subject.
3	eclearnings.com increases professional knowledge in communication.
4	eclearnings.com provides self -assessment tools (quizzes)
5	eclearnings.com incorporates clearly stated learning goals.
6	eclearnings.com provides an opportunity to be more independent in learning.
7	eclearnings.com allows students learn new skills.
8	eclearnings.com helps students set realistic goals.
9	eclearnings.com provides a "conquerable" challenge.

**iv. Satisfaction**

Item	Statement
1	eclearnings.com allows using newly acquired skills in a realistic setting.
2	eclearnings.com increases students' cooperation.
3	eclearnings.com reinforces intrinsic skills in difficult tasks.
4	eclearnings.com rewards exciting assignment performance.
5	eclearnings.com gives personal attention to students.
6	eclearnings.com provides helpful feedback.
7	eclearnings.com provides motivating feedback immediately following task performance.