Self-Assessment Instrument Online Opportunity Skills and Online Risk Survival Skills for e-Learning Students of Economics and Education Programs

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ABSTRACT
This study aims to explore Online Opportunity Skills (OPS) and Online Risk Survival Skills (ORSS) in order to develop a self-assessment instrument and identify factors that reflect these skills. The main analytical technique used is exploratory factor analysis, with additional analysis techniques such as face validity and discriminant validity used as robustness checks. The sample used in this study consisted of active undergraduate students, with a total of 638 data collected. To clarify the research process, five phases were conducted: phase 1 involved drafting the self-assessment instrument for OPS and ORSS, phase 2 focused on face validity with expert validation, phase 3 involved data collection, phase 4 examined discriminant validity (using Pearson, Kendall's tau-b, Spearman, and Cronbach's alpha), and phase 5 encompassed exploratory factor analysis. The results of this study include the development of the online opportunity skills instrument (consisting of 9 statement items) and the online risk survival skills instrument (consisting of 8 statement items) through robustness checks and the elimination of statements that did not meet the requirements of the analysis techniques used in this study. The findings revealed four factors in the OPS variable (highest initial eigenvalue: 2.474 > 1.000) and three factors in the ORSS variable (highest initial eigenvalue: 2.320 > 1.000). The researcher hopes that this study will be beneficial for educators and future researchers as a reference and as a basis for further research, such as confirmatory factor analysis on the identified factors in this study.

Keywords: *Exploratory Factor Analysis, Self-Assessment Instrument, Online Opportunity Skills, Online Risk Survival Skills, e-Learning, Undergraduates.*

1. INTRODUCTION

The rapid development of e-learning has led to modern learning that has many positive impacts. Various studies have been conducted to identify how these positive impacts are achieved, such as the utilization of modern technology [1]–[7], learning media [8]–[13] to learning models [2], [14]–[22] to improve outcomes, skills, literacy, and learning motivation [10], [23], [24]. Is undoubtedly beneficial for the development of education worldwide.

However, it should be noted that in the e-learning process that utilizes modern technology such as search engines (Google, Yahoo, Microsoft Bing, Baidu, Yandex, DuckDuckGo, Ask.com, and Ecosia), article or journal search platforms (Google Scholar, eric.ed.gov, ResearchGate, Oxford Academic, ScienceDirect, Emerald Insight, Taylor & Francis, etc.), communication platforms (WhatsApp, Facebook, Instagram, Zoom, Google Meet, etc.), and artificial intelligence (Artificial Narrow Intelligence, Artificial General Intelligence, Artificial Super Intelligence, Self-Aware, and OpenAI), apart from providing positive impacts [25]–[28] they can also have negative impacts [27], [29], [30] on undergraduate students. The positive impacts in the field of undergraduate learning include improving scientific thinking, reading comprehension instruction, learning experiences, writing performance, skills enhancement, outcome improvement, and policy enhancement [1], [2], [24], [31]–[33], [4]–[10], [23]. On the other hand, many researchers have found negative impacts that can occur, such as lower scores in learning outcomes or academic performance [34]–[37], psychological effects [34], [38], addiction [35], [39], online media dependence [40], [41], disruption of sleep patterns [37], [42] frauds in learning

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or education sector [43], [44], academic dishonesty [45]–[48] up to plagiarism[49]–[52].

In order to achieve positive impacts and avoid negative impacts, specific skills are needed [50], [53], [54]. Previous research on these positive impacts is often referred to as online opportunity (OP), while the negative impacts are closely related to online risk (OR) [55]–[58]. Both components (OP & OR) are considered as a "given" or a "concept" acquired by individuals due to the consequences [57], [58] or the impact of using modern technology and have not been recognized as specific skills that can be developed or improved through specific treatment. For example, critical thinking is a process of analyzing, evaluating, and critically understanding a situation, idea, or problem, which is further analyzed by researchers and developed into a skill called critical thinking skills [53], [59]. Critical thinking skills are necessary to effectively engage in critical thinking. Communication, on the other hand, is the process of transferring information, understanding, and comprehension from one person, place, or thing to another person, place, or thing, which is developed into communication skills [60]. Communication skills are the abilities or competencies needed to engage in effective communication.

With the given reflection, OP and OR should also be developed into skills to achieve these outcomes. Unfortunately, previous researchers on OP & OR [55]–[58], [61] have not identified OP & OR as skills. Consequently, an instrument for identifying online opportunity skills (OPS) and online risk survival skills (ORSS) has not been discovered or utilized. Therefore, in the initial stage of developing these skills, the self-assessment instrument and the determination of factors or constructs that can reflect OPS and ORSS are of utmost urgency.

Based on this urgency, this study aims to explore OPS and ORSS to obtain a self-assessment instrument and factors that can reflect these skills. The primary analysis technique used is exploratory factor analysis, and additional analysis techniques such as face validity and discriminant validity are employed as robustness checks. Exploratory factor analysis is chosen because neither the OPS and ORSS instruments nor the factors have been developed previously. Face validity and discriminant validity are utilized as robustness checks to ensure the validity and strength of the self-assessment instrument. With the hope of contributing to the literature and providing researchers with the undergraduate perspective on these abilities.

2. METHOD

The sample group of this study consisted of 638 students who were studying at the undergraduate level at the Universitas Sebelas Maret (UNS) dan Univeritas Negeri Malang (UM), Indonesia, in the 2023 academic year who had carried out e-learning in education process. The sample of this study was randomly selected from volunteer students. The sample size calculation were based on a stable factor structure model, which requires a minimum of 100 and 200 subjects, and a subject variable ratio of at least 2:1 to reduce the standard error (SE) of the correlations to negligible proportions [62]. The method used in this study is Exploratory Factor Analysis (EFA) as convergent validity. EFA was used to determine the construct validity [63] of Instrument OPS & ORSS. Face validity with expert judgment and discriminant validity with discriminant validity are not the main analysis in instrument development, both are used as reinforcement in instrument development. [64] revealed "Face validity is the degree to which a measure appears to be related to a specific construct, in the judgment of nonexperts such as test takers". , and the clarity of the language used. While discriminant validity is the extent to which latent variable A discriminates from other latent variables (e.g., B, C, D) [64]. We used five phases as a research procedure (see table 1) Phase-1 of the draft OPS and ORSS self-assessment instrument was prepared based on a literature review using Indonesian by adapting a Likert scale coded 1 to 5. Phase-2, expert validation was carried out using experts or experts to assess the instrument by filling out the validation sheet table 4 with a rating scale of (1) very poor, (2) not good, (3) fair, (4) good, and (5) very good. If the item gets a score of (2) or (1) on expert validation, then the statement item will be eliminated. Phase-3, collecting data by distributing self-assessment instruments to 638 samples. Phase-4 data were tabulated and validity were carried out (Pearson, Kendall's tau-b, Spearman & cronbach's alpha). Test the validity & reliability using SPSS 26 and use criteria.

a. If the value of Sig. (2-tailed) < 0.05 and the correlation is positive, then the Questionnaire item is declared **valid.**
b. If the value of Sig. (2-tailed) < 0.05 and the correlation is negative, then the Questionnaire item is declared **invalid.**
c. If the value of Sig. (2-tailed) > 0.05 then the Questionnaire item is declared **invalid.**

After criterion "a" is met, the next step is to compare the Pearson correlation with r table df 600 (0.080). If the *Pearson,* Kendall's tau-b, & Spearman *correlation* > 0.080 then the item is declared valid. Then if *Cronbach's alpha* > 0.6 then the instrument is declared reliable.

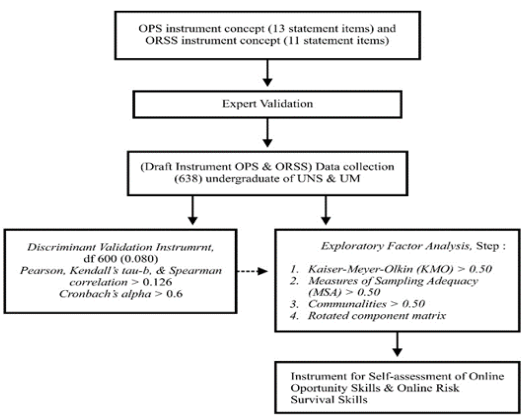
Phase-5 carried out Exploratory Factor Analysis (EFA). EFA was used in this study because the OPS and ORSS instruments for undergraduate student had never been made in Indonesia. EFA in this study uses the Extraction Method in the form of Principal Component Analysis and the Rotation Method in the form of Varimax to find out which statement items will then be eliminated, to group items into indicators and to find out which items have strong dimensions with computational thinking skills and collaboration skills. The first requirement that must be met to perform factor analysis is Kaiser-Meyer-Olkin (KMO) > 0.50 and sig. < 0.05. The second requirement is anti-image correlation-Measures of Sampling Adequacy (MSA) > 0.50, if MSA < 0.50 then

the statement item must be eliminated and retested. The third condition is Communalities > 0.50, if Communalities < 0.50 then the item must be eliminated and retested. These conditions must be met before describing how many factors or dimensions appear based on the total initial elgenvalues > 1, and to determine the items that are factors or dimensions through the max rotated component matrix value per dimension component that appears with a loading factor of 0.40 [63]. The instrument consists of several aspects which are interpreted and described in several indicators for each aspect. In detail, research aspects and indicators are described in table 1.

Table 1. Instrument validation "experts"

Aspect (Code)	Indicator	Item Question 1 2 3 4 Etc
Clarity (A1)	Clarity title sheet questionnaire	
	Clarity sheet statement	
	Clarity item statement	
	Clarity instruction charging	
Accuracy (A2)	Accuracy statement with expected answer	
Relevance (A3)	Statement related with indicator	
	Statement in accordance with aspect you want achieved	
Validity contents (A4)	Statement uncover correct information	
Not there is a bias (A5)	Statement have complete idea	
Language Accuracy (A6)	Language used easy understood	
	Language used effective	
	Writing in accordance good Indonesian spelling and Correct	

The procedure after accumulating the instruments in this study is to determine the research phase. The research phase is divided into 5 main sections starting from determining the instrument to assessing the validity of the instrument. **Figure 1**



3. FINDINGS

3.1. (Phase-1) Online Opportunity Skills

As a consideration in the development of this draft instrument, the researcher used reference indicators from online opportunity (OP) [65], critical thinking skills (CTS) [23], communication skills (CS) [23], dan computations thinking skills (CmTS) [66]. and computational thinking skills (CmTS) (Korkmaz et al., 2017). The OP indicators considered include internet access, internet usage, and internet literacy. The CTS indicators considered include clarification, judgment, justification, connecting ideas, and novelty. For CS, the indicators considered include conformity, expansion, profile, and networks. Lastly, the CmTS indicators considered in this study include creativity, algorithmic thinking, cooperativity, and problem-solving. Based on these variable considerations, the researcher developed a draft instrument called OPS with 13 initial instrument items, which will also generate OPS indicators (see Table 9).

3.2. (Phase-1) Online Risk Survival Skills

The ORSS draft instrument was developed by considering indicators of online risk (OR) [67], critical thinking skills (CTS) [23], communication skills (CS) [23], dan computations thinking skills (CmTS) [66]. This was done due to the absence of previous indicators for online risk survival skills. It is expected that the ORSS draft instrument (see Table 3) with 11 instrument items can generate indicators that reflect ORSS (see Table 9). The entire draft instrument was developed using the Indonesian language because the research subjects are in Indonesia. However, in this article, it has been translated into English without losing the contextual or meaningful aspects of the draft instrument.

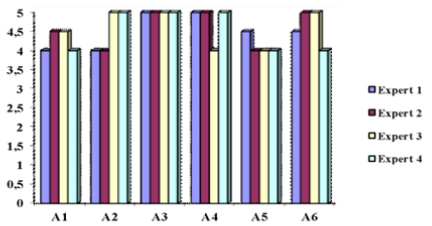
Table 3. Draft Instrument ORSS

Item Code	Item Statement
ORSS_01	I am able to communicate with someone I just met through digital social media.
ORSS_02	I have received and ignored unwanted messages/calls (in the form of words, images, videos, etc.) with sexual content through digital media (WhatsApp, Facebook Messenger, Instagram DM, email, etc.).
ORSS_03	I have received and ignored scam messages/calls through digital media (WhatsApp, Facebook Messenger, Instagram DM, SMS, email, etc.).
ORSS_04	I have received and ignored bullying messages/calls through digital media (WhatsApp, Facebook Messenger, Instagram DM, email, etc.).
ORSS_05	I have received and ignored fake information/news (hoaxes) through digital media (WhatsApp, Facebook Messenger, Instagram DM, SMS, email, etc.).
ORSS_06	I have the belief that I can solve risky problems that may arise when facing new situations in the digital world.
ORSS_07	I can logically express ways to solve risky problems I encounter in the digital world.

ORSS_08	If I meet someone online, I know how to check if their profile is genuine.
ORSS_09	I know how to compare various sources to determine if the information is true.
ORSS_10	I know how to identify online information and evaluate it.
ORSS_11	I can easily draw conclusions from the online information I receive.

3.3. (Phase-2) Face Validity-Expert Judgment

The second phase is face validity using expert validation. The appointed experts are professionals in their respective fields and have credibility, independence, objectivity, and accountability in assessing the research instrument items based on the predetermined indicators (see Table 1). The appointed experts include content experts and language experts. Each expert is given an assessment form and the draft instrument items of OPS and ORSS to be evaluated. The aspects assessed in the expert validation include clarity, accuracy, relevance, content validity, absence of bias, and language accuracy.



Based on the conducted validation, the following are the results of the validation:

***Noted**

A1: clarity, A2: accuracy, A3: relevance, A4: validity content, A5: not there a bias, dan A6: language accuracy.

Figure 2. Expert Validation Results

Based on the expert validation results in Figure 2 above, the average validation scores for each aspect in each category were "Good". This indicates that the instrument evaluated and assessed by experts based on the indicators (Table 1) yielded valid scores, and none of them were eliminated. However, the experts provided suggestions for improvement, such as correcting typographical errors, which have been addressed by the team.

3.4. (Phase-3) Data Collection

Students enrolled at universities were contacted by researchers and provided with a research instrument link, and they were asked to give their consent before participating. All students were informed that their participation, including personal data and survey results, would be kept confidential. Additionally, it was assured that the survey results would not affect their final grades in any subject. Considering external validity and the need to recruit research subjects with characteristics of undergraduate students, the researchers recruited active undergraduate students studying between 2022 and 2023. A total of 638 data were successfully collected by the researchers using the aforementioned criteria and steps.

3.5. (Phase-4) Discriminant Validity

After the draft instrument has met the criteria for face validity using expert judgment and data collection has been conducted with 638 collected data, the researcher performed validation on the 13 items of the OPS instrument and the 11 items of the ORSS instrument using discriminant validity. As a comparison in the analysis and validation in this phase, the researcher used Pearson, Kendall's tau-b, and Spearman correlations to determine the discriminant validity of each instrument item. The results showed that the 13 items of the OPS instrument (see Table 4) remained valid with a comparison result of r table (0.080). The lowest Pearson correlation in the OPS instrument was found in item code OPS_05 with a value of 0.361>0.080. Similarly, the lowest Kendall's tau-b value was found in item code OPS_05 with a value of 0.248>0.080. The same pattern was observed in the Spearman test for OPS_5 with a value of 0.293>0.080. The reliability test using Cronbach's alpha yielded a value of 0.703>0.600, indicating that all OPS statement items (13 items) were valid with strong discriminant validity and reliability.

Furthermore, the validation results of the ORSS draft instrument showed a similar condition to the OPS draft instrument, where all statement items (11 items) were declared valid with strong and reliable discriminant validity. The lowest Pearson correlation was found in item ORSS_07 (0.284>0.080). The lowest Kendall's tau-b value was found in item ORSS_07 (0.204>0.080), and the lowest Spearman correlation was found in item ORSS_07 (0.240>0.080). The Cronbach's alpha test (0.649>0.600) indicated that all items were reliable. Based on these validation results, all statement items can be continued to the next phase, which is the EFA.

Tabel 4. Result of Discriminant Validity

Item Code	Pearson	Kendall's tau-b	Spearman	Information	Cronbach's alpha	Information
OPS_01	0.475**	0.406**	0.475**	Valid	0.703	Reliabel
OPS_02	0.584**	0.506**	0.589**	Valid		
OPS_03	0.580**	0.483**	0.566**	Valid		
OPS_04	0.407**	0.340**	0.403**	Valid		
OPS_05	0.361**	0.248**	0.293**	Valid		
OPS_06	0.422**	0.308**	0.361**	Valid		
OPS_07	0.496**	0.360**	0.422**	Valid		
OPS_08	0.418**	0.277**	0.324**	Valid		

OPS_09	0.466**	0.371**	0.439**	Valid		
OPS_10	0.499**	0.463**	0.540**	Valid		
OPS_11	0.570**	0.520**	0.606**	Valid		
OPS_12	0.376**	0.326**	0.389**	Valid		
OPS_13	0.494**	0.421**	0.495**	Valid		
ORSS_01	0.642**	0.563**	0.662**	Valid	0.649	Reliabel
ORSS_02	0.614**	0.531**	0.621**	Valid		
ORSS_03	0.626**	0.538**	0.633**	Valid		
ORSS_04	0.441**	0.337**	0.400**	Valid		
ORSS_05	0.412**	0.318**	0.374**	Valid		
ORSS_06	0.329**	0.248**	0.291**	Valid		
ORSS_07	0.284**	0.204**	0.240**	Valid		
ORSS_08	0.504**	0.412**	0.486**	Valid		
ORSS_09	0.430**	0.347**	0.405**	Valid		
ORSS_10	0.467**	0.368**	0.432**	Valid		
ORSS_11	0.304**	0.240**	0.283**	Valid		

3.6. (Phase-5) Exploratory Factor Analysis (EFA)

Kaiser-Meyer-Olkin

The Exploratory Factor Analysis (EFA) is the main analysis in this study, which is expected to produce a final instrument with even stronger validity as it has gone through several previous phases. In phase 2 and phase 4, all developed statement items were retained as none of them were eliminated due to invalidity or unreliability. A total of 638 data were analyzed using this technique, starting with the KMO and Bartlett's Test for the OPS and ORSS instruments (see Table 5).

Table 5. Result of KMO and Bartlett's Test OPS & ORSS

		OPS	ORSS
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.602	0.649
Bartlett's Test of Sphericity	Approx. Chi-Square	1445.411	1024.079
	Df	36	28
	Sig.	0.000	0.000

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) values for the OPS instrument (0.602 > 0.50) and the ORSS instrument (0.649 > 0.50) with sig. for both instruments (0.000 < 0.50) indicate that the data meet the requirements for factor analysis. These KMO values and sig. values (see Table 5) are the final data after eliminating several statement items in the Measures of Sampling Adequacy (MSA) analysis (see Table 6) and the communalities analysis (see Table 7). The initial KMO values for OPS (0.679 > 0.50) and ORSS (0.664 > 0.50) as well as the sig. values for OPS and ORSS (0.000 < 0.50) also meet the KMO requirements for proceeding with the Measures of Sampling Adequacy (MSA) analysis in the EFA.

Measures of Sampling Adequacy (MSA)

The Measures of Sampling Adequacy (MSA) have a requirement of Anti-Image Correlation > 0.50. Before conducting the analysis, the communalities requirements for the 13 statement items of OPS and the 11 statement items of ORSS were met, as the anti-image correlation values were > 0.50 (see Table 6). After performing the communalities analysis and eliminating several statement items that did not meet the communalities requirements, 9 statement items for OPS and 8 statement items for ORSS remained and needed to be retested from KMO to MSA. The lowest MSA value for the OPS instrument was found in statement item OPS_10 (0.535 > 0.50), and the lowest MSA value for the ORSS instrument was in ORSS_07 (0.560 > 0.50). These results indicate that both the data before eliminating statement items in the communalities phase and the data after retesting, considering the elimination of several statement items in the communalities analysis, still meet the minimum requirement of the Anti-Image Correlation values (see Table 6).

Table 6. Result of Measures of Sampling Adequacy (MSA)

(Analysis-1) MSA-Before Elimination of Communalities				(Analysis-2) MSA-After Elimination of Communalities			
OPS		ORSS		OPS		ORSS	
CI	AIC	CI	AIC	CI	AIC	CI	AIC
OPS_01	0.597[a]	ORSS_01	0.632[a]	OPS_01	0.567[a]	ORSS_01	0.631[a]
OPS_02	0.628[a]	ORSS_02	0.720[a]	OPS_02	0.603[a]	ORSS_02	0.732[a]
OPS_03	0.726[a]	ORSS_03	0.683[a]	OPS_03	0.694[a]	ORSS_03	0.659[a]
OPS_04	0.656[a]	ORSS_04	0.652[a]	OPS_04	0.614[a]	ORSS_06	0.562[a]
OPS_05	0.736[a]	ORSS_05	0.684[a]	OPS_05	0.656[a]	ORSS_07	0.560[a]
OPS_06	0.732[a]	ORSS_06	0.566[a]	OPS_06	0.678[a]	ORSS_08	0.682[a]
OPS_07	0.781[a]	ORSS_07	0.567[a]	OPS_08	0.676[a]	ORSS_09	0.710[a]
OPS_08	0.729[a]	ORSS_08	0.591[a]	OPS_10	0.535[a]	ORSS_10	0.665[a]

OPS_09	0.800[a]	ORSS_09	0.724[a]	OPS_11	0.545[a]		
OPS_10	0.622[a]	ORSS_10	0.683[a]				
OPS_11	0.623[a]	ORSS_11	0.789[a]				
OPS_12	0.710[a]						
OPS_13	0.762[a]						

Communalities

The communalities analysis stage requires that statement items have extraction values > 0.50 or communalities > 0.50 in order to proceed to the next analysis. If one or several statement items obtain communalities < 0.50, those items will be eliminated one by one starting from the lowest value, and then a retest will be conducted from KMO to communalities with the same requirements applied in each analysis. The results of Analysis-1 (Communalities-Before Elimination) for the OPS instrument show that statement item OPS_09 (0.295 < 0.50) is the lowest value, which is eliminated and included in Analysis-2, resulting in the lowest value in item OPS_12 (0.294 < 0.50). The item with the lowest value in Analysis-2 is eliminated in Analysis-3, resulting in the lowest value in item OPS_13 (0.471 < 0.50). This process continues in Analysis-4, where the lowest value is found in item OPS_07 (0.498 < 0.50). Item OPS_07 is eliminated in Analysis-5, and the lowest value is obtained in item OPS_08 (0.502 > 0.50), indicating that the analysis at this stage is stopped as all items have met the communalities requirements. Through 5 rounds of analysis (see Table 7), a total of 4 statement items (OPS_09, OPS_12, OPS_13, OPS_07) have been eliminated from the initial 13 statement items in OPS.

Tabel 7. Result of Communalities

(Analysis-1) Comunalities-Before Elimination				(Analysis-2 to 5) Comunalities-After Elimination								
OPS		ORSS		OPS					ORSS			
CI	Ext (a1)	CI	Ext (a1)	CI	Ext (a2)	Ext (a3)	Ext (a4)	Ext (a5)	CI	Ext (a2)	Ext (a3)	Ext (a4)
OPS_01	0.789	ORSS_01	0.631	OPS_01	0.799	0.802	0.794	0.805	ORSS_01	0.629	0.659	0.734
OPS_02	0.807	ORSS_02	0.595	OPS_02	0.808	0.807	0.810	0.816	ORSS_02	0.596	0.635	0.609
OPS_03	0.669	ORSS_03	0.6	OPS_03	0.7	0.7	0.7	0.729	ORSS_03	0.6	0.6	0.6
OPS_04	0.731	ORSS_04	0.296	OPS_04	0.766	0.796	0.795	0.797	ORSS_04	0.297	0.279	**elim**
OPS_05	0.509	ORSS_05	0.229	OPS_05	0.515	0.522	0.541	0.617	ORSS_05	0.229	**elim**	**elim**
OPS_06	0.539	ORSS_06	0.749	OPS_06	0.543	0.543	0.519	0.610	ORSS_06	0.750	0.755	0.761
OPS_07	0.501	ORSS_07	0.698	OPS_07	0.498	0.492	0.498	**elim**	ORSS_07	0.699	0.735	0.751
OPS_08	0.478	ORSS_08	0.543	OPS_08	0.497	0.501	0.517	0.502	ORSS_08	0.593	0.606	0.607
OPS_09	0.295	ORSS_09	0.575	OPS_09	**elim**	**elim**	**elim**	**elim**	ORSS_09	0.596	0.588	0.585
OPS_10	0.696	ORSS_10	0.608	OPS_10	0.693	0.752	0.868	0.868	ORSS_10	0.631	0.639	0.639
OPS_11	0.781	ORSS_11	0.211	OPS_11	0.772	0.819	0.863	0.863	ORSS_11	**elim**	**elim**	**elim**
OPS_12	0.302			OPS_12	0.294	**elim**	**elim**	**elim**				
OPS_13	0.489			OPS_13	0.498	0.471	**elim**	**elim**				

Furthermore, the results of (Analysis-1) Comunalities-Before Elimination for the ORSS instrument show that statement item ORSS_11 (0.211<0.50) needs to be eliminated. The ORSS_11 item is eliminated in Analysis-2, and item ORSS_05 (0.229<0.50) is identified for elimination in the subsequent analysis (Analysis-3). Analysis-3 reveals that item ORSS_04 (0.279<0.50) still needs to be eliminated as it does not meet the communalities requirement. Analysis-4 eliminates ORSS_04, and all communalities values now meet the requirement, with the smallest value

found in item ORSS_09 (0.585>0.50). The analysis of the ORSS instrument concludes at the fourth analysis stage as the requirements have been fulfilled and no further items need to be eliminated. Based on the communalities analysis results, 3 statement items (ORSS_11, ORSS_05, ORSS_04) have been eliminated, while 8 statement items remain (refer to Table 7), particularly in Analysis-4.

Rotated component matrix

After all the items meet the communalities requirement, the data is further analyzed using factor grouping or component matrix generated by the system. Table 8 shows a strong assessment and grouping with loading factors > 0.40. For the OPS variable, the statement items are grouped based on the rotated component matrix using the principal component analysis as the extraction method and varimax rotation method with Kaiser normalization, resulting in 4 components. These four components obtain Initial Eigenvalues > 1.000, starting with component 1 (2.474), component 2 (1.806), component 3 (1.276), and component 4 (1.053). The loading factor values obtained from the rotated component matrix are lowest for item OPS_08 with a value of 0.656 and highest for item OPS_10 with a value of 0.926 among the OPS instrument items. This indicates that the item with the lowest value (OPS_08: 0.656 > 0.40) has met the loading factor requirement, and other items with higher values have also met the loading factor requirement.

Table 8. Result of Rotated component matrix

Rotated component matrix							
Code Item	F1	Code Item	F2	Code Item	F3	Code Item	F4
OPS							
OPS_01	0.889	OPS_10	0.926	OPS_05	0.763	OPS_03	0.732
OPS_02	0.840	OPS_11	0.920	OPS_06	0.747	OPS_04	0.876
				OPS_08	0.656		
ORSS							
ORSS_01	0.841	ORSS_06	0.864	ORSS_08	0.764	F1is Factor 1; F2 is Factor 2; F3 is Factor 3; F4 is Factor 4	
ORSS_02	0.776	ORSS_07	0.860	ORSS_09	0.760		
ORSS_03	0.814			ORSS_10	0.796		

Next, in the ORSS instrument, the analysis of loading factor values from the rotated component matrix results in three factors or components (see Table 8), with the lowest value found in item ORSS_09 (0.760), "I know how to compare various sources to determine if the information is accurate," and the highest value in ORSS_06 (0.865), "I have confidence that I can solve risky problems that may arise when I face new situations in the digital world." The Initial Eigenvalues obtained in this analysis are component 1 (2.320), component 2 (1.732), and component 3 (1.303).

Table 9. Indicator OPS & ORSS

Variabel	I. Eg	Indicator/Factor	Code Item
OPS	2.474	Skills for accessing the internet	OPS_01; OPS_2
	1.806	Skills for communicating through online media	OPS_10; OPS_11
	1.276	Skills for solving problems using online media	OPS_05; OPS_06; OPS_08
	1.053	Skills for obtaining privileges from online media	OPS_03; OPS_04
ORSS	2.320	Skills for safeguarding against online fraud	ORSS_01; ORSS_02; ORSS_03
	1.732	Skills for logical problem-solving	ORSS_06; ORSS_07
	1.303	Skills for analyzing the credibility of online information	ORSS_08; ORSS_09; ORSS_10

Furthermore, each statement item with a loading factor > 0.40 [63] will be grouped into one dimension or factor, and the dimension or factor will be named based on the characteristics of the statement item in table 9. Based on the largest Initial Eigenvalue (2.474) as the first factor in the OPS instrument, it is named "internet access skills" with 2 statement items included. Meanwhile, in the ORSS instrument, the largest Initial Eigenvalue (2.320) represents the first factor, which is named "skills for safeguarding against online fraud".

4. DISCUSSION

This study formulated a dependable self-assessment tool for undergraduates' e-learning, centered on online opportunity skills (OPS) and online risk survival skills (ORSS). While initial tests validated 13 OPS and 11 ORSS items, exploratory factor analysis trimmed these to 9 OPS and 8 ORSS items. The refined OPS instrument identified four key factors, with the primary factor being the ability to access the internet, as indicated by specific statement items. This primary factor evaluates students' proficiency in utilizing different devices for personal internet access.. As stated by previous researchers, the internet, which has reached various locations and can be accessed through various devices, can be maximized to obtain information and fulfill individual needs positively[56].

The second factor in OPS is the ability to communicate through online media, represented by OPS_10 and OPS_11 statement items. To seize opportunities in the digital world, communication needs to be supported by the simultaneous utilization of devices and software [56]. Previous studies have found that communication is a necessary skill for every individual, with self-imposed limits and existing rules, to convey information and obtain feedback effectively [68]–[70]. In this context, the feedback referred to in the OPS variable primarily relates to opportunities for individuals.

The third factor in OPS is the ability to solve problems using online media, represented by OPS_05,

OPS_06, and OPS_08 statement items. Every individual who seeks opportunities from online media usually encounters challenges in meeting specific needs or tasks. These challenges need to be addressed through various approaches [2], [71]–[73], In the context of OPS, this skill is crucial because online media is a tool that cannot operate without the involvement of individuals and is utilized to fulfill individual needs. As previously emphasized by researchers, problem-solving skills are fundamental for survival and seizing opportunities in various domains [73], [74].

The fourth factor in OPS is the ability to obtain privileges from online media, consisting of OPS_03 and OPS_04 statement items. These two statements are grouped together into the fourth factor, named "privilege," which should be interpreted positively. It refers to positioning individuals according to their preferences or needs in specific contexts [75] In this case, it pertains to the financial and non-financial advantages that individuals require. Additionally, privilege also signifies someone's special rights, particularly in the digital world, where the security of personal data is of utmost importance. This indicator, therefore, becomes a necessary skill to determine whether an individual possesses OPS.

Next, there are three factors that reflect and identify OPS (see Table 9), starting with the first factor, which is the ability to survive online scams, consisting of ORSS_01, ORSS_02, and ORSS_03 statements. All of these items reflect the ability to withstand online risks, particularly in the area of fraud and scams. As stated by previous researchers, the best way to avoid falling victim to online scams is by understanding their mechanisms and avoiding or disregarding (not responding to) any processes or mechanisms that indicate fraudulent activities, such as messages or calls related to such matters [76]–[78]. Therefore, it is essential for students to possess this skill in order to protect themselves from academic and non-academic scams.

The second factor in ORSS is the ability to think logically in solving risky problems, consisting of the ORSS_06 and ORSS_07 statements. In order to survive and avoid online risks, logical thinking needs to be considered when individuals are faced with risks. Every online user will inevitably encounter unforeseen problems, which require calm and logical thinking to make informed decisions in resolving those issues [58], [79]. The third factor in ORSS is the ability to analyze the truthfulness of online information, consisting of the ORSS_08, ORSS_09, and ORSS_10 items. By being aware of the accuracy of information, individuals are expected to be able to protect themselves from risks associated with the use of online media, such as plagiarism [50], [80] [34], [38], online media dependence [40], [41], fraud in the learning or education sector [43], [44], and academic dishonesty [45], [47], [48].

5. CONCLUSION

This research aimed to develop a self-assessment instrument for Online Opportunity Skills (OPS) and Online Risk Survival Skills (ORSS) through a rigorous validation process. Initially, 13 OPS and 11 ORSS items were identified as suitable, but after using exploratory factor analysis, four OPS and three ORSS items were eliminated. Ultimately, the OPS instrument comprised four factors and the ORSS instrument had three, with the highest and lowest loading factors identified. Data was sourced from Indonesian students. Despite the comprehensive approach, including face and discriminant validity checks, the study acknowledges limitations and suggests future work using confirmatory factor analysis for a more robust model evaluation..

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