e-Bangi Faculty of Social Sciences and Humanities Universiti Kebangsaan Malaysia
Journal of Social Sciences and Humanities

eISSN: 1823-884x

Volume 21, Issue 4, DOI: https://doi.org/10.17576/ebangi.2024.2104.16

Article

Developing and Validating a Digital Literacy Assessment: Bridging the Digital Divide among Adolescents in Sabah, Malaysia

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Received: 21 August 2024
Accepted: 14 October 2024

Abstract: This study investigates the computer literacy of adolescents in Tawau, Sabah, challenging the notion that all "Digital Natives" are inherently proficient in technology. Despite growing up in a digital era, many youths in Tawau demonstrate limited skills in essential software like Microsoft Office, highlighting a significant digital divide. The study began by identifying key themes from existing instruments, leading to the development of a tailored assessment tool for Tawau, Sabah. This tool underwent rigorous validation through Rasch analysis, confirming its effectiveness in measuring various dimensions of computer literacy, including basic skills and Microsoft Office proficiency. The findings provided insights into the instrument's performance and scoring, refining its items and confirming reliability and validity. Ultimately, the index quantifies computer literacy by aggregating scores across categories, offering a reliable measure of adolescents' digital competencies in Tawau. This research contributes to a broader understanding of the digital divide and informs strategies to improve computer literacy in similar contexts. The study's implications underscore the importance of policy adjustments to bridge the digital gap, especially in underserved regions like Tawau.

Keywords: Instrument Development; ıntrument validation; computer literacy; digital divide; Sustainable Development Goal; adolescents; ICT

Introduction

The term "Digital Native," introduced by Prensky (2001), suggests that individuals born during the rise of digital technology are inherently proficient in its use. However, adolescents in Tawau, Sabah, challenge this notion. Despite growing up in the digital era, many lack basic computer skills, such as using Microsoft Office, revealing a significant gap in digital literacy. Sabah, one of Malaysia's least developed regions in terms of digital infrastructure, has the lowest percentage of households with access to computers and the Internet. Tawau, in particular, has limited internet access, which exacerbates the digital divide. This issue goes beyond access and includes the skills necessary to benefit from technology, as highlighted by Ragnedda and Kreitem (2018).

Malaysia's Twelfth Malaysia Plan (2021-2025) emphasizes the development of future-ready talent, aligning with Sustainable Development Goal 4, which seeks to promote inclusive education and lifelong learning. However, there is little research focused on adolescent digital literacy in underserved areas like Tawau, leaving a critical gap in understanding how this population engages with technology.

This study aims to address that gap by developing and validating an instrument to measure computer literacy and the digital divide among adolescents in Tawau. By examining both access to technology and the skills required to use it, this research provides essential insights into the challenges faced by adolescents in this region. The findings will guide strategies to enhance computer literacy and bridge the digital divide, contributing to national and global efforts to improve digital competencies.

The objectives of this study are:

i. To identify key themes in existing computer literacy instruments.
ii. To develop and validate a digital skills and literacy measurement tool.
iii. To create an index to measure computer literacy.

Literature Review

1. The Digital Divide

The digital divide refers to the gap between individuals or communities that have access to digital technologies and those that do not (Charles et al., 2024). It manifests in three levels: access to digital tools, disparities in digital skills, and the ability to derive benefits from technology (Ragnedda & Kreitem, 2018). In Malaysia, while 99.1% of individuals use mobile phones, only 80.2% use computers (Department of Statistics, Malaysia, 2022). The COVID-19 pandemic worsened this divide, increasing the demand for computers for remote work and online learning. However, post-pandemic trends show a return to pre-pandemic levels of computer usage, particularly in low-income and rural areas where access and proficiency remain limited (Ayob et al., 2022; Charles et al., 2024).

While mobile phones offer widespread access, they cannot fully replace computers in educational settings, where tools like Microsoft Office are critical for developing digital literacy. Government initiatives like netbook distribution (MCMC, 2010) have attempted to reduce this divide, but challenges persist, especially as Malaysia progresses into Wave 3 of the Education Blueprint 2013-2025.

2. Computer Literacy and the Second-Level Digital Divide

The second-level digital divide focuses on digital skills. Computer literacy, the ability to use computers and essential software like Microsoft Office, is crucial for academic and professional success (Marisa et al., 2019). However, many adolescents possess only basic skills, such as browsing and online gaming (Ayob et al., 2022). The diminished emphasis on ICT education, combined with inconsistent infrastructure, has limited opportunities for skill development. Without targeted interventions, these gaps will persist, restricting future opportunities (Ibrahim et al., 2023).

3. Prior Studies on Digital Literacy Assessments

Studies such as the International Computer and Information Literacy Study (ICILS) assess students' technology use for learning and problem-solving (Fraillon et al., 2020). However, these assessments often overlook the specific challenges of underserved populations, like those in Tawau, Sabah. A study on ICT training for women in Sarawak demonstrated the empowering potential of ICT, showing improvements in confidence, skills, and business management (Ibrahim et al., 2023). These findings highlight the importance of tailored interventions to address skill gaps in underserved communities.

4. Novelty and Importance of the Current Study

This study's focus on adolescents in Tawau, Sabah, offers a critical perspective on the second-level digital divide in rural areas. By targeting both access to digital tools and the skills required to use them, this research fills gaps left by broader assessments like ICILS, which often fail to address challenges in regions with underdeveloped infrastructure. The findings will provide valuable insights into the digital skills and literacy of adolescents in Tawau, contributing to interventions aimed at improving digital education and bridging the digital divide.

Aligned with Malaysia's Twelfth Plan, this research aims to support the development of future-ready talent and ensure equitable access to digital opportunities in underserved regions.

Methodology

In this research, a gap was identified concerning the need for a refined instrument to measure the digital divide, specifically focusing on the accessibility of computers and basic computer skills. While several existing instruments exist for measuring computer literacy, none adequately address the measurement of adolescent access and computer skills. Consequently, a new instrument tailored to this construct was developed. Customizing this tool to the unique context of the study area ensures its relevance and applicability, aligning with the goal of understanding and addressing computer literacy issues among adolescents. The meticulous development process are outlined in Figure 1 of Instrument Development Model. There are 8 steps involved.

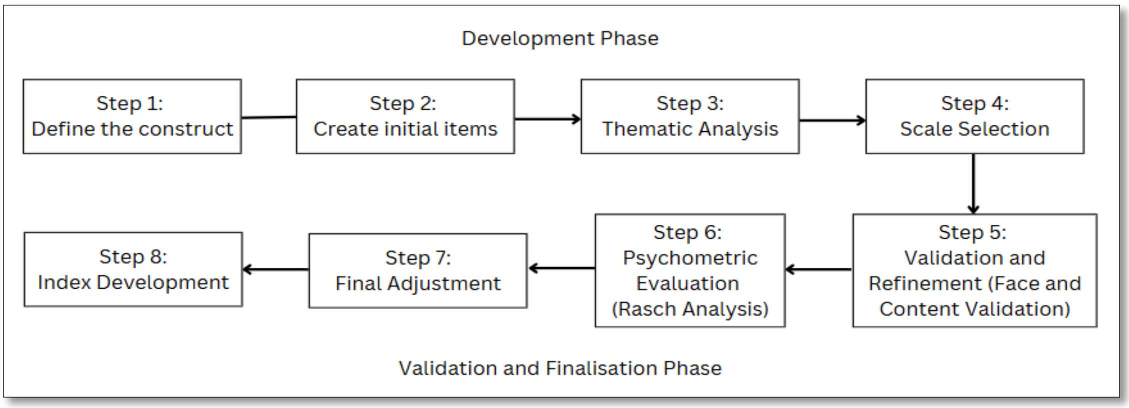

Figure 1. Instrument development model

Step 1: Define the Construct

This study investigated computer literacy among adolescents in Tawau, driven by initial discussions with students aged 11-18, many of whom reported limited computer experience due to lack of access at home and school. Data from the Department of Statistics showed low ICT usage in Sabah, supporting the study's focus. A survey of 487 students from 16 high schools in Tawau. Convenience sampling was used, where questionnaires were distributed based on participants' availability. Age distribution showed that 15-year-olds comprised 22.4%, followed by 16-year-olds (22.0%) and 17-year-olds (21.1%). The largest ethnic group was Bugis (39.8%), with females representing 55.9% of the sample.

Step 2: Create Initial Items

The study compiled an item pool of 114 questions drawn from previous research and Sustainable Development Goals (SDG) indicators, covering topics from hardware knowledge to email proficiency. After review, 32 questions were discarded as irrelevant. The final instrument consists of two parts: the first addresses access to ICT at home and school, aiming to answer the third research question on access levels in Tawau. The second part assesses computer literacy, focusing on students' skills and knowledge, supporting the investigation into digital literacy among adolescents in the region.

Step 3: Thematic Analysis

Thematic analysis of the remaining 82 questions addressed the first research question: "What are the essential components for a comprehensive computer literacy assessment tool for adolescents?" Five key themes emerged: General Computer Knowledge (GCK), Microsoft Word Skills (MWS), Microsoft Excel Skills (MES), Microsoft PowerPoint Skills (MPS), and Web Browsing Skills (WBS). Based on these, a new instrument with 25 questions was developed. GCK includes 7 questions on tasks like identifying hardware, MWS covers 5 questions on basic Word functions, MES has 4 questions on Excel skills, MPS includes 3 questions on PowerPoint presentations, and WBS contains 6 questions on web browsing tasks, like bookmarking websites.

i. General Computer Knowledge

This theme encompasses fundamental computer skills necessary for effective digital engagement. It includes tasks such as file transfer, document creation and management, application navigation, operating system comprehension, and hardware identification. Additionally, it covers activities such as graphic design, presentation development, and device installation. Mastery of these foundational skills is essential for adolescents' daily and educational activities.

ii. Microsoft Excel Skills
This theme emphasizes proficiency in Microsoft Excel, focusing on tasks such as spreadsheet creation, text and object manipulation, formatting, and the application of functions like IF and SUM. Other competencies include merging cells, managing worksheets, and preparing spreadsheets for printing. Excel skills are crucial for academic and professional success.

iii. Microsoft PowerPoint Skills
This theme pertains to the creation and editing of presentations using Microsoft PowerPoint. Key competencies include slide management, content animation, integration of WordArt, and preparation for printing. These skills are vital for effective visual communication in academic settings.

iv. Microsoft Word Skills
This theme addresses the use of Microsoft Word for document creation and management. It includes skills such as text and object manipulation, font customization, comment management, and page formatting. Proficiency in these areas is fundamental for academic writing and document handling.

v. Web Browsing Skills
This theme involves various online activities, including emailing with attachments, internet navigation, software management, and programming. Skills in these areas are essential for effective online communication, research, and digital tool management. According to the findings by Mohd Tamring et al., while internet literacy levels in Kota Kinabalu, Sandakan, and Tawau are generally favorable, the study also notes that significant differences exist among various variables tested. This suggests that targeted training could enhance web browsing skills among adolescents, particularly in assessing and utilizing online information critically.

Step 4: Scale Selection

This study utilized a 7-point interval scale, where participants rated their responses based on a range from 1 indicating "strongly disagree" to 7 representing "strongly agree".

Step 5: Validation and Finalization Phase

To ensure the validity of the instrument, we employed both content and face validity methods. Initially, 83 items derived from literature and thematic analysis were refined to 28 items for further evaluation. The validation process involved 10 experts, categorized into two groups: lay experts and professional experts.

Expert Selection and Criteria:

i. Lay Experts: This group provided insights on the general usability and relevance of the items. Selection criteria for lay experts included their expertise in fields related to digital literacy and their experience with the target demographic. The lay experts were:

Table 1. Details of Lay Experts

Experts #	Expertise	Institution
Expert 1	Quantitative Science, Operations Research	UUM College of Arts and Sciences
Expert 2	Computer Science, eCommerce	GRAAS.AI
Expert 3	Information Technology	Maxis
Expert 4	Computer Science, eCommerce	Hyperack

ii. Professional Experts: This group was selected based on their specialized knowledge and experience in ICT and education. Criteria included their professional roles in educational and technology institutions. The professional experts were:

Table 2 Details of professional expert

Experts #	Expertise	Institution
Expert 1	ICT, Computer Science, Education	Sri KDU International School
Expert 2	Information Technology, Network Engineering	FK Technology Sdn. Bhd.
Expert 3	Computer Science, Software Development	Fujitsu
Expert 4	ICT, STEM, Education, Digital Learning	Nilai International School
Expert 5	Data Science, Digitalisation, ICT	SK Pangkalan TLDM Kota Kinabalu
Expert 6	Education, Microsoft PPT & Canva for Education, Digitalisation	SK Blok 31 Tawau

Validation Process:

i. Content Validity: The 28 items were reviewed by 6 content experts. Each item was rated on a 4-point scale: (1) Not relevant, (2) Somewhat relevant, (3) Quite relevant, (4) Highly relevant. Ratings were then converted to binary values (1 for relevant and 0 for not relevant). The Content Validity Index (CVI) for each item (I-CVI) and the Scale Content Validity Index (S-CVI) were calculated. An S-CVI above 0.80 is deemed acceptable. In this study, the S-CVI was 0.96, indicating a high level of content validity.

ii. Face Validity: Four lay experts evaluated the clarity, sentence structure, spelling, and overall relevance of the items. Their feedback was used to refine the instrument further, ensuring that the items were understandable and pertinent to the target audience.

iii. Consensus Among Experts: Consensus was reached through iterative reviews and discussions among the experts. For content validity, items with I-CVI scores below 0.80 were revised or removed based on expert feedback. The S-CVI score of 0.96 reflected the collective agreement on the relevance of the items. For face validity, feedback from lay experts was used to make necessary adjustments to enhance the clarity and applicability of the items. This rigorous validation process ensures that the instrument accurately measures the intended constructs and is suitable for assessing digital literacy among adolescents.

All 28 items were deemed valid, though five items were revised based on expert feedback. The revised items and their updates are summarized below:

Item 4: Original: "I can identify hardware." Revised: "I can identify computer hardware and specifications."
Item 5: Original: "I can transfer files between a computer and other devices." Revised: "I can transfer data between computers, laptops, and other digital devices."
Item 9: Original: "I can connect new device to my computer (e.g., modem, camera, printer)." Revised: "I can connect new devices to my computer (e.g., modem, camera, printer)."
Item 10: Original: "I can install new device to my computer (e.g., modem, camera, printer)." Revised: "I can install new software to my computer (e.g., Spotify, Google Chrome)." (Hardware installation was excluded.)
Item 21: Original: "I can add WordArt to a presentation." Revised: "I can edit WordArt in a presentation."
These revisions ensured clarity and relevance, enhancing the overall quality of the instrument.

Step 6: Psychometric Evaluation Using Rasch Model

The Rasch model, applied via WINSTEPS software, evaluates categorical data to assess the alignment of respondents' abilities with item difficulty (Rasch, 1960). Key aspects include:

i. Item Fit: Assessed through Mean Square (MnSq) and Z-statistics. Acceptable MnSq values arebetween 0.5 and 1.5, and Z-statistics should range from -2 to 2 (Bond & Fox, 2015).

ii. Unidimensionality: Ensures items measure a single construct. Acceptable unexplained variance in the first contrast is below 2% or 2.5% (Fisher, 2007).

iii. Local Independence: Items should be independent, with correlation values below 0.7 (Linacre, 2018).

iv. Item Polarity: Evaluated using Point Measure Correlation (PTMEA CORR). Values above 0.4 indicate "very good" items, 0.3 to 0.39 "good," and 0.20 to 0.29 "moderate" (Rosli et al., 2020).

v. Separation Index: Values above 2 are desirable (Fox & Jones, 1998).

vi. Item-Person Map: Shows the alignment of items and respondents along ability and difficulty scales.

vii. Differential Item Functioning (DIF): Assesses item bias across demographics. A Welch probability less than 0.01 indicates bias (Linacre, 2018).
viii. Reliability: Measured by WINSTEPS and categorized as Poor (<0.67), Fair (0.67-0.80), Good (0.81-0.90), Very Good (0.91-0.94), and Excellent (>0.94) (Fisher, 2007).

Step 7: Final Adjustment
Before the psychometric evaluation using the Rasch model, the initial set of questions underwent validation to ensure accuracy in measuring the intended constructs. Face and content validity were assessed to confirm relevance for the target population. Refinement efforts addressed redundant items, ambiguities, and alignment with the constructs. The Rasch model was then applied to evaluate psychometric properties, including item difficulty, person ability, fit statistics, reliability, and dimensionality. Based on these results, further refinements were made. The final step produced a revised set of questions that accurately and reliably measures the digital divide and computer literacy among adolescents.

Step 8: Index Development
To address research question 4 and research objective 3, an index to assess ICT and digital literacy among adolescents in Tawau, Sabah, was developed. This index is crucial for designing and implementing targeted interventions or educational programs aimed at enhancing computer literacy. By measuring various dimensions of ICT and digital literacy, the index provides valuable insights into areas of proficiency and need among adolescents, helping identify gaps in ICT access and digital skills. The development of this index involved several key steps:

i. Scoring System: A scoring system was established to evaluate individual performance on each indicator. This system involved assigning numerical scores or categorical ratings based on predefined proficiency levels.
ii. Weighting of Indicators: Indicators were weighted according to their importance in promoting overall computer literacy. These weights were assigned based on the significance of each dimension in the context of adolescent ICT skills.
iii. Index Calculation: The index was calculated by aggregating scores across all indicators, incorporating the assigned weights. This resulted in a composite score reflecting each adolescent's overall ICT and digital literacy level.
iv. Interpretation of Results: Index scores were analyzed to identify strengths and weaknesses in ICT and digital literacy among adolescents in Tawau. This analysis informed the development of targeted interventions or educational programs aimed at addressing specific gaps and enhancing computer literacy.

The developed index serves as a valuable tool for researchers and policymakers, facilitating the design of effective interventions and programs to improve ICT and digital literacy among adolescents in Tawau, Sabah.

Findings

1. Rasch Analysis

Reliability Test. The reliability of our Measurement Instrument was Impressive
Person Reliability: This statistic (0.95) measures how effectively the instrument differentiates between varying levels of participant ability. A value above 0.94 is considered "Excellent" (Fisher, 2007), indicating that our instrument can reliably distinguish between different levels of participant skill.

i. Item Reliability: At 0.99, this statistic reflects how consistently the items measure the intended constructs. A high value suggests that the items are stable and reliable across different samples.
ii. Cronbach's Alpha: With a value of 0.96, this statistic indicates excellent internal consistency of the instrument. It shows that the items are highly correlated and measure the same underlying construct.

iii. Correlation Between Raw Scores and Measures: The correlation of 0.97 confirms the accuracy of individual measurements, validating that raw scores align closely with the measured ability.

Overall, these high reliability scores confirm that the instrument is both stable and consistent in measuring computer literacy.

SUMMARY OF 487 MEASURED PERSON

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	109.2	24.0	.34	.18	1.06	-.3	1.03	-.3
S.D.	33.2	.0	.89	.07	.74	2.3	.72	2.1
MAX.	167.0	24.0	3.83	.97	4.33	7.3	5.85	7.6
MIN.	28.0	24.0	-2.69	.14	.15	-5.4	.16	-5.1

REAL RMSE .22 TRUE SD .87 SEPARATION 3.87 PERSON RELIABILITY .94
MODEL RMSE .19 TRUE SD .87 SEPARATION 4.54 PERSON RELIABILITY .95
S.E. OF PERSON MEAN = .04

PERSON RAW SCORE-TO-MEASURE CORRELATION = .97
CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .96

Figure 2. Person Reliability Test

Unidimensionality. Unidimensionality Assesses Whether The Instrument Measures a Single Underlying Construct.

i. Explained Variance: The model explained 58.1% of the total variance, which means that a significant portion of the differences in item and person responses is accounted for by the construct being measured. Specifically, 34.2% of the variance was due to differences among items, and 23.9% was due to differences among persons.
ii. Unexplained Variance: The remaining 41.9% of the variance was unexplained, indicating that there may be additional factors affecting responses. The first contrast, which accounted for 5.0% of the unexplained variance, suggests that there might be some multidimensional aspects. Checking item fit will help ensure that each item aligns well with the intended construct.

Item Fit Test. Item Fit Statistics Evaluate How Well Each Item Fits The Measurement Model

SUMMARY OF 24 MEASURED ITEM

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	2214.9	487.0	.00	.04	1.03	.2	1.03	.3
S.D.	266.7	.0	.33	.00	.19	2.7	.22	2.8
MAX.	2918.0	487.0	.78	.04	1.45	6.3	1.54	7.0
MIN.	1585.0	487.0	-.91	.03	.78	-3.8	.73	-3.7

REAL RMSE .04 TRUE SD .33 SEPARATION 8.80 ITEM RELIABILITY .99
MODEL RMSE .04 TRUE SD .33 SEPARATION 9.23 ITEM RELIABILITY .99
S.E. OF ITEM MEAN = .07

UMEAN=.0000 USCALE=1.0000
ITEM RAW SCORE-TO-MEASURE CORRELATION = -1.00
11688 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 34089.25 with 11058 d.f. p=.0000
Global Root-Mean-Square Residual (excluding extreme scores): 1.2753

Figure 3. Item reliability test

i. Mean Square (MSQ) Values: MSQ values indicate how well the items conform to the Rasch model expectations. Values within the acceptable range (0.5 to 1.5) suggest that the items are fitting the model well. For example, an MSQ value of 1.0 indicates perfect fit, while values significantly above or below this range suggest potential issues. In our analysis, all items had MSQ values within this range, showing good overall fit.
ii. Z-Statistics (ZSTD): Z-statistics measure the deviation of an item's fit from the expected model. Values greater than 2 or less than -2 indicate potential issues with the item's fit. Items with high ZSTD values, such as "I can identify computer hardware and specifications," had issues that were addressed by revising the items for greater clarity.
Other items were similarly revised to enhance clarity and specificity, as shown in Table 3.

Table 3. High ZSTD revisal table

Item	Initial Question	Revised Question
B1	I can identify computer hardware and specifications.	I can identify the main components of a computer (e.g., CPU, RAM, hard drive) and their specifications.
I1	I can search for information I need on the Internet. (e.g. Videos, Articles)	I can effectively search for specific information on the Internet, such as finding instructional videos or detailed articles
B7	I can install new software to my computer. (e.g. Spotify, Google Chrome)	I can follow the necessary steps to download and install new software on my computer, such as Spotify or Google Chrome
B5	I can make simple graphic designs. (e.g using Paint)	I can create simple graphic designs, such as drawing or editing images, using software like Paint.

Difficulty Test. The Difficulty Test Assesses How Challenging Each Item Is for Participants

Logits: This unit measures the difficulty of items, with higher logits indicating more challenging items. For instance, an item with a measure of 0.78 is more difficult than one with -0.91. These measures help ensure that the instrument covers a broad range of difficulty levels, allowing for a comprehensive assessment of participants' skills.

ITEM STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	ITEM	G
15	1585	487	.78	.04	1.07	1.0	1.06	1.0	.68	.70	36.8	33.7	E3. I can merge cells in Excel.	0
14	1826	487	.49	.04	.97	-.4	.93	-1.1	.73	.71	35.9	31.4	E2. I can create tables and charts in Excel spreadsheets.	0
16	1822	487	.47	.04	1.06	1.0	1.04	.6	.70	.72	35.3	30.6	E4. I can insert and delete rows and columns in an Excel spreadsheet.	0
5	1920	487	.38	.04	1.21	3.2	1.30	4.0	.66	.72	30.0	30.5	B5. I can make simple graphic designs. (e.g using Paint)	0
6	2036	487	.23	.03	1.12	1.9	1.22	2.9	.70	.72	29.8	29.5	B6. I can connect new devices to my computer. (e.g. modem, camera, printer)	0
2	2056	487	.21	.04	1.15	2.3	1.29	4.1	.67	.72	29.6	30.0	B2. I can transfer data between computers, laptops, and other digital devices.	0
18	2093	487	.16	.03	.88	-2.0	.93	-1.1	.75	.72	33.7	29.5	P2. I can edit WordArt in a presentation.	0
1	2060	487	.14	.04	1.45	6.3	1.54	7.0	.54	.69	32.6	36.3	B1. I can identify computer hardware and specifications.	0
12	2142	487	.08	.04	.90	-1.7	.87	-2.0	.75	.72	32.2	30.0	W5. I can create and insert tables in Word.	0
13	2167	487	.07	.04	1.14	2.1	1.13	1.8	.68	.72	33.5	30.6	E1. I can create a spreadsheet.	0
19	2190	487	.03	.03	.78	-3.8	.78	-3.2	.77	.72	34.7	29.8	P3. I can insert tables and charts in a PowerPoint slide.	0
9	2269	487	-.04	.03	.78	-3.8	.80	-2.8	.78	.72	36.3	30.1	W2. I can copy and paste objects into a Word document.	0
3	2291	487	-.09	.04	.96	-.6	.92	-1.1	.73	.72	36.1	30.7	B3. I can create a file or a folder.	0
7	2329	487	-.10	.03	1.24	3.4	1.41	4.5	.67	.72	31.6	30.6	B7. I can install new software to my computer. (e.g. Spotify, Google Chrome)	0
11	2313	487	-.11	.03	.79	-3.5	.74	-3.6	.78	.72	40.0	30.3	W4. I can insert pictures in Word documents.	0
8	2320	487	-.12	.03	.79	-3.5	.73	-3.7	.78	.72	35.9	30.5	W1. I can open, save, and close documents in Word.	0
24	2292	487	-.14	.04	1.00	.1	.99	-.1	.72	.71	35.9	31.0	I5. I can send email with attachment(s).	0
17	2362	487	-.15	.03	.80	-3.4	.81	-2.4	.76	.72	38.6	31.3	P1. I can create and modify a presentation slide.	0
10	2367	487	-.17	.03	1.03	.6	1.02	.2	.71	.71	32.2	31.3	W3. I can change fonts and font characteristics in Word. (e.g. Size, Colour).	0
23	2413	487	-.24	.04	.91	-1.5	.86	-1.7	.74	.71	37.2	31.5	I4. I can bookmark favourite website.	0
21	2421	487	-.30	.04	1.07	1.1	1.25	2.7	.68	.71	29.4	31.8	I2. I know how to enter a URL (web address) into the address bar.	0
22	2460	487	-.30	.04	1.07	1.1	1.17	2.0	.69	.71	32.4	32.1	I3. I can open, close, and organize multiple tabs.	0
4	2506	487	-.34	.04	1.00	.0	.93	-.8	.72	.70	36.8	32.3	B4. I can rename the file or folder.	0
20	2918	487	-.91	.04	1.45	4.7	1.10	.8	.58	.64	49.1	50.8	I1. I can search for information I need on the Internet. (e.g. Videos, Articles)	0
MEAN	2214.9	487.0	.00	.04	1.03	.2	1.03	.3			34.8	31.9		
S.D.	266.7	.0	.33	.00	.19	2.7	.22	2.8			4.1	4.2		

Figure 4. Item statistic

Figure 5 shows participants' estimated abilities in logits. Higher values reflect greater skill, with participants scoring at 3.83 having higher skills compared to those at -2.69. This scale ensures that the instrument can accurately differentiate between varying levels of participant ability.

PERSON STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	PERSON
149	167	24	3.83	.97	.82	.2	.41	-.1	.09	.09	95.8	96.1	149 18 Kolej Tingkatan 6 Tawau Kadazan Male Other (Please specify) | Lain-lain (Sila Nyatakan) 1 1 1 149
305	166	24	3.20	.67	1.64	.9	1.04	.4	.24	.13	95.8	92.6	305 17 SM Konven Ursula Melayu Female Master's degree (Ijazah Sarjana) 1 1 2 305
423	166	24	3.20	.67	.78	.1	.59	-.1	.20	.13	91.7	92.6	423 15 SMK Kinabutan Suluk Male Other (Please specify) | Lain-lain (Sila Nyatakan) 1 1 1 423
77	165	24	2.85	.53	1.29	.6	1.16	.5	.20	.17	91.7	89.5	77 17 SMK Balung Tidung Female High school graduate (Lulusan sekolah menengah) 1 1 1 77
443	165	24	2.85	.53	1.06	.3	.41	-.6	.58	.17	91.7	89.5	443 15 SMK Kinabutan Bugis Female High school graduate (Lulusan sekolah menengah) 1 1 1 443
236	164	24	2.61	.46	1.20	.5	2.31	1.5	-.20	.20	87.5	86.6	236 16 SMK Tawau Bajau Male Other (Please specify) | Lain-lain (Sila Nyatakan) 2 1 1 236
111	163	24	2.43	.40	.88	.0	.63	-.3	.19	.23	79.2	81.8	111 17 SMK Merotai Besar Bugis Male High school graduate (Lulusan sekolah menengah) 1 1 1 111
274	163	24	2.43	.40	.65	-.4	.65	-.3	.30	.23	75.0	81.8	274 17 SMK Titingan Bugis Female Other (Please specify) | Lain-lain (Sila Nyatakan) 1 1 1 274
165	162	24	2.29	.37	4.33	3.4	2.37	1.7	.09	.25	87.5	77.8	165 17 SMK Tawau Bajau Female Diploma (Diploma) 1 1 1 165
291	162	24	2.29	.37	1.70	1.2	.80	-.1	.42	.25	87.5	77.8	291 16 SM Konven Ursula Kadazan Female Bachelor's degree (Ijazah Sarjana Muda) 1 1 2 291
336	162	24	2.29	.37	1.47	.9	1.65	1.0	.14	.25	79.2	77.8	336 17 SMK Tawau 2 Murut Female High school graduate (Lulusan sekolah menengah) 2 1 1 336
381	162	24	2.29	.37	1.70	1.2	.80	-.1	.42	.25	87.5	77.8	381 17 SMK Jalan Apas Bisaya Female Master's degree (Ijazah Sarjana) 1 1 2 381
164	161	24	2.16	.34	3.06	2.7	2.88	2.2	.16	.27	79.2	72.6	164 18 Kolej Tingkatan 6 Tawau Cina Female College (Kolej/Latihan Vokasional) 1 1 1 164
78	160	24	2.06	.32	1.50	1.0	1.11	.4	.46	.29	75.0	69.3	78 15 SMK Abaka Suluk Female High school graduate (Lulusan sekolah menengah) 1 1 1 78
203	160	24	2.06	.32	1.05	.3	.90	.0	.29	.29	66.7	69.3	203 16 SMK Tawau Bugis Male Diploma (Diploma) 2 1 1 203
269	160	24	2.06	.32	1.16	.5	1.19	.5	.06	.29	62.5	69.3	269 17 SMK Titingan Suluk Female High school graduate (Lulusan sekolah menengah) 1 1 1 269
179	159	24	1.96	.30	3.83	3.7	5.85	4.2	-.02	.31	70.8	66.4	179 18 Kolej Tingkatan 6 Tawau Bajau Female High school graduate (Lulusan sekolah menengah) 1 1 1 179
286	159	24	1.96	.30	1.75	1.5	3.06	2.5	-.25	.31	54.2	66.4	286 16 SM Konven Ursula Bugis Female High school graduate (Lulusan sekolah menengah) 1 1 2 286
413	159	24	1.96	.30	.77	-.4	.88	.0	.33	.31	66.7	66.4	413 15 SMK Kinabutan Bajau Female High school graduate (Lulusan sekolah menengah) 1 1 2 413
455	159	24	1.96	.30	1.97	1.8	1.17	.5	.29	.31	75.0	66.4	455 18 Kolej Vokasional Tawau Kedayan Female Other (Please specify) | Lain-lain (Sila Nyatakan) 1 1 1 455
458	159	24	1.96	.30	.39	-1.5	.34	-1.3	.68	.31	79.2	66.4	458 18 Kolej Vokasional Tawau Bugis Female High school graduate (Lulusan sekolah menengah) 1 1 1 458
52	158	24	1.88	.28	.82	-.3	.56	-.7	.60	.32	75.0	65.2	52 15 SMK Abaka Bugis Female Bachelor's degree (Ijazah Sarjana Muda) 1 1 1 52
54	158	24	1.88	.28	.82	-.3	.56	-.7	.60	.32	75.0	65.2	54 15 SMK Abaka Kadazan Female Diploma (Diploma) 1 1 1 54
86	158	24	1.88	.28	.63	-.8	.46	-1.0	.58	.32	79.2	65.2	86 16 SMK Balung Bugis Female High school graduate (Lulusan sekolah menengah) 1 1 1 86
449	158	24	1.88	.28	3.65	3.7	2.40	2.0	.28	.32	75.0	65.2	449 18 Kolej Vokasional Tawau Jawa Female High school graduate (Lulusan sekolah menengah) 1 1 1 449
85	157	24	1.80	.27	1.78	1.6	1.61	1.1	.18	.34	54.2	64.0	85 15 SMK Abaka Bugis Female High school graduate (Lulusan sekolah menengah) 1 1 2 85
392	157	24	1.80	.27	.58	-1.0	.68	-.5	.35	.34	58.3	64.0	392 13 SM St Patrick Cina Female High school graduate (Lulusan sekolah menengah) 1 1 2 392
82	156	24	1.73	.26	1.94	1.9	1.52	1.0	-.01	.35	45.8	58.1	82 16 SMK Balung Tidung Female High school graduate (Lulusan sekolah menengah) 2 1 1 82
254	156	24	1.73	.26	.73	-.6	.60	-.7	.54	.35	58.3	58.1	254 17 SMK Titingan Bugis Male Bachelor's degree (Ijazah Sarjana Muda) 1 1 1 254
448	156	24	1.73	.26	.56	-1.1	.61	-.7	.57	.35	70.8	58.1	448 15 SMK Kinabutan Bugis Male High school graduate (Lulusan sekolah menengah) 1 1 1 448
472	155	24	1.66	.25	.61	-1.0	.58	-.8	.15	.36	54.2	55.6	472 18 Kolej Vokasional Tawau Jawa Male High school graduate (Lulusan sekolah menengah) 1 1 1 472
152	154	24	1.60	.24	.51	-1.4	.57	-.9	.66	.37	70.8	53.4	152 18 Kolej Tingkatan 6 Tawau Tidung Male Other (Please specify) | Lain-lain (Sila Nyatakan) 1 1 1 152
450	154	24	1.60	.24	.37	-2.0	.37	-1.5	.65	.37	66.7	53.4	450 18 Kolej Vokasional Tawau Melayu Female College (Kolej/Latihan Vokasional) 1 1 1 450
50	153	24	1.55	.24	.70	-.7	.80	-.3	.45	.38	50.0	52.7	50 15 SMK Abaka Bugis Female Other (Please specify) | Lain-lain (Sila Nyatakan) 2 1 1 50
204	153	24	1.55	.24	.81	-.4	.73	-.5	.61	.38	62.5	52.7	204 14 SMK Pasir Putih Bugis Female High school graduate (Lulusan sekolah menengah) 2 1 1 204
253	153	24	1.55	.24	1.23	.7	1.19	.5	.13	.38	50.0	52.7	253 17 SMK Titingan Bisaya Male Diploma (Diploma) 1 1 1 253

Figure 5. Person statistic

Overall, the Rasch analysis results validate the instrument's effectiveness in measuring computer literacy by confirming its reliability, fit, and coverage of difficulty levels. The revisions made based on the analysis further enhance the instrument's accuracy and clarity.

2. Revision of ICT Access Questions

During the analysis of ICT disparities among adolescents in Tawau, Sabah, it was found that the initial questions on computer and internet access were not fully capturing the situation. The original questions included:

i. Do you have access to a computer or laptop at home?
ii. Do you have an internet connection at home?
iii. Do you have access to a computer or internet connection at your school?

The question about school access yielded inconsistent responses, likely due to varying experiences in ICT classes. To address this, the question was removed, and a revised set of questions was introduced:

i. Do you have access to a computer or laptop at home?
ii. Do you have an internet connection at home?
iii. Do you have access to a computer at your school?
iv. Do you have an internet connection at your school?
v. Do you take any ICT classes at school?
vi. Do you take any ICT classes outside of school?

These changes aim to more accurately capture ICT access and involvement, providing clearer insights into the digital disparities faced by adolescents in the region.

3. Index Development

The Computer Literacy Index for Adolescents is developed using a weighted average method, commonly applied in composite indices like the Human Development Index (HDI) and the Digital Economy and Society Index (DESI). This approach involves averaging indicators within each category and multiplying these averages by their respective weights to reflect the importance of each component. The final index score is the sum of these weighted averages, making it a context-specific and meaningful measurement.

The development process draws on the historical use of weighted averages, with formal mathematical foundations established in the 17th century by mathematicians like Blaise Pascal and Pierre de Fermat. Today, this method is widely used in economics, education, and social sciences for measuring complex phenomena. For adolescents in Tawau, Sabah, creating a robust Computer Literacy Index is crucial to addressing ICT access disparities and improving digital skills. The index development follows four key steps:

i. Scoring System: Assign scores based on individual performance on various indicators.
ii. Weighting of Indicators: Reflect the relative importance of each computer literacy dimension.
iii. Index Calculation: Aggregate scores across all indicators using assigned weights to produce a composite score.

iv. Interpretation of Results: Analyze scores to identify strengths and weaknesses, guiding targeted interventions to enhance computer literacy.

Step 1: Define Indicators and Scoring System
The index is structured around five main categories, each encompassing several indicators. A Likert scale ranging from 1 to 7 is used for scoring, where:
1 = Strongly Disagree
2 = Disagree
3 = Somewhat Disagree
4 = Neutral
5 = Somewhat Agree
6 = Agree
7 = Strongly Agree

Step 2: Weighting of Indicators
Assigning weights to different categories in the computer literacy index is essential for accurately reflecting each skill's significance. The weights, based on their importance in promoting overall computer literacy and relevance to adolescents' daily digital interactions, are as follows:

i. General Computer Knowledge (30%): This category receives the highest weight, forming the foundation for all other digital skills. Essential skills like identifying hardware and installing software are critical for navigating advanced tools. Studies like the International Computer and Information Literacy Study (ICILS) highlight that strong general computer knowledge predicts overall digital literacy (Fraillon et al., 2014). Adolescents with robust foundational skills are better equipped to adapt to new technologies, vital for their academic and professional futures.
ii. Web Browsing Skills (25%): Proficiency in web browsing is essential for accessing information, communication, and completing various online tasks. Skills like searching for information and managing tabs are crucial in today's digital landscape. The European Commission's Digital Competence Framework (DigComp 2.1) emphasizes that information and data literacy, including web browsing skills, are key components of digital competence (Carretero, Vuorikari, & Punie, 2017). As reliance on the internet grows, adolescents must be proficient in these skills to participate effectively in the digital world.
iii. Microsoft Word Skills (15%): Proficiency in Microsoft Word is vital for creating, editing, and formatting documents, essential for school assignments and professional communication. Effective document management enhances efficiency and productivity (Dibbari & Dangata, 2018).
iv. Microsoft Excel Skills (15%): Excel skills are crucial for organizing data, performing calculations, and creating visual representations of information, increasingly sought after in the job market.
v. Microsoft PowerPoint Skills (15%): PowerPoint skills are essential for creating effective presentations, enhancing students' communication abilities (Kahraman, Çevik, & Kodan, 2011).The assigned weights reflect the relative importance of each category in contributing to overall computer literacy. By prioritizing General Computer Knowledge and valuing Web Browsing Skills, the index emphasizes foundational competencies while recognizing specific applications widely used in educational and professional contexts. This balanced approach captures a comprehensive view of computer literacy, aiding in identifying specific areas where adolescents may lack proficiency and require additional support.

Step 3: Index Calculation
To calculate the index score for each individual, the average score for each category is computed and then weighted according to the assigned percentages. The overall index score is the sum of these weighted scores.

Example Calculation
Assume an individual scores the following:

General Computer Knowledge
Scores: 6, 5, 4, 5, 6, 7, 6 (average score = 5.57)

Microsoft Word Skills
Scores: 5, 4, 5, 5, 4 (average score = 4.60)

Microsoft Excel Skills
Scores: 4, 5, 4, 6 (average score = 4.75)

Microsoft PowerPoint Skills
Scores: 5, 4, 5 (average score = 4.67)
Web Browsing Skills
Scores: 6, 7, 6, 5, 6 (average score = 6.00)

Calculate the weighted score for each category:
General Computer Knowledge: $5.57 \times 0.30 = 1.671$
Microsoft Word Skills: $4.60 \times 0.15 = 0.690$
Microsoft Excel Skills: $4.75 \times 0.15 = 0.713$
Microsoft PowerPoint Skills: $4.67 \times 0.15 = 0.701$
Web Browsing Skills: $6.00 \times 0.25 = 1.500$

Aggregate the scores:

$$Index\ Score = 1.671 + 0.690 + 0.713 + 0.701 + 1.500 = 5.275$$

Step 4: Interpretation of Results

i. High Scores (5.5-7): Strong Proficiency
Scores between 5.5 and 7 indicate strong proficiency in computer literacy. Students at this level demonstrate advanced skills and a thorough understanding of digital tools. Research from the International Computer and Information Literacy Study (ICILS) shows that high-proficiency individuals are better equipped for learning and problem-solving, enhancing their academic performance and readiness for professional environments (Fraillon et al., 2014).

ii. Medium Scores (3.5-5.5): Moderate Proficiency
Scores of 3.5 to 5.5 reflect moderate proficiency. Adolescents in this range have adequate skills but may struggle with complex tasks, making targeted training beneficial for improvement.

iii. Low Scores (1-3.5): Low Proficiency
Scores between 1 and 3.5 indicate low proficiency, revealing significant gaps in digital skills. The National Skills Coalition (2017) notes that individuals with low computer literacy often face challenges with basic tasks like file management and internet navigation. These scores highlight the need for targeted interventions to develop foundational digital skills, enabling effective participation in the digital world.

4. Index Validation

Table 4 compares the top 10 and bottom 10 adolescents' computer literacy levels using the Winstep Person Statistic from Rasch Analysis and the Computer Proficiency Index. The Winstep Person Statistic assigns logits based on test performance, with higher values indicating greater ability. The Computer Proficiency Index aggregates indicators into a single score for overall proficiency.

Table 4. Rasch analysis and index output comparison

Top 10				Bottom 10			
Winstep Person Statistic Output		Computer Proficiency Index Output		Winstep Person Statistic Output		Computer Proficiency Index Output	
ENTRY	MEASURE	No	Index Score	ENTRY	MEASURE	No	Index Score
149	3.83	149	6.96	225	-1.52	224	1.62
423	3.2	423	6.92	181	-1.52	181	1.61
305	3.2	305	6.91	210	-1.64	210	1.57
443	2.85	443	6.89	224	-1.64	225	1.57
77	2.85	77	6.86	247	-1.96	166	1.36
236	2.61	236	6.81	166	-2.06	247	1.34
274	2.43	274	6.8	366	-2.32	366	1.27
111	2.43	111	6.78	364	-2.48	364	1.25
291	2.29	291	6.76	243	-2.48	243	1.21
381	2.29	381	6.76	124	-2.69	124	1.19

Key findings reveal that the top 10 performers show high logits (e.g., 3.83, 3.2) and high Computer Proficiency Index scores (e.g., 6.96, 6.92), indicating both methods effectively identify proficient individuals. In contrast, the bottom 10 performers exhibit low or negative logits (e.g., -1.52, -2.69), matching low index scores (e.g., 1.62, 1.19). This strong correlation between the Winstep Person Statistic and the Computer Proficiency Index validates the index as a reliable measure of computer literacy, reinforcing its use in educational assessments.

5. Detailed Analysis of the Computer Proficiency Index

The Computer Proficiency Index offers insights into specific skill areas: Basic Computer Skills, Microsoft Word, Excel, PowerPoint, and Web Browsing. Each area is weighted, with maximum possible scores such as 2.10 for Basic Computer Skills and 1.05 for each Microsoft Office skill.

Table 5. Computer proficiency index output

Computer Proficiency Index Output							
No	Index Score	Basic Computer Skill Weighted Score (Max: 2.10)	Microsoft Word Skill Weighted Score (Max: 1.05)	Microsoft Excel Skill Weighted Score (Max: 1.05)	Microsoft PowerPoint Skill Weighted Score (Max: 1.05)	Web Browsing Skill Weighted Score (Max: 1.75)	Proficiency Level
1	5.75	1.89	0.93	0.79	1.05	1.10	Strong
2	5.10	1.37	0.75	0.68	0.80	1.50	Moderate
3	5.06	1.63	0.78	0.60	0.75	1.30	Moderate
4	4.53	1.11	0.72	0.60	0.75	1.35	Moderate
5	4.77	1.67	0.69	0.56	0.80	1.05	Moderate
6	5.97	1.54	0.93	0.75	1.00	1.75	Strong
7	6.00	1.50	0.99	0.86	0.90	1.75	Strong
8	4.10	1.20	0.60	0.60	0.60	1.10	Moderate
9	2.97	0.90	0.33	0.34	0.30	1.10	Low
10	1.64	0.56	0.21	0.23	0.25	0.40	Low

Examples from the study illustrate varying proficiency levels. For instance, Participant No. 1, with an Index Score of 5.75, shows strong overall proficiency but a lower score in Excel (0.79), suggesting room for improvement. In contrast, Participant No. 9, with an Index Score of 2.97, has significant weaknesses, especially in Microsoft Word (0.33) and Excel (0.34), indicating a need for comprehensive support.

The index classifies proficiency into strong, moderate, and low levels, allowing for targeted interventions. Participants with moderate proficiency, like No. 2 and No. 3, could benefit from specific training. The Computer Proficiency Index serves as both a measurement and diagnostic tool, helping to design efficient, tailored educational programs.

Conclusion

This study focused on developing, validating, and analyzing an instrument to measure computer literacy among adolescents in Tawau, Sabah. The process began by identifying key themes from existing instruments, leading to the creation of a context-specific tool. The instrument underwent rigorous validation, including Rasch analysis, which ensured it accurately captured various dimensions of computer literacy, such as basic skills, Microsoft Office proficiency, and web browsing.Rasch analysis provided valuable insights into the instrument's reliability and validity, helping to refine item performance and scoring. The resulting index, which quantifies computer literacy by aggregating scores from different categories, aligns well with Rasch analysis outputs, further validating its effectiveness.

Practical Implications and Recommendations:

The final instrument and index are robust tools that hold significant potential for future research and educational interventions. Policymakers and educators can leverage these tools to improve digital literacy in several ways:

i. Targeted Interventions: Given the variability in proficiency levels observed, targeted interventions are essential. Specific classes or workshops should be designed to address areas where students exhibit the most significant gaps. For instance, if deficiencies in Microsoft Excel skills or web browsing abilities are identified, tailored classes focusing on these areas can be implemented. Such targeted interventions will help bridge the gap between varying levels of digital skills and ensure that all students achieve a baseline proficiency necessary for academic and professional success.

ii. Educational Program Design: Educators can use the instrument to design focused educational programs that address the specific needs identified through the index. By implementing these programs, educators can provide support where it is most needed, helping students develop the skills required to excel in a digital world.

iii. Policy Development: Policymakers can utilize the findings to inform the development of policies and initiatives aimed at improving digital literacy across the region. The index can serve as a benchmark for evaluating the effectiveness of these policies and for making data-driven decisions to enhance digital education.

iv. Enhancing Digital Learning Platforms: Stakeholders should expand digital learning infrastructure by leveraging successful initiatives like the 1BestariNet project, which connects schools to the Frog VLE cloud-based system. This project has shown potential in enhancing ICT access and student engagement (Kamalludeen et al., 2016). Providing teachers and students with mobile devices and high-speed internet can enable interactive learning environments. Effective technology adoption is vital for achieving national ICT education policy goals (Zainal & Zainuddin, 2020).

Yekeen et al. (2021) highlighted a significant shift towards online platforms during the global academic lockdown. Despite challenges like misunderstandings and misuse, respondents preferred digital alternatives to traditional classroom methods, indicating online education's potential as an effective substitute. To create a healthy and secure educational environment, it is crucial to invest in school systems and technology, especially during crises like COVID-19. This will improve student proficiency and educational infrastructure, ensuring preparedness for future challenges. By addressing gaps in computer literacy, targeted interventions can enhance the digital skills of adolescents in Tawau and similar regions, ensuring more effective and relevant digital literacy programs.

Acknowledgement: This research was made possible by the invaluable contributions of experts who provided insights and feedback on the proposed instrument. I extend my gratitude to the School of Quantitative Sciences at Universiti Utara Malaysia for facilitating the documentation during my engagement with external experts. Special thanks to the Ministry of Education and the Sabah State Education Department for granting approvals and supporting this study. I am also deeply grateful to the participating secondary schools, whose cooperation was essential to the success of this research.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

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Appendix A (Final Instrument)

Category		Questions	Suggested Scale
Access to ICT		Do you have access to a computer or laptop at home?	YES, NO
		Do you have an internet connection at home?	YES, NO
		Do you have access to a computer at your school?	YES, NO
		Do you have internet connection at your school?	YES, NO
		Do you take any class on ICT at school?	YES, NO
		Do you take any ICT class outside of school?	YES, NO
Literacy	General Computer Knowledge	I can identify the main components of a computer (e.g., CPU, RAM, hard drive) and their specifications.	SD 1 2 3 4 5 6 7 SA
		I can transfer data between computers, laptops, and other digital devices.	SD 1 2 3 4 5 6 7 SA
		I can create a file or a folder.	SD 1 2 3 4 5 6 7 SA
		I can rename the file or folder	SD 1 2 3 4 5 6 7 SA
		I can create simple graphic designs, such as drawing or editing images, using software like Paint.	SD 1 2 3 4 5 6 7 SA
		I can connect new device to my computer (e.g. modem, camera, printer)	SD 1 2 3 4 5 6 7 SA
		I can follow the necessary steps to download and install new software on my computer, such as Spotify or Google Chrome	SD 1 2 3 4 5 6 7 SA
	Microsoft Word Skills	I can open, save, and close documents in Word.	SD 1 2 3 4 5 6 7 SA
		I can copy and paste objects in a Word document.	SD 1 2 3 4 5 6 7 SA
		I can change fonts and font characteristics in Word. (e.g. Size, Color)	SD 1 2 3 4 5 6 7 SA
		I can insert pictures in Word documents.	SD 1 2 3 4 5 6 7 SA
		I can create and insert tables in Word.	SD 1 2 3 4 5 6 7 SA
	Microsoft Excel Skills.	I can create a spreadsheet.	SD 1 2 3 4 5 6 7 SA
		I can create tables and charts into Excel spreadsheets.	SD 1 2 3 4 5 6 7 SA
		I can merge cells in Excel.	SD 1 2 3 4 5 6 7 SA
		I can insert and delete rows and columns in an Excel spreadsheet	SD 1 2 3 4 5 6 7 SA
	Microsoft PowerPoint Skills	I can create and modify a presentation slide.	SD 1 2 3 4 5 6 7 SA
		I can edit WordArt in a presentation.	SD 1 2 3 4 5 6 7 SA
		I can insert tables and charts in a PowerPoint slide.	SD 1 2 3 4 5 6 7 SA
	Web Browsing Skills	I can effectively search for specific information on the Internet, such as finding instructional videos or detailed articles	SD 1 2 3 4 5 6 7 SA
		I know how to enter a URL (web address) into the address bar	SD 1 2 3 4 5 6 7 SA
		I can open, close and organize multiple tab	SD 1 2 3 4 5 6 7 SA
		I can bookmarked favorite website	SD 1 2 3 4 5 6 7 SA
		I can send email with attachment(s)	SD 1 2 3 4 5 6 7 SA