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Developing a quality assessment model (QAM) using logical prediction: Binary validation

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Abstract: This study focuses on evaluating the quality of competency transfer through various assessment methods and results, considering diverse stakeholder perspectives. The research aims to introduce an innovative approach for validating assessment outcomes, leveraging predicted sub-measurements, and transforming Boolean parameters' symbols into a binary coding system. This transformation simplifies the validation process by employing logical equations. The study's sample involves the adaptation of a competency transfer model, which combines internal parameters with the novel logical assessment method. The research findings indicate that the binary 2^x system effectively simplifies quantitative and qualitative data representation within the validation process. This system facilitates the early detection of potentially ambiguous results, enabling the creation of validation procedures grounded in organizational cultural dimensions, outcomes, reports, and assessments. The proposed Quality Assessment Model (QAM) serves as a powerful tool for prediction, enhancing the quality of both quantitative and qualitative data outcomes. This approach generates distinct values, precise predictive measurements, and valuable result quality suitable for informed decision-making in various contexts. Ultimately, the study contributes to the advancement of assessment methodologies, enabling stakeholders to make more accurate and reliable judgments based on the quality of competency transfer.

1. INTRODUCTION

In the dynamic realm of quality assessment, the pursuit of more precise and streamlined methods remains a constant endeavor. As the realm of technology continually reshapes our environment, the demand for assessment techniques that resonate with the intricacies of contemporary data and systems intensifies. In light of this backdrop, the call for a novel quality assessment approach emerges-one that leverages the potency of logical prediction rooted in binary validation. While traditional quality assessment techniques have proven their value, they often encounter challenges in effectively encompassing the intricacies of intricate data and systems. The emergence of binary validation, accompanied by the integration of predictive

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analytics, presents a promising avenue for surmounting these limitations. This innovative strategy not only holds the potential to elevate precision but also offers the prospect of streamlining the assessment process, thus conserving invaluable time and resources. This introduction will delve into the rationale behind the pursuit of a new quality assessment method, exploring the shortcomings of existing approaches and highlighting the potential advantages of a logical prediction-based framework. By delving into the intricacies of this topic, we aim to shed light on the critical role that such a method could play in a variety of fields, from software development to data analysis and beyond. As we embark on this exploration, we invite you to join us in considering the compelling case for embracing a new era of quality assessment through logical prediction and binary validation based on an algorithm that uses questionnaires at the same time. Algorithms or questionnaires are different tools to collect data and produce results. Both questionnaires and algorithms serve distinct purposes and have their advantages depending on the context. Meanwhile, questionnaires are a method of data collection that involves presenting a series of questions to individuals or groups to gather information. They are commonly used in surveys, research studies, and assessments. Questionnaires can be useful for collecting qualitative and quantitative data directly from participants. They offer the following advantages: rich data, flexibility, subjective information, and exploration. However, questionnaires also have limitations, such as being biased, consuming time and effort, and limited sample size. On the other hand, algorithms are sets of rules or instructions designed to solve specific problems or perform tasks. In the context of data analysis and decision-making, algorithms can automate processes, identify patterns, and make predictions based on data. They have several advantages, such as speed in processing and analyzing large datasets quickly, making them efficient for tasks that involve data crunching. Algorithms are also described with consistency in providing consistent results across different instances. They considered a complex pattern that can identify intricate patterns and relationships within data that may be difficult for humans to discern, and scalability to be applied to a wide range of data without much additional effort. The algorithms, however, have come with challenges that lie under the data quality, interpretability, results that are difficult to interpret or explain or a lack of context in understanding nuanced or contextual information. In conclusion, the choice between questionnaires and algorithms depends on the goals and requirements of the specific task. Questionnaires are valuable for gathering detailed qualitative data and capturing subjective experiences, while algorithms excel at processing large datasets and automating decision-making processes. Often, a combination of both approaches can provide a more comprehensive understanding and effective solutions.

1.1. Literature Review

The dimensions of organizational culture exhibit variations based on internal and external activities, as well as outcomes associated with processes, services, and products (Dandan, 2017). Furthermore, the assessment outcomes stemming from these activities demonstrate divergence due to the specific assessment type, methodologies employed, sample sizes, assessment dates, and underlying objectives (Alas et al., 2015; Schwartz, 1994). These assessment tools culminate in definitive results (Göckede et al., 2004; Graymore et al., 2008; Hawthorne et al., 2016) . In this context, Thireau (2002) emphasizes that each result holds valuable significance and meaning. These collective aspects coalesce to represent quality (Mitra, 2016; Shewfelt, 1999). Additionally, a quality validation model is utilized to ensure the coherence of results and facilitate comparisons between multiple stakeholders within the model. It may also involve comparisons with internal or external audits, as well as evaluation reports from public and/or private agencies (Arnold et al., 2012; Dias et al., 2014; East et al., 2016; Fox, 1981; Grönroos, 1984; Jabangwe et al., 2015; Pinson et al., 2013; Wittenberg et al., 2016). The process of competency transfer has been subject to examination over several decades to assess both individual and group competitiveness. This intricate process involves various participants (Brandt & Dimmitt, 2015; Gutierrez Gutierrez et al., 2016; Koskinen & Pihlanto,

2006). These authors bring diverse perspectives to the table, expressed through quantitative methods such as questionnaire responses and involvement in designing or taking exams, and it is essential to enhance these processes by predicting thinking patterns and neural activities, as highlighted by Fayaz et al. (2018). Furthermore, the landscape of assessments has evolved and remains variable due to the influence of numerous factors (McCallin & McCallin, 2009). Satisfaction levels serve as an example of an assessment approach, encompassing tacit knowledge that becomes formalized once combined with explicit knowledge. The measurement of tacit knowledge involves quantitative techniques to extract data and subsequently present statistics about the percentage, level, limitations, types, and values within each data segment (Nonaka & Konno, 1998; Nonaka & Teece, 2001; Purdy et al., 2018). It is important to note that satisfaction is influenced by perceptions and is affected by emotional, organizational, contextual, and policy-related elements inherent in the tested data, collectively constituting the organizational environment. Assessments are inherently influenced by actors' varying levels of satisfaction and perspectives on particular issues. Consequently, it becomes imperative to establish an evaluative model that accommodates these differing viewpoints. While numerous studies have employed diverse assessment approaches, these still encapsulate specific viewpoints. Recognizing this, the current study endeavors to introduce a novel methodology for validating result quality. This involves the utilization of triangulation procedures, as proposed by Guion (2002). Furthermore, the study incorporates sub-assessments to examine the coherence of responses. The approach draws inspiration from the conversion of actors and results into a binary system (Boole, 1854). This simplifies the assessment technique, aligning with multi-factor modeling series principles akin to those presented by Li and Yu (2020). Notably, this study stands as an original endeavor, setting it apart from previous research. It employs the competency transference model outlined by Dandan (2017) as a practical example of implementation. The suggested Quality Assessment Model (QAM) is a novel concept, while the prior studies lacking on presenting a predicting process to validate the data used for assessment of results in any research using binary system. It draws inspiration from the triangulation method, which validates data accuracy from various sources. Using an example model for evaluating competency transfer data among schools, graduates, and employers initiated by Dandan (2017), validation is conducted from three different perspectives within the model. Each part of the model offers a unique viewpoint on similar questions. The expected results are transformed into binary values (0, 1) representing true and false. These values facilitate usage of the arithmetic logical operator the “AND” gate or specific formulas to assess expected results. If the results are true among the three parties, the questions or survey results are accepted for further analysis. Otherwise, an alternative formulaic analysis is employed.

1.1.1. *Quality assessment using logical prediction algorithms*

In a study by Sharma et al. (2021), they examined a comprehensive survey that reviews various machine learning techniques employed in quality assessment. It covers traditional methods as well as emerging approaches such as logical prediction algorithms. The paper discusses the advantages of logical prediction in improving assessment accuracy and provides insights into its application across different domains. Meanwhile, Alas et al. (2015) focused specifically on logical predictive modeling; this paper explores the integration of logical reasoning into quality assessment processes. The authors present a novel algorithm that combines binary validation with logical inference to enhance assessment outcomes. Real-world case studies illustrate the effectiveness of this approach in areas like software testing and anomaly detection. In addition, a review paper by Burggräf et al. (2021) examined the applications of predictive analytics in quality assurance. It discusses the role of logical prediction algorithms in identifying potential defects or anomalies before they impact the system. The authors emphasize the importance of accurate prediction models for ensuring high-quality products and services. Earlier, Singh et al. (2017) focused on the data science domain; this study investigates the integration of logical inference techniques in quality assessment processes. The authors present a framework that

leverages logical prediction algorithms to identify data inconsistencies, leading to improved data quality and more reliable analysis outcomes. (Jafarian et al., 2020) paper explored the application of logical prediction algorithms in software testing. It discusses how binary validation and logical reasoning can be used to identify anomalies and potential defects early in the development lifecycle. The authors highlight the benefits of this approach in reducing debugging efforts and improving software reliability. Prediction is also used in many health fields as protein detection, and a comparative study by Chen and Siu (2020) evaluated different machine learning techniques for quality assessment, including logical prediction algorithms. The authors compare the performance of logical prediction-based methods with traditional approaches and discuss the advantages of using logical inference in enhancing assessment accuracy.

1.1.2. *Quality assessment using logical prediction algorithms as binary code*

Hranisavljevic et al. (2020) delved into the practical application of logical prediction algorithms; this study focuses on anomaly detection in binary code. The authors propose a method that leverages logical inference to detect unusual patterns and behaviors in executable files. Real-world case studies demonstrate the effectiveness of the approach in identifying malicious code and software vulnerabilities. Later on, Tian et al. (2021) published a paper that introduced the concept of utilizing logical prediction algorithms for assessing the quality of binary code. It outlines the challenges associated with traditional methods and presents a framework that combines binary validation and logical reasoning to enhance the accuracy of identifying defects and vulnerabilities in compiled software. Meanwhile, Wang's (2023) paper explored the integration of logical prediction algorithms in the context of embedded systems. It discusses how logical reasoning can be used to assess the quality and reliability of binary code running on resource-constrained devices. The authors provide insights into the benefits of this approach in ensuring the robustness of embedded software. Being in the same marathon of developing novel prediction techniques, Zhang (2023) focused on code analysis; this research investigates the role of logical inference in improving the accuracy of identifying code defects and vulnerabilities. The authors propose a method that combines static analysis with logical prediction algorithms to achieve more reliable results. The study showcases the effectiveness of this approach in various software security scenarios. Croft et al. (2023) addressed the quality assessment of compiled software; this study presents a systematic approach that employs logical prediction algorithms. The authors highlight how binary validation and logical reasoning can be used to uncover hidden code flaws that may evade traditional analysis techniques. The paper emphasizes the importance of incorporating logical inference in modern software quality assurance practices. This is not so far from the comparative study by Bride et al. (2021) that evaluated the effectiveness of machine learning techniques, including logical prediction algorithms, for verifying the correctness and reliability of binary code. The authors analyze the performance of different methods in identifying bugs and vulnerabilities, shedding light on the advantages of logical inference in this context.

1.1.3. *Quality assessments using modelled algorithms*

Baqais and Alshayeb (2020) explored a systematic review of a comparative study that examined the efficiency and accuracy of automated quality assessment algorithms for software code, comparing them with manual reviews. It discusses the benefits of algorithms in terms of scalability, consistency, and reduced human bias. The paper also addresses challenges, such as algorithmic limitations in detecting certain code quality issues. In addition, Cetiner and Sahingoz (2020) sought to examine predictive algorithms by comparing their performance in quality assessment across various domains. The authors discuss the advantages of algorithms in predicting potential quality issues before they manifest, leading to proactive problem-solving. They also explore the need for continuous refinement of algorithms to adapt to evolving quality standards. This earlier was obtained in a study by Marchisio et al. (2018) that

presented an approach that leverages algorithms to analyze user feedback and extract meaningful insights for quality assessment. It discusses how algorithms can identify patterns and trends in large datasets, offering a data-driven perspective on quality. The paper emphasizes the benefits of algorithmic analysis in processing and interpreting vast amounts of user-generated content.

1.1.4. *Competency transfer process in business school*

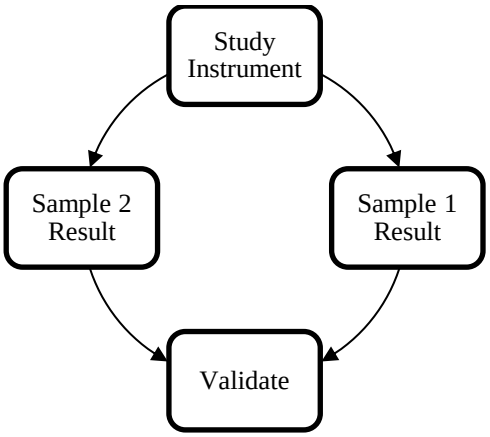
A comprehensive review paper examined the evolution of competency-based education (CBE) in business schools and explored how CBE aligns with the demands of the modern workforce and the changing nature of business. The authors discuss how CBE frameworks enable the transfer of relevant competencies to students, preparing them for real-world challenges. (Silitonga, 2021). Before that, Bratianu et al. (2020) suggested a design aspect to analyze various competency transfer models implemented in business schools. They reviewed how these models integrate theoretical knowledge with practical skills, emphasizing experiential learning and industry collaboration. The paper highlights the benefits of well-structured competency transfer processes in producing job-ready graduates. Meanwhile, Alnasib (2023) investigates the role of (DigComp) as a digital tool and technology in enhancing competency transfer within Teacher-business education. It reviews the utilization of online platforms, simulations, and virtual environments to simulate real-world scenarios. The authors explore how technology-driven learning experiences prepare teachers to meet students' demands in dynamic business environments. Moreover, Wohlfart et al. (2022) selected a CBT of industry relevance; this case study examines how business schools align their curriculum with industry demands. It discusses how competency transfer processes can bridge the gap between academic knowledge and practical skills. The paper showcases examples of collaborations between business schools and corporations to ensure graduates possess the required competencies.

2. METHOD

2.1. Improvement of Assessment

Mostly, it is known that to evaluate results between two different perspectives, you need to find a comparative tool (Shi, 2013). The following model expresses a sample of evaluation actions between different results (Figure 1).

Figure 1. *Validation of two different results.*



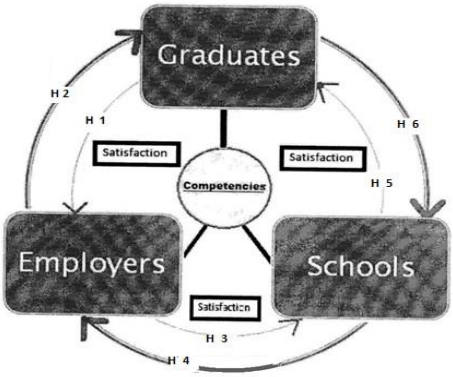
For example, if you use a questionnaire to ask two different samples about their perspective of a determined issue, you need a third sample that is qualified, expert, or similar to previous samples' cultural dimensions to justify results. The Validation of Assessments' Results (VAR) expressed with the following formula:

$$(\boldsymbol{VAR})^{\boldsymbol{n}} = if \begin{cases} R\,n0 \quad \text{AND} \quad R\,n1 \;=\; VAR\,n\,(0\;AND\;1) & ,\; Substitute\;Hypothesis\;Accepted \\ R\,n0 \quad \text{AND} \quad R\,n1 \;\neq VAR\,n\,(0\;AND\;1) & ,\; Validation\;Procedure\;Accepted \\ R\,n0 \quad \text{AND} \quad R\,n1 = \;VAR\,n\,(0\;AND\;1) & ,Hypothesis\;Accepted \end{cases}$$

2.2. Participants

In this case, the Competency transference model (Dandan, 2017) as shown in Figure 2, is used as a case study to examine the validation assessment method.

Figure 2. *Competency transfer model (Dandan, 2017).*



2.3. Measurement

The study used a systematic review of assessment methodologies and techniques and abbreviated this result as an assessment result with ASSR. Each actor has a symbol. The actors and relations in our case are:

1- E: Employer.
2- S: School.
3- G: Graduate.
4- H_1, H_2,……H_6.: The hypothesis of relationships based on the level of satisfaction.

2.4. Proceedings

Validation of stakeholders' perspectives are based on organizational cultural dimensions, reports, outcomes, and at the same time, sub-assessments of these parts (Dami et al., 2018; Evans et al., 2018). These sub-assessments are engaged by or under independent authorities of evaluations and monitoring inside or outside the organization. Also, to simplify the validation process, the study assumed symbolic equations that were used based on the binary system to draw the validation map. The expected results are calculated based on the number of assessments, and at the same time, the number of assessments is calculated based on the number of actors as defined in a binary system in Table 1.

Table 1. *Binary table of actors, assessments, and results.*

No of Actors	Formula of Assessments	Expected Results
1	21	2
2	22	4
3	23	8
4	24	16
5	25	32
6	26	64

2.5. Model Assessment Validation Procedures

It is imperative to establish the significance of validation rules and procedures before initiating the assessment process to construct a validation framework grounded in arithmetic, logical, or algorithmic systems. This validation process can be effectively executed through the integration of sub-assessments (Woods, 2018). Particularly, organizational culture and activities are deemed as optimal avenues for quantitatively measuring data. Within the scope of this study, the following validation procedures have been posited:

- Conformity Check: Assessing the alignment of collected data with predefined validation rules. This step ensures that data adhere to expected standards. During this step, the collected data of any questionnaire must be aligned with the domain of the study, applicable for evaluation, and correlated between parties of the sample to help prediction succeed. i.e., questions of collecting data between social studies will not be accepted to predict the agricultural assessment studies.
- Consistency Examination: Scrutinizing data for logical coherence and internal consistency. This procedure ensures that data points within the assessment are harmonious. Here, any questionnaire's data will be tested by QAM model and must be evaluated early as biometric and consistency tests such as alpha Cronbach if they are available.
- Cross-validation: Employing multiple sources or approaches to validate data accuracy. This approach enhances the reliability of the collected information. As mentioned in previous steps, data accuracy is mandatory.
- Triangulation Verification: Utilizing multiple data collection methods to corroborate findings. This technique increases confidence in the accuracy of the gathered data. Triangulation of using many approaches will lead to selecting suitable evaluation methods for one type of data. This will give mirror results if the data are accurate and the results are correct. Meanwhile, QAM using prediction techniques will be a successful method to evaluate results earlier.
- External Validation: Comparing collected data with external benchmarks or reference sources to affirm its accuracy and validity. Meanwhile, statistical reports of different stakeholders and evaluation reports of many external parties are available, which will help compare the results from different perspectives. Therefore, this stage will assist to ensuring that QAM is suitable if the prediction is adequate with results.
- Expert Review: Involving subject-matter experts to review and validate the data collected, enhancing its credibility and quality. This point lies under the previous one, where experts and professionals help to examine the accuracy of methods and results.
- Time-Series Analysis: Examining data trends over time to ensure consistency and detect any anomalies or deviations. Time matters, and perspectives differ so prediction must be conducted within an acceptable time interval.
- Contextual Relevance Assessment: Evaluating the contextual relevance of collected data to ensure it accurately represents the intended information. In qualitative studies, the collected data must be correct to assess pure information that is accredited to present results accurately.

By instituting these validation procedures, the study aims to create a robust validation map that ensures the accuracy, consistency, and reliability of the assessment outcomes.

2.6. Validation of Graduate Perspective and Data Consistency

A comprehensive validation approach is proposed to ascertain the validity of graduate perspectives and ensure the consistency of collected data. This approach involves the integration of diverse assessments, including annual academic or national examinations, which assess skills and learning outcomes. This comprehensive strategy incorporates various measurement techniques, such as evaluating individual performance, gauging responses in both individual and group work settings, engaging in debates and discussions, conducting workshops, analyzing case studies, administering examinations, documenting students' scientific research achievements, assessing innovative products and inventions, as well as

evaluating entrepreneurial endeavors. This amalgamation of assessment procedures forms a holistic framework termed "Validate Graduate Competencies and Satisfaction" (VG-CS), ensuring a thorough and accurate validation process for graduate competencies and satisfaction levels.

2.7. Validation of School Perspectives

To validate the perspectives held by educational institutions, an encompassing approach is proposed, focusing on the capability of academic staff to transfer knowledge and skills effectively. This validation process entails a thorough examination of essential components such as a robust curriculum, effective teaching methods, well-equipped infrastructures, adherence to legislations and policies, comprehensive plans, and the availability of sufficient funds. The impact of these factors on graduates' achievements is a pivotal aspect of this assessment. This validation process hinges on the utilization of key indicators to measure the effectiveness of the school environment. These indicators encompass annual reports that highlight tangible achievements by graduates, including scholarships earned, successful project funding, contributions to scientific research, and various accomplishments. Additionally, the assessment includes the perspective of students, gauging the quality of education from their standpoint through annual assessments. Moreover, corporate social responsibilities are considered, assessing the interaction between the school, employers, and the broader community. This engagement is further evidenced by records of training courses, job preparation programs, and social initiatives. This holistic approach, referred to as "Validate School Competencies and Satisfaction" (VS-CS), ensures the comprehensive evaluation of the school's abilities and the overall satisfaction of stakeholders, aligning the institution's efforts with the broader goals of education and skill development.

2.8. Validation of Employer Perspectives and Activities

The validation process for employers is facilitated by adherence to disclosure policies, enhancing the ease of assessment. This validation is achieved through the examination of various key indicators that provide insight into the engagement between employers and graduates. One of the core validation indicators is the analysis of the number of employed graduates. This data offers a tangible measure of the effectiveness of the educational institution in preparing students for the job market. Additionally, the number and nature of job advertisements by employers serve as valuable evidence of their engagement in the recruitment of graduates. A crucial aspect of this validation process involves corporate social responsibilities. These responsibilities are assessed based on the extent to which employers collaborate with educational institutions and graduates. This collaboration may encompass initiatives such as funding research and projects, actively participating in educational endeavors, and engaging in annual meetings with decision-makers to discuss career opportunities and growth prospects. Moreover, the organization of events like Job days and the establishment of memorandums of training and recruitment further underline employer engagement. This comprehensive validation approach, referred to as "Validate Employer Activities and Satisfaction" (VE-AS), ensures a thorough evaluation of employers' activities and their satisfaction with the quality of graduates entering the workforce. By aligning employers' perspectives with educational goals, this approach enhances the employability of graduates and reinforces the relationship between educational institutions and the professional world.

2.9. Validation Using Binary Equations

In this section, we have gathered the anticipated assessment outcomes from various approaches within the university as well as from employers. The objective is to delineate the framework of a binary test that encapsulates the interactions among the three stakeholders. For this purpose, we have employed the AND gate, which is characterized as follows:

$$x \wedge y = x \times y = \min(x, y)$$

- AND, present an expression of $x \wedge y$, while $x \wedge y = 1$ if $x = y = 1$ and $x \wedge y = 0$ otherwise.

2.10. Validation of Model Assessment Results

Utilizing the binary representation of the QAM (Quality Assessment Model) actors and their corresponding assessment outcomes, the study has established the validation map as outlined in Table 2. This comprehensive map not only encompasses the primary assessments but also incorporates recommended sub-assessments strategically designed to verify the accuracy and coherence of the major assessment procedures. Within the framework of this study, all hypotheses (H1, H2, … H6) have been considered pre-approved by default, under the presumption of a high level of satisfaction among all stakeholders, particularly within higher education (Vassiliadis & Schwarz, 1990). To empirically evaluate this assumption, the study proposes the utilization of questionnaires as a data collection instrument. These questionnaires are designed to elicit responses from the three key actors, capturing their distinct perspectives regarding the extent of their satisfaction. Through this methodological approach, the study seeks to systematically gather and analyze data, offering insights into the level of satisfaction within the relationships between the stakeholders.

This assessment aligns with the broader objective of the study, which is to substantiate the presumed high satisfaction levels and validate the proposed hypotheses within the context of higher education. See Table 2.

Table 2. *Validation map.*

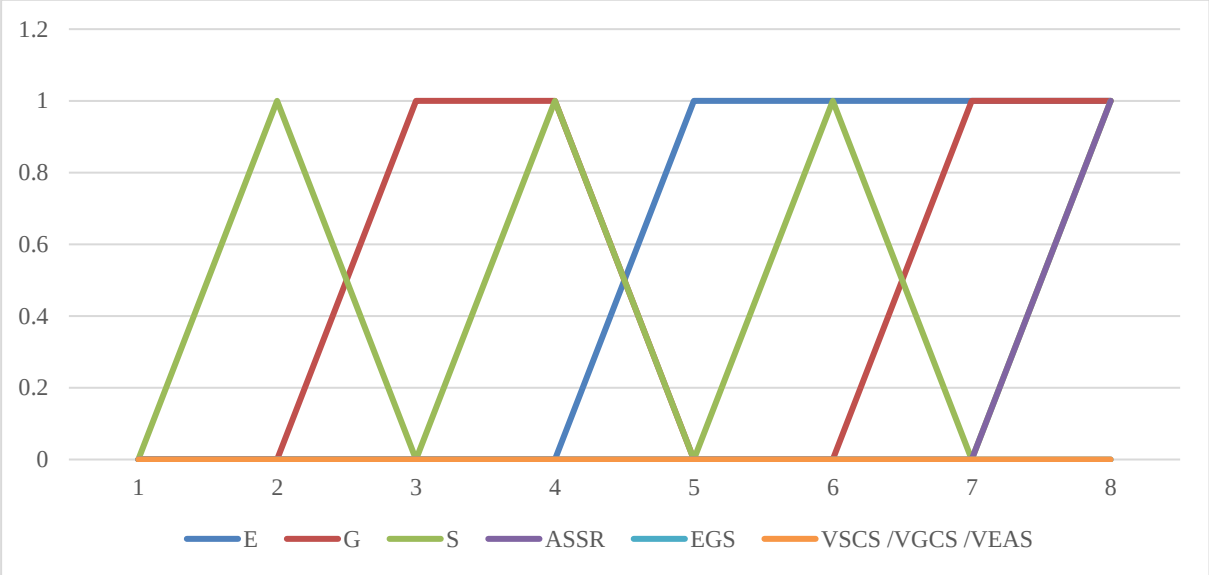
Validation map of Competency Transfer Model					
AND Operation for all Operands (E, G, S)			Binary expression of assessment result	The opposite actor	Quality Validation Procedures using Suggested Sub- Assessment
Employer	Graduate	School			
E	G	S	ASSR	EGS	VSCS /VGCS /VEAS
0	0	0	0	----	Substitute hypothesis
0	0	1	0	S	VSCS
0	1	0	0	G	VGCS
0	1	1	0	E	VEAS
1	0	0	0	E	VEAS
1	0	1	0	G	VGCS
1	1	0	0	S	VSCS
1	1	1	1	-----	Hypothesis accepted

Within the Boolean AND gate framework, two significant outcomes emerge. The first outcome pertains to a scenario in which all stakeholders express dissatisfaction. In this case, the study recommends resorting to substitute hypotheses due to the rejection of the initially proposed hypotheses. Conversely, if all stakeholders express satisfaction, the proposed hypotheses are accepted.

As illustrated in Figure 3, the school consented to confer degrees on two occasions. The initial instance pertains to the endorsement from employers, signifying the school's confidence in the academic accomplishments' ability to effectively convey skills to graduating individuals who also validate this process. The subsequent instance involves the mutual agreement between the

school and employers, ensuring satisfaction on both ends. Here, the school is successful in facilitating the optimal transfer of competencies, enabling graduates to acquire skills in alignment with the perspective of employers. See Figure 3.

Figure 3. *Validation map of competency transfer model.*



As shown in Figure 3, each cross point is considered as a probability result of prediction that reflects the data of Table 2. The first party 'S' of the school recorded four times on the line on 1, 3, 5, and 7 cross points of zero value, respectively, and value '1' on points 2, 4m 6 and synchronized with assessment result on point 8 to express that the hypothesis accepted. According to the table, the party 'G' of the graduate recorded a twice hit on a zero on cross points 2 and 6, and one on both trial cross points '3-4' and '6-8'. In addition, the third actor here, party 'E' the employer, confirmed zero value in the first four trials on the cross points 1, 2, 3, and 4 and raised to value '1'to meet both of school 'S' and graduate 'G' on points 5, 6, 7 and all of them "E, S, and G" confirmed value '1 on cross point trial 8 of prediction values. These values of the probability results are similar to the Boolean arithmetic probabilities of (0, 1) between three parties. These results will not be accurate or correct unless all the parts are '1' for each or '0' for all.

The critical role of validation becomes evident when any one of the three primary stakeholders deviates from the consensus level of satisfaction exhibited by the other two. The study designates the distinct stakeholders as represented by the letters E, G, and S, signifying Employer, Graduate, and School, respectively. If any or all of these stakeholders present a conflicting perspective, suggesting either lower or higher levels of satisfaction, it indicates a disparity.

In such instances, the study suggests the utilization of predefined validation procedures, namely VS-CS, VG-CS, and VE-AS, to rigorously assess the precision and coherence of the major assessment quality. Additionally, the selection of these validation procedures is influenced by the unique organizational environment, dimensions, outcomes, reports, and assessments inherent in the case study context.

Through this comprehensive validation approach, the study endeavors to ensure the reliability of the assessment results, effectively accounting for varying perspectives and potential disparities among the stakeholders. This approach aligns with the study's overarching goal of substantiating the hypotheses and validating the assessment framework within the specific organizational context.

3. FINDINGS

The Quality Assessment Validation Model (QAM) has uncovered that the validation procedures, namely VS-CS, VG-CS, and VE-AS, meticulously crafted to align with organizational cultural dimensions, outcomes, reports, and assessments and have played a pivotal role in shaping a virtual sub-assessment approach. This approach serves as a mechanism to scrutinize and ascertain the precision and cohesiveness of major assessment quality. By employing the binary system, the virtual sub-assessment method becomes adept at pinpointing potential weak points and anomalies within the assessment outcomes. It effectively identifies values that might appear inconsistent or suspicious when assessed from differing perspectives on the same matter. Furthermore, the binary system can be harnessed in various ways to enhance or invalidate multiple hypotheses. This approach underscores the versatility of the binary system in contributing to a comprehensive assessment validation process. Through these mechanisms, the model promotes accuracy, reliability, and robustness in assessing major quality evaluations, offering a nuanced and thorough understanding of the assessment outcomes from multiple angles. Moreover, the Quality Assessment Model (QAM) offers several additional benefits beyond its core functionality of validating assessment outcomes. Some of these benefits include:

- Comprehensive Understanding: QAM provides a holistic approach to assessment validation, taking into account various stakeholders' perspectives, organizational cultural dimensions, and contextual factors. This leads to a more comprehensive understanding of assessment quality.
- Enhanced Decision-Making: By identifying weaknesses, anomalies, and potential biases in assessment outcomes, QAM empowers decision-makers to make more informed and accurate decisions based on reliable data.
- Transparent Accountability: QAM promotes transparency and accountability in the assessment process. It allows stakeholders to understand the validation methods employed and the reasoning behind assessment results, fostering trust in the assessment outcomes.
- Continuous Improvement: The binary system and virtual sub-assessment approach of QAM can be used iteratively to identify areas for improvement in assessment methodologies. This supports a cycle of continuous enhancement in assessment practices.
- Effective Resource Allocation: By pinpointing weaknesses and areas of concern, QAM aids in directing resources to the right areas for improvement, optimizing the allocation of time, effort, and budget.
- Adaptability: QAM can be adapted to different contexts, industries, and assessment types. Its flexibility makes it a valuable tool for a wide range of quality assessment scenarios.
- Reduced Bias: QAM's systematic approach minimizes potential biases that may arise from relying solely on one stakeholder's perspective. It offers a balanced view of assessment outcomes.
- Strategic Alignment: QAM ensures that assessment objectives align with broader organizational goals and objectives. This strategic alignment enhances the relevance and impact of assessment results.
- Consistency: The use of predefined validation procedures and the binary system in QAM promotes consistency in assessment evaluation, leading to more reliable and comparable results over time.
- Sustainability: QAM promotes the sustainability of assessment practices by identifying areas of concern early on, allowing for timely adjustments and improvements to maintain assessment quality over the long term.

In summary, the Quality Assessment Validation Model (QAM) offers benefits that go beyond mere validation, providing a framework that enhances decision-making, accountability, transparency, and overall assessment quality while enabling organizations to refine their assessment practices continuously.

4. DISCUSSION and CONCLUSION

Utilizing the binary system to formulate validation procedures for assessing the quality of results derived from both quantitative and qualitative assessments holds significant potential. This approach can yield distinct studies, precise predictive measurements, and valuable outcome quality applicable across various scientific disciplines. Leveraging the competency model proposed by (DANDAN, 2017) enhances the ability to differentiate between hypotheses derived from systematic reviews and those resulting from triangulation methods, thereby facilitating hypothesis testing. The introduced Quality Assessment Model (QAM) effectively illustrates how researchers can strategically anticipate and identify potentially suspicious results. By preemptively devising sub-assessment strategies before these findings emerge, researchers can proactively validate the quality of their results. Additionally, the adoption of the AND gate as an expression of the validation process offers a robust and versatile approach for assessing both qualitative and quantitative values. This approach's applicability spans diverse domains, ranging from computer science to art, health, engineering, and even space science. Moreover, the categorization of validation based on sub-assessment within the organizational environment contributes to the meticulous examination of assessment result accuracy and consistency. This categorization strategy ensures a comprehensive and systematic approach to evaluating the quality of assessment outcomes, enhancing their reliability and applicability across various contexts. In essence, the binary system-driven Quality Assessment Validation Model presents a multidimensional approach that transcends disciplinary boundaries, providing researchers with a systematic and adaptable tool to enhance the accuracy, reliability, and overall quality of assessment results.

For further studies and recommendations based on results, the study recommended exploring additional validation procedures in various scientific disciplines that hold immense potential for enhancing the quality and reliability of assessment outcomes. This can contribute to the development of standardized methods that can be applied across different domains, leading to more accurate predictions and informed decision-making. Moreover, extending research to different areas of science, such as systems, medicine, the environment, climate, and agriculture, presents exciting opportunities for proactive risk management and strategic planning. By identifying potential failures and risks early on, researchers can develop predictive procedures that aid in minimizing negative impacts and optimizing resource allocation. In summary, pursuing further studies that delve into diverse validation techniques and applying these methods to various scientific fields has the potential to advance both research methodologies and practical applications. It can lead to more robust assessments, better predictions, and improved strategies for managing risks and uncertainties in complex systems and environments.

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Declaration of Conflicting Interests and Ethics

The authors declare no conflict of interest. This research study complies with research publishing ethics. The scientific and legal responsibility for manuscripts published in IJATE belongs to the authors.

Contribution of Authors

Sameer Dandan: Review previous studies, design study instrument and analysis implementation. **Odai AL-Ghaswyneh**: Review methodology, examining the data consistency, review results. **Both authors:** 1st draft of the paper, proofreading, final version.

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