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Nominal group techniques to assess teachers' readiness for online teaching at higher education institution

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ABSTRACT

Education 4.0 marks a new era of learning with virtual online classrooms, requiring teachers to adapt. Despite this shift, standardized tools to evaluate teachers' online instruction readiness are lacking. This article explores nominal group technique (NGT) in the design and development research (DDR) need analysis stage to identify challenges in online teaching and the need for a new assessment tool in higher education. There were 15 professionals from Malaysia and Indonesia contributed insights to identify key educator challenges. Results show validation of study topics with over 70% agreement, highlighting the urgent need for a reliable tool to assess educators' online instruction competence in higher education. These findings inform further instrument development.

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1. INTRODUCTION

Online education faces global scrutiny amid the fourth industrial revolution and the coronavirus disease 2019 (COVID-19) pandemic, prompting widespread adoption by educational institutions [1], [2]. While it promises enhanced quality and student-centered approaches through advanced technologies like artificial intelligence and data analytics [3], challenges including privacy, data security, and evolving teacher and learner roles persist. Policies matching the evolving education landscape and collaboration among stakeholders are crucial. Continuous research, innovation, and adaptability are necessary to ensure online teaching readiness amidst the fourth industrial revolution and heightened demand during the pandemic [4].

The industrial revolution has transformed online teaching in Indonesia and Malaysia, with increased internet access and adoption of online learning platforms [5], [6]. In Indonesia, improved computer and internet availability has streamlined remote studying [3], while government initiatives and infrastructure improvements support the transition to online teaching amidst the COVID-19 pandemic [4], [7]. Similarly, Malaysia has seen widespread adoption of online teaching, supported by government initiatives and internet infrastructure upgrades [2], [8]. The pandemic has accelerated this shift to online instruction for safety reasons [8], making education more accessible regardless of location. As technology evolves globally, educators' readiness for online teaching becomes increasingly crucial [9], [10]. Industry 4.0, marked by the integration of digital, physical, and biological systems, significantly impacts education and online teaching [3], [11]. Educators must adapt to new technologies like artificial intelligence and machine learning [11], as their preparedness determines the success of online education [12]–[14]. As technology advances, educators

need to be equipped with the skills to integrate emerging tools effectively [5], [15], emphasizing the importance of readiness for embracing new teaching methods [15].

Educators' readiness for online teaching, shaped by individual and institutional factors [16]–[18], is crucial. Teaching online demands distinct abilities, yet only a minority receive instructional support or engage in professional development [19]. Survey results reveal educators' lack of confidence, attributed to limited familiarity with technology and pedagogical methods [20], [21]. Research categorizes readiness into low, uneven, and high levels [21]–[23]. Professors' preparedness varies, indicating the need for tailored assistance [23]. Classroom preparation is pivotal [8], influenced by personal, environmental, and cultural factors [8]. Institutional readiness, critical for online teaching, hinges on technology, facilitation, and student engagement [24]–[26]. While the importance of adequate preparation is recognized [27], many faculty members lack professional development and instructional support [13]. Despite lacking necessary skills, doctoral students express willingness to teach online [13]. Addressing online teaching challenges requires precise assessment tools. This research develops EROT-i, employing nominal group technique for needs analysis and expert validation. Comparative analysis underscores the necessity for this tool, aiming to establish readiness issues and demonstrate its importance based on expert opinions.

2. RESEARCH METHOD

This section delineates the approach adopted for the study's methodology. The central objectives of the investigation were centered on the application of the nominal group technique (NGT) within the needs analysis phase of the design and development research (DDR) framework. The DDR process encompassed three distinct stages: needs analysis, design and development, and evaluation [13], [28]. For a visual representation of the phases and methodology employed within the DDR approach, refer to Figure 1.

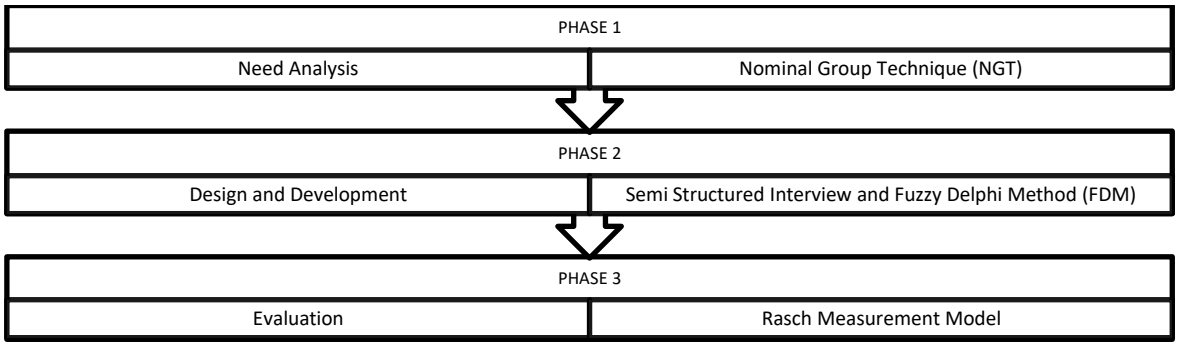

Figure 1. Phase and method used in DDR approach

2.1. Needs analysis phase

The needs analysis phase, an integral part of the DDR approach, involves gathering specific data on consumer group needs within an industry or educational sector, particularly focusing on student learning requirements [24]. This phase serves as a crucial foundation for formulating research questions and identifying issues to be addressed in module or instrument development [24]. It encompasses identifying and assessing needs, determining expectations, and finding optimal approaches for problem resolution [24], [29]. Conducting a needs analysis is paramount for educators and learners alike, enabling them to make informed decisions on teaching and learning materials aligned with instructional objectives and students' needs [30], [31]. Recognizing the importance of educator readiness in online teaching for quality education, identifying online teaching issues, and the need for a new readiness measurement instrument is imperative in this phase [30]. This process collects data on instrument development purposes, informing subsequent phases with educators' opinions validated through NGT [30].

2.2. Nominal group technique

The NGT is designed to systematically collect a group's ideas on a specific topic in an organized and interactive manner [2], [24]. Initially conceived as a participatory strategy for scenarios related to social planning, it involved exploratory research, active engagement of citizens, collaboration with specialists from various disciplines, and the evaluation of proposals [2], [24]. While the NGT has been applied in various contexts over the years, including empirical investigations within the field of social sciences, its primary application has been within health studies in social science research [2]. The technique's purpose is to

identify issues, explore potential solutions, and prioritize them. NGT is particularly valuable in situations involving unfamiliar groups where the status and dominance of members need to be balanced. The typical NGT process consists of six steps [31].

In the NGT, participants engage in a structured process to generate and prioritize ideas. Firstly, in silent reflection, they independently brainstorm ideas related to a given question, jotting them down without discussion. Then, during round robin, each participant shares one idea, recorded by the researcher without debate until all ideas are exhausted. Next, in clarification, responses are reviewed for accuracy and merged if necessary. Following this, in rating of statements, participants score each idea from five to one based on importance, with the highest-scoring idea receiving five points and the least important receiving one. Focus Reflection allows participants to discuss their thoughts on the process and statements without individual attribution, recorded for further analysis. Finally, in marks collation and statement ranking, the researcher compiles scores to rank statements by importance and evaluates overall group consensus on each idea. This systematic approach ensures thorough idea generation and prioritization. By mandating anonymous voting, as well as the aforementioned provisions, the NGT promotes genuine results and a stronger commitment to the outcomes. The NGT approach also requires that all contributions and accepted changes be recorded on flipchart pages, producing a permanent record of the group's activities and outcomes. These sheets may be presented at following sessions, enabling the group to pick up where it left off, and they also work well for updating missing participants [32].

2.3. Participant of nominal group technique

The optimal number of participants for a NGT session remains a subject of debate. Some researchers suggest that NGT can be conducted with a single cohort or a large group, while others propose that it may be beneficial to divide participants into smaller groups to enhance communication and facilitate study requirements [2], [33]. Table 1 provides a list of sample sizes used in previous research employing this methodology.

The researcher enlisted 15 specialists from Malaysia and Indonesia for the NGT process, with seven from Indonesia and eight from Malaysia. These experts validated items related to educators' online teaching preparedness and the need for a new tool using an online NGT questionnaire via Google Meet due to logistical constraints. Selection criteria included relevant background, willingness to revise judgments for consensus, and at least three years of online teaching experience [34]. Experts were from various education fields and met criteria to provide significant perspectives during the NGT session, aimed at authenticating items and creating a new tool [34]. Table 2 presents the composition of experts for this need analysis using NGT.

During this session, a panel of experts engaged in comprehensive dialogue on online teaching challenges in higher education, providing valuable insights for identifying and prioritizing these challenges. They emphasized the need for a reliable instrument to measure educator readiness in online teaching. Responding to questionnaire questions formed the basis of their discussions. The experts' contributions enhanced understanding of online teaching complexities and highlighted potential solutions for educators' challenges in this domain.

Table 1. List of appropriate number for experts involved in NGT

Authors	Sample
Van de Ven and Delbecq	5–9 experts/participants
Horton	7–10 experts/participants
Harvey and Holmes	6–12 experts/participants
Abdullah and Islam	7–10 experts/participants
Carney *et al.*	Min. 6 experts/participants

Table 2. List of experts involved in NGT

Experts	Level of education	Field of expertise	Years of experience
M1	Doctor of Philosophy (Ph.D.)	Instructional technology	4
M2	Doctor of Philosophy (Ph.D.)	Mathematics education	4
M3	Doctor of Philosophy (Ph.D.)	Instructional technology	4
M4	Master Degree	Education management & leadership	5
M5	Doctor of Philosophy (Ph.D.)	Pure mathematics	5
M6	Doctor of Philosophy (Ph.D.)	Basic education	8
M7	Doctor of Philosophy (Ph.D.)	Academic writing	5
M8	Master Degree	TESL	5
IN9	Master Degree	English language teaching (ELT)	5
IN10	Master Degree	Basic education	3
1N11	Doctor of Philosophy (Ph.D.)	English language teaching (ELT)	5
1N12	Doctor of Philosophy (Ph.D.)	English language teaching (ELT)	3
1N13	Doctor of Philosophy (Ph.D.)	Mathematic education	3
1N14	Master Degree	Mathematic education	3
1N15	Master Degree	Research in education	3

2.4. Instrumentation of nominal group technique

The NGT instrument, developed through a literature review and incorporating items from the faculty readiness in online teaching (FRTO) tool with authorization from authors, consists of three sections [29]. Section A covers expert demographics, section B addresses the main component, and section C includes specific elements [29]. It comprises 32 five-point Likert scale questions focusing on technical competence, time management, course communication, and course design, adjusted to a 7-point Likert scale for this study [29], [35]. The instrument's validity and reliability, supported by a Cronbach's alpha of 0.92 [29], [35], were ensured through a rigorous expert selection process based on alignment with research requirements and themes [10]. Experts received NGT surveys a day before the scheduled session and provided individual insights during the session, quantified using the Likert scale [29]. This methodology, backed by previous research, emphasizes effective topic selection and expert group criteria establishment to enhance NGT reliability and validity [10].

2.5. Implementation of nominal group technique

In this study, 15 experts were chosen both from Malaysia and Indonesia, divided into two groups and participated in an online NGT workshop using Google Meet due to geographical and workloads constraints. The workshop was facilitated by a moderator, who served as an interaction manager during the NGT session, lasted for approximately two hours which is an optimal duration for NGT implementation [36]. The five fundamental steps for implementing NGT proposed by previous studies were followed in this research [37], as shown in Table 3.

Referring to Table 3, upon the conclusion of the session, the researcher conducted a precise calculation utilizing the NGT approach to derive results aimed at addressing the study's objectives. The data analysis procedure for NGT is notably straightforward, as it centers on the determination of the percentage of agreement. A value of 70% or higher for the percentage of agreement is indicative of the acceptance of individual components and elements [37], [38].

Table 3. Steps of data analysis in NGT

Steps	Activity
Step 1	Ensuring the number of participants (experts) involved with the study.
Step 2	The formation and calculation of score value is based on the templet data analysis of NGT.
Step 3	Convert score values into percentage form to get the value of percentage of agreement: $Percentage\ (\%) = \frac{Total\ score\ X\ 100}{A\ X\ B}$ A=Number of item B=Likert scale used
Step 4	Determining the acceptance and establishment on issues of educators readiness in online teaching based on percentage of agreement.
Step 5	Determine the rank on issues of educators readiness in online teaching and the needs to develop a new instrument according to the highest to lowest of percentage of agreement.

3. RESULTS AND DISCUSSION

After conducting an online NGT session, the researcher gained crucial insights into educators' preparedness for online teaching, forming the basis for a new instrument development. Data were collected via distributed questionnaires, utilizing a Likert scale for comprehensive assessment. Experts marked agreement on the questionnaire and assigned scores to evaluated items, which will be converted into percentages to determine acceptance. Table 4 displays the questionnaire findings regarding educators' readiness issues in higher education institutions.

Table 4 presents total scores for items derived from experts' questionnaire responses. The highest total score belonged to item 7, "I agree lack of online communication readiness is an issue in online teaching readiness", scoring 95 with a percentage of 90.4%. Conversely, item 2, "I agree online teaching is tough", received the lowest total score of 82 with a percentage of 78%. All percentage ratings surpassed the 70% threshold as required, indicating experts' consensus on the presented issues. This confirms the acceptance and adequacy of the identified issues in addressing the first research question. Table 5 showcases data findings related to the second research question, measuring the need for developing a new instrument from the experts' perspective.

Items 11, 12, and 13 assess the need for a new instrument to measure educators' readiness for online teaching in higher education, with 83.8% and 90.4% agreement for items 11 and 12, respectively, and 92.4% strong agreement for item 13. Experts strongly agree on the necessity of developing such an instrument. Employing the NGT for needs analysis, experts from Malaysia and Indonesia concur on factors contributing to educators' readiness issues in online teaching at higher education institutions. To support these findings, relevant literature on online teaching, distance education, and e-learning will be reviewed.

Table 4. Data finding on the issues of educators' readiness in online teaching at higher educational institutions

No.	Item	Experts group score M (n=8)	Experts group score IN (n=7)	Total score	Percentages (%)	Voters acceptance status
1.	I experienced online teaching previously.	48	43	91	86.7	Accepted
2.	I agree that online teaching is tough.	46	36	82	78.0	Accepted
3.	Most of educators struggling with their readiness in online teaching.	48	44	92	87.6	Accepted
4.	Many educators at higher educational institution are having issues and challenges during with their online teaching classes.	46	40	86	81.9	Accepted
5.	Many factors contributing to the issue of online teaching readiness among educators in higher educational institution.	44	42	86	81.9	Accepted
6.	I agree that course design is one of the issues in online teaching readiness.	46	45	91	86.7	Accepted
7.	I agree that lack of online communication readiness is one of the issues in online teaching readiness.	50	45	95	90.4	Accepted
8.	I admit that time and environment preparation is one of the issues in online teaching readiness.	50	44	94	89.5	Accepted
9.	I admit that lack of technological competence is one of the issue in online teaching readiness.	48	38	86	81.9	Accepted
10.	I admit that lack of technological support contributed to issue in online teaching readiness	50	42	92	87.6	Accepted

Note: Acceptance percentages ≥70%

Table 5. Data finding on the need for a new instrument to measure educators' readiness in online teaching at higher educational institutions

No.	Item	Experts group score M (n=8)	Experts group score IN (n=7)	Total score	Percentages (%)	Voters acceptance status
11.	I think there is **NO** available published instrument measured educators readiness in online teaching at higher educational institution.	50	38	88	83.8	Accepted
12.	I think there is **LESS** of available published instrument measured educators readiness in online teaching at higher educational institution.	50	45	95	90.4	Accepted
13.	I think there is necessary to develop a new instrument to measure educators readiness in online teaching at higher educational institutional.	52	45	97	92.4	Accepted

Note: Acceptance percentages ≥70%

4. CONCLUSION

In summary, this study effectively utilized the NGT to explore educators' preparedness for online teaching in higher education institutions, involving participants from Malaysia and Indonesia. The unanimous agreement among experts on the need for a new measurement tool highlights the significance of this research. The findings contribute to understanding the challenges faced by educators in online teaching and emphasize the urgent need for a tailored instrument. While acknowledging limitations like the focus on expert opinions, this study lays the groundwork for future investigations into factors influencing educators' readiness and the development of a comprehensive framework for the proposed instrument. These findings are essential for informing the design and constructs of the instrument, with relevant literature playing a crucial role. Overall, this research provides a valuable foundation for further inquiry and initiatives to enhance online education for educators and students alike.

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