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Integrating Industry Needs with Language Training from Classroom to Profession: English Translation Courses Measurement in Neutrosophic Number Operator

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Abstract: It is now crucial to match vocational education with market demands in the cutthroat global economy of today, particularly when it comes to language instruction. Vocational and technical institutions' English translation programs should go beyond only teaching language skills to meet the demands of the workplace. To close the gap between classroom education and the working world, this paper investigates how English translation courses might incorporate industry-specific skills, digital technologies, and hands-on experience. The evaluation considers student readiness, company expectations, and instructional practices using a multi-criteria MCDM assessment framework. The PROMETHEE method is used under the neutrosophic numbers to deal with uncertainty information and rank the alternatives. We use the neutrosophic operator to combine the different decision matrix. The results highlight the value of designing curricula with industry knowledge to generate translation specialists.

Keywords: Einstein operator; Neutrosophic Numbers; English Translation Courses; Language Training.

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1. Introduction

Vocational education institutions are under increasing pressure to guarantee that their graduates are not just academically capable but also prepared for the workforce in the current era of linked economies and fast globalization. This difficulty is particularly noticeable in English translation education, where language proficiency must be paired with industry-specific knowledge and technology competence. English translation courses must adapt to satisfy the multidisciplinary demands of businesses, which are calling for translators who are proficient in both language and industry procedures[1], [2]. Future translators are largely trained in vocational and technical colleges, especially those who are anticipated to work in specialized and fast-paced industries like healthcare, engineering, finance, and law. However, the intricate reality of professional translation assignments is frequently not captured by conventional classroom-based education. Graduates with a curriculum that isn't aligned with real-world job expectations find it difficult to adjust, which hinders their employability and long-term professional development[3], [4].

There is a rising movement to actively integrate industry feedback into curriculum design to close this gap. This entails including the use of contemporary translation technologies like computer-assisted translation software, encouraging cooperation with employers, and presenting real-world translation projects. Students gain skills beyond grammar and vocabulary, like project management, quality assurance, and client communication, by integrating academic material with real-world applications[5], [6].

Additionally, the translation profession has undergone tremendous change because of digitization. Today's translators need to be at ease using a variety of cloud-based collaboration platforms, localization tools, and digital platforms. Thus, in addition to linguistic competency, digital fluency must be given top priority in educational programs. To keep up with the changing requirements of the business, this change also necessitates that teachers themselves undergo ongoing professional development[7], [8].

The flexibility of teaching strategies is another essential component of successful translation education. Programs should consider local industry trends, changing labor market statistics, and technology advancements rather than following a one-size-fits-all strategy. Institutions are guaranteed to be current and future-proof when adaptability and responsiveness are incorporated into the program framework[9], [10].

Thorough framework is required to evaluate the caliber and efficacy of English translation courses offered by vocational and technical colleges. This incorporates feedback from alumni, employers, teachers, and students. Stakeholders may have a better understanding of how education translates into professional capabilities by assessing how closely programs match real-world objectives. This ensures that graduates are both practically equipped and linguistically proficient[11], [12].

By permitting constituents to have different levels of membership, the idea of a fuzzy set expands on that of classical sets. Fuzzy sets have membership values ranging from 0 to 1 to represent the degree of belonging, as opposed to classical sets where items are either completely within or outside a set. For example, a fuzzy set called "Tall" may designate someone as "quite tall" if their height has a membership value[13], [14].

The uncertainty or imprecision present in certain real-world notions is captured by these membership values, which are established via functions known as membership functions. Fuzzy sets are used in a variety of domains where ambiguity or insufficient information is present, including artificial intelligence, control systems, and decision-making[15], [16].

A mathematical concept known as a neutrosophic set is a generalization of the ideas of intuitionistic fuzzy sets, fuzzy sets, and classical sets. In 1998, mathematician Florentin

Smarandache presented it as an expansion of these pre-existing set theories to better adaptably handle ambiguity, indeterminacy, and partial knowledge[17], [18]. When components' truth membership, indeterminacy membership, and falsity membership are considered all at once, neutrophilic sets are very helpful. In the real world, decision-making has become more complex in a variety of areas because of the increasing ambiguities and uncertainties[19], [20].

2. Einstein Operator

We show definitions of the Einstein operator under single valued neutrosophic numbers (SVNNs).

$$ESVN=\begin{pmatrix}\dfrac{\prod_{j=1}^{n}\left(1+T_j\right)^{w_j}-\prod_{j=1}^{n}\left(1-T_j\right)^{w_j}}{\prod_{j=1}^{n}\left(1+T_j\right)^{w_j}+\prod_{j=1}^{n}\left(1-T_j\right)^{w_j}},\\ \dfrac{2\prod_{j=1}^{n}\left(I_j\right)^{w_j}}{\prod_{j=1}^{n}\left(2-I_j\right)^{w_j}+\prod_{j=1}^{n}\left(I_j\right)^{w_j}},\\ \dfrac{2\prod_{j=1}^{n}\left(F_j\right)^{w_j}}{\prod_{j=1}^{n}\left(2-F_j\right)^{w_j}+\prod_{j=1}^{n}\left(F_j\right)^{w_j}}\end{pmatrix} \tag{1}$$

$$ESVN=\begin{pmatrix}\dfrac{2\prod_{j=1}^{n}\left(T_j\right)^{w_j}}{\prod_{j=1}^{n}\left(2-T_j\right)^{w_j}+\prod_{j=1}^{n}\left(T_j\right)^{w_j}},\\ \dfrac{\prod_{j=1}^{n}\left(1+I_j\right)^{w_j}-\prod_{j=1}^{n}\left(1-I_j\right)^{w_j}}{\prod_{j=1}^{n}\left(1+I_j\right)^{w_j}+\prod_{j=1}^{n}\left(1-I_j\right)^{w_j}},\\ \dfrac{\prod_{j=1}^{n}\left(1+F_j\right)^{w_j}-\prod_{j=1}^{n}\left(1-F_j\right)^{w_j}}{\prod_{j=1}^{n}\left(1+F_j\right)^{w_j}+\prod_{j=1}^{n}\left(1-F_j\right)^{w_j}}\end{pmatrix} \tag{2}$$

$$x_j\oplus y=\begin{pmatrix}r\left(r^{-1}\left(T_j\right)\right)+r^{-1}(T),\\ q\left(r^{-1}\left(I_j\right)\right)+q^{-1}(I),\\ q\left(r^{-1}\left(F_j\right)\right)+q^{-1}(F)\end{pmatrix} \tag{3}$$

$$ESVN(x_1\oplus y,\dots,x_n\oplus y)=\begin{pmatrix}r\sum_{j=1}^{n}w_j r^{-1}\left(r\left(r^{-1}\left(T_j\right)\right)+r^{-1}\left(T_j\right)\right),\\ q\sum_{j=1}^{n}w_j q^{-1}\left(q\left(q^{-1}\left(I_j\right)\right)+q^{-1}\left(I_j\right)\right),\\ q\sum_{j=1}^{n}w_j q^{-1}\left(q\left(q^{-1}\left(F_j\right)\right)+q^{-1}\left(F_j\right)\right)\end{pmatrix} \tag{4}$$

$$ESVN(x_1 \oplus y, \ldots, x_n \oplus y) = \begin{pmatrix} r\sum_{j=1}^{n} w_j \left(\left(r^{-1}(T_j)\right) + r^{-1}(T_j)\right), \\ q\sum_{j=1}^{n} w_j \left(\left(q^{-1}(I_j)\right) + q^{-1}(I_j)\right), \\ q\sum_{j=1}^{n} w_j \left(\left(q^{-1}(F_j)\right) + q^{-1}(F_j)\right) \end{pmatrix} \tag{5}$$

$$ESVN(x_1 \oplus y, \ldots, x_n) \oplus y = \begin{pmatrix} r\sum_{j=1}^{n} w_j r^{-1}(T_j), \\ q\sum_{j=1}^{n} w_j q^{-1}\left(\left((I_j)\right)\right), \\ q\sum_{j=1}^{n} w_j q^{-1}\left(\left((F_j)\right)\right) \end{pmatrix} \oplus (T, I, F) \tag{6}$$

$$ESVN(x_1 \oplus y, \ldots, x_n) \oplus y = \begin{pmatrix} r\left(r^{-1}\left(r\sum_{j=1}^{n} w_j r^{-1}(T_j)\right) + r^{-1}(T)\right), \\ q\left(q^{-1}\left(q\sum_{j=1}^{n} w_j q^{-1}(I_j)\right) + q^{-1}(I)\right), \\ q\left(q^{-1}\left(q\sum_{j=1}^{n} w_j q^{-1}(F_j)\right) + q^{-1}(F)\right) \end{pmatrix} \tag{7}$$

$$ESVN(x_1 \oplus y, \ldots, x_n) \oplus y = \begin{pmatrix} r\left(\left(\sum_{j=1}^{n} w_j r^{-1}(T_j)\right) + r^{-1}(T)\right), \\ q\left(\left(\sum_{j=1}^{n} w_j q^{-1}(I_j)\right) + q^{-1}(I)\right), \\ q\left(\left(\sum_{j=1}^{n} w_j q^{-1}(F_j)\right) + q^{-1}(F)\right) \end{pmatrix} \tag{8}$$

3. SVN-PROMETHEE Method

We show the steps of the PROMETHEE method to obtain the rank of alternatives.

Experts use the SVNNs to build the decision matrix. Einstein operator with SVNNs is used to combine the decision matrix, and we compute the crisp values. We obtain the criteria weights by the average method.

Normalize the decision matrix such as:

$$A_{ij} = \frac{B_{ij} - \min(B_{ij})}{\max(B_{ij}) - \min(B_{ij})} \tag{9}$$

$$A_{ij} = \frac{\max(B_{ij}) - B_{ij}}{\max(B_{ij}) - \min(B_{ij})} \tag{10}$$

Compute the relative difference among the alternatives.

Compute the preference function

$$F_j(C, D) = 0 \quad if\ A_{Cj} \leq A_{Dj} \tag{11}$$

$$F_j(C, D) = \left(A_{Cj} - A_{Dj}\right)\ if\ A_{Cj} > A_{Dj} \tag{12}$$

Combine the $F_j(C, D)$ values.

$$G(C, D) = \left[\sum_{j=1}^{n} w_j\, F_j(C, D)\right] / \sum_{j=1}^{n} w_j \tag{13}$$

Compute the leaving and entering outranking flows

$$H^{+} = \frac{1}{m-1} \sum_{z=1}^{m} G(C, D) \tag{14}$$

$$H^{-} = \frac{1}{m-1} \sum_{z=1}^{m} G(C, D) \tag{15}$$

Compute the net outranking flow

$$H(C) = H^{+}(C) - H^{-}(C) \tag{16}$$

4. Outcomes

This section shows the outcomes of the proposed approach. This study uses eight criteria and seven alternatives to be evaluated under Fig 1.

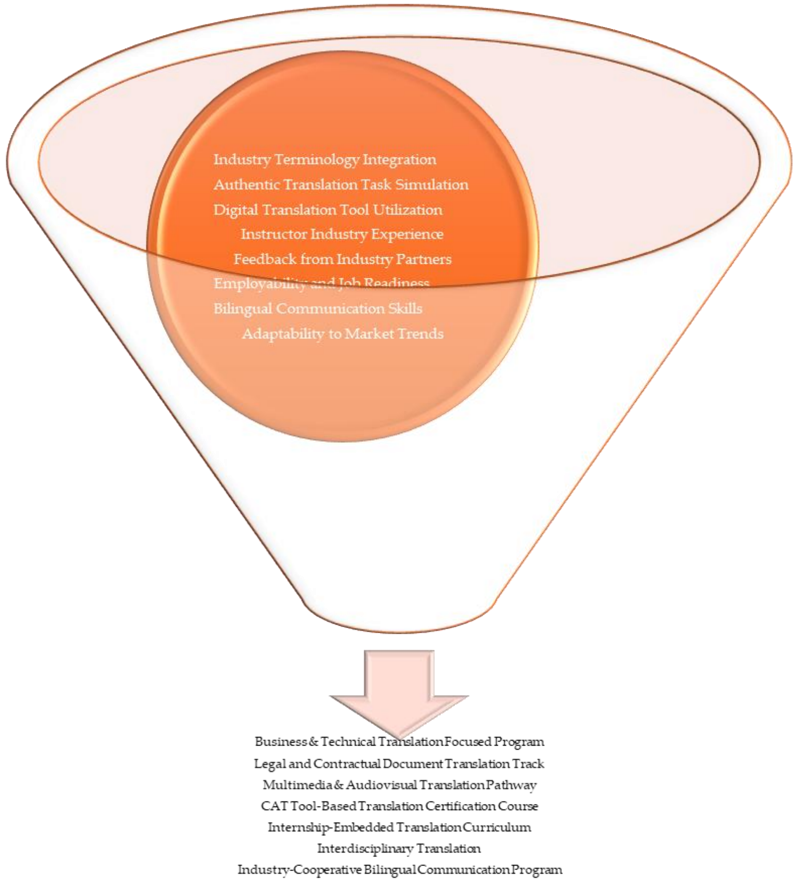

Fig 1. List of factors.

Four experts use SVNNs to evaluate the criteria and alternatives as shown in table 1. Einstein operator with SVNNs is used to combine the decision matrix, and we compute the crisp values. We obtain the criteria weights by the average method under Fig 2.

Table 1. The decision matrix.

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
A_1	(0.9,0.1,0.2)	(0.7,0.3,0.4)	(0.5,0.5,0.5)	(0.4,0.5,0.6)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.1,0.8,0.9)	(0.5,0.5,0.5)
A_2	(0.9,0.1,0.2)	(0.1,0.8,0.9)	(0.2,0.7,0.8)	(0.3,0.6,0.7)	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.9,0.1,0.2)	(0.4,0.5,0.6)
A_3	(0.7,0.3,0.4)	(0.5,0.5,0.5)	(0.4,0.5,0.6)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.7,0.3,0.4)	(0.7,0.3,0.4)	(0.3,0.6,0.7)
A_4	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.7,0.3,0.4)	(0.9,0.1,0.2)	(0.1,0.8,0.9)	(0.9,0.1,0.2)	(0.5,0.5,0.5)	(0.2,0.7,0.8)
A_5	(0.3,0.6,0.7)	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.7,0.3,0.4)	(0.9,0.1,0.2)	(0.1,0.8,0.9)	(0.4,0.5,0.6)	(0.1,0.8,0.9)
A_6	(0.3,0.6,0.7)	(0.3,0.6,0.7)	(0.4,0.5,0.6)	(0.3,0.6,0.7)	(0.1,0.8,0.9)	(0.2,0.7,0.8)	(0.3,0.6,0.7)	(0.2,0.7,0.8)
A_7	(0.2,0.7,0.8)	(0.2,0.7,0.8)	(0.5,0.5,0.5)	(0.2,0.7,0.8)	(0.2,0.7,0.8)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.3,0.6,0.7)
	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
A_1	(0.4,0.5,0.6)	(0.7,0.3,0.4)	(0.5,0.5,0.5)	(0.4,0.5,0.6)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.1,0.8,0.9)	(0.5,0.5,0.5)
A_2	(0.5,0.5,0.5)	(0.1,0.8,0.9)	(0.2,0.7,0.8)	(0.4,0.5,0.6)	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.4,0.5,0.6)	(0.4,0.5,0.6)
A_3	(0.7,0.3,0.4)	(0.5,0.5,0.5)	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.4,0.5,0.6)	(0.7,0.3,0.4)	(0.5,0.5,0.5)	(0.3,0.6,0.7)

A_4	(0.9,0.1,0.2)	(0.5,0.5,0.5)	(0.7,0.3,0.4)	(0.7,0.3,0.4)	(0.5,0.5,0.5)	(0.9,0.1,0.2)	(0.7,0.3,0.4)	(0.2,0.7,0.8)
A_5	(0.1,0.8,0.9)	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.9,0.1,0.2)	(0.7,0.3,0.4)	(0.1,0.8,0.9)	(0.9,0.1,0.2)	(0.3,0.6,0.7)
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A_1	(0.9,0.1,0.2)	(0.7,0.3,0.4)	(0.5,0.5,0.5)	(0.4,0.5,0.6)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.1,0.8,0.9)	(0.5,0.5,0.5)
A_2	(0.1,0.8,0.9)	(0.1,0.8,0.9)	(0.2,0.7,0.8)	(0.3,0.6,0.7)	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.9,0.1,0.2)	(0.4,0.5,0.6)
A_3	(0.2,0.7,0.8)	(0.9,0.1,0.2)	(0.4,0.5,0.6)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.7,0.3,0.4)	(0.1,0.8,0.9)	(0.3,0.6,0.7)
A_4	(0.3,0.6,0.7)	(0.1,0.8,0.9)	(0.9,0.1,0.2)	(0.9,0.1,0.2)	(0.9,0.1,0.2)	(0.9,0.1,0.2)	(0.2,0.7,0.8)	(0.2,0.7,0.8)
A_5	(0.4,0.5,0.6)	(0.2,0.7,0.8)	(0.1,0.8,0.9)	(0.9,0.1,0.2)	(0.1,0.8,0.9)	(0.9,0.1,0.2)	(0.3,0.6,0.7)	(0.1,0.8,0.9)
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A_7	(0.7,0.3,0.4)	(0.4,0.5,0.6)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.3,0.6,0.7)	(0.2,0.7,0.8)	(0.5,0.5,0.5)	(0.3,0.6,0.7)
	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
A_1	(0.2,0.7,0.8)	(0.1,0.8,0.9)	(0.7,0.3,0.4)	(0.1,0.8,0.9)	(0.3,0.6,0.7)	(0.4,0.5,0.6)	(0.1,0.8,0.9)	(0.7,0.3,0.4)
A_2	(0.1,0.8,0.9)	(0.9,0.1,0.2)	(0.9,0.1,0.2)	(0.9,0.1,0.2)	(0.4,0.5,0.6)	(0.5,0.5,0.5)	(0.9,0.1,0.2)	(0.1,0.8,0.9)
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A_4	(0.7,0.3,0.4)	(0.7,0.3,0.4)	(0.7,0.3,0.4)	(0.3,0.6,0.7)	(0.5,0.5,0.5)	(0.7,0.3,0.4)	(0.3,0.6,0.7)	(0.3,0.6,0.7)
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A_6	(0.1,0.8,0.9)	(0.1,0.8,0.9)	(0.1,0.8,0.9)	(0.7,0.3,0.4)	(0.9,0.1,0.2)	(0.1,0.8,0.9)	(0.9,0.1,0.2)	(0.7,0.3,0.4)
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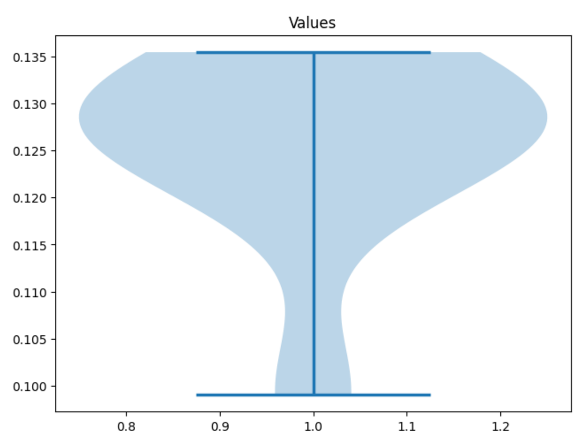

Fig 2. The Weights of factors.

Fig 3 shows the normalized decision matrix which is obtained using Eqs. (9 and 10).

This study computes the relative difference among the alternatives.

This study computes the preference function using eqs. (11 and 12) as shown in Fig 4.

We combine the $F_j(C, D)$ values using Eq. (13) as shown in Fig 5.

We compute the leaving and entering outranking flows using eqs. (14 and 15).

We Compute the net outranking flow using eq. (16). We rank the alternatives as shown in Fig 6.

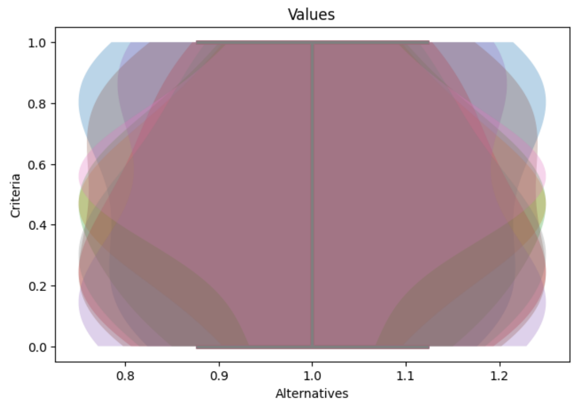

Fig 3. Normalized matrix.

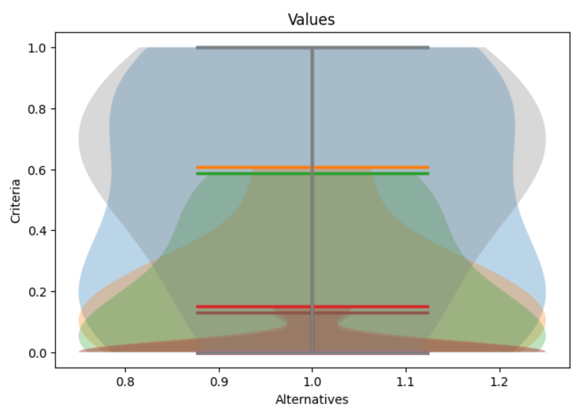

Fig 4-1. Preference values.

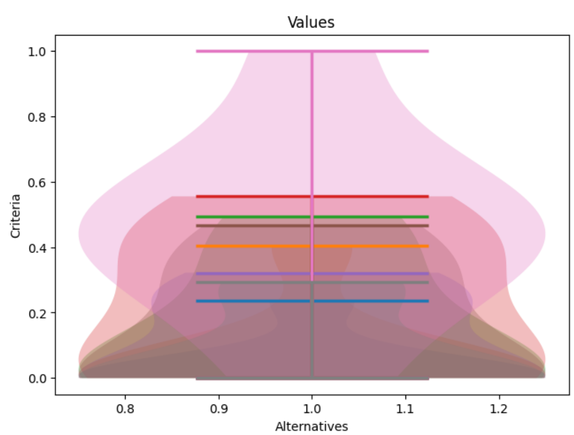

Fig 4-2. Preference values.

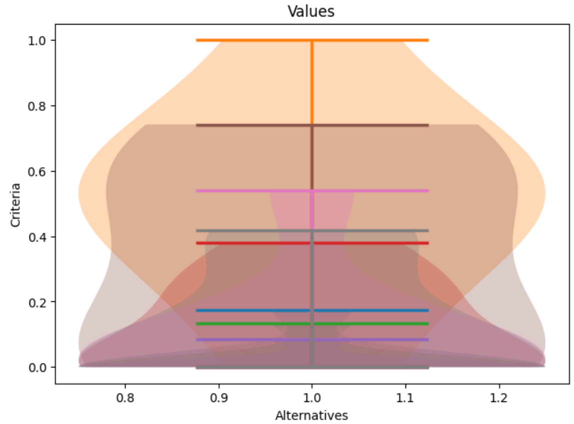

Fig 4-3. Preference values.

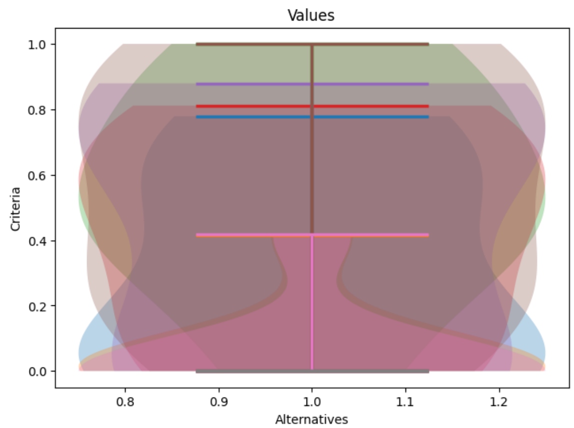

Fig 4-4. Preference values.

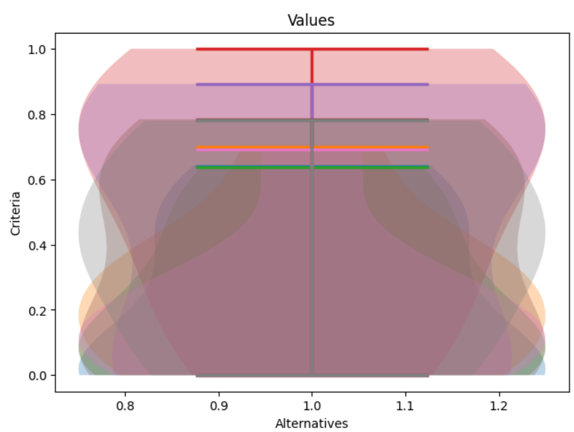

Fig 4-5. Preference values.

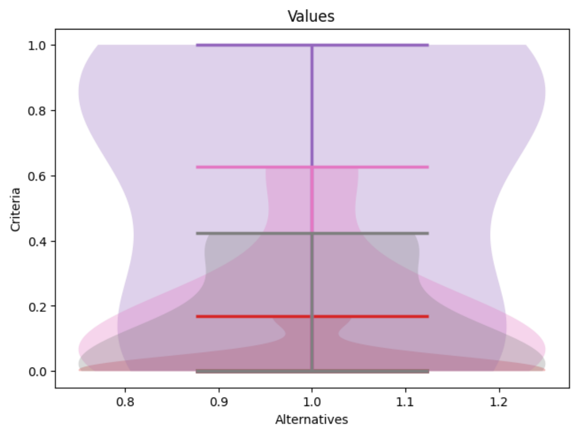

Fig 4-6. Preference values.

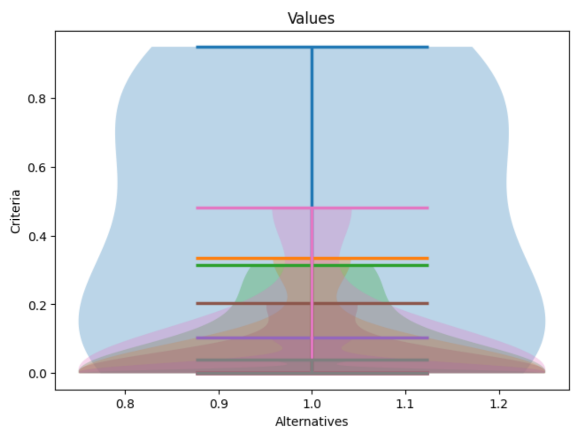

Fig 4-7. Preference values.

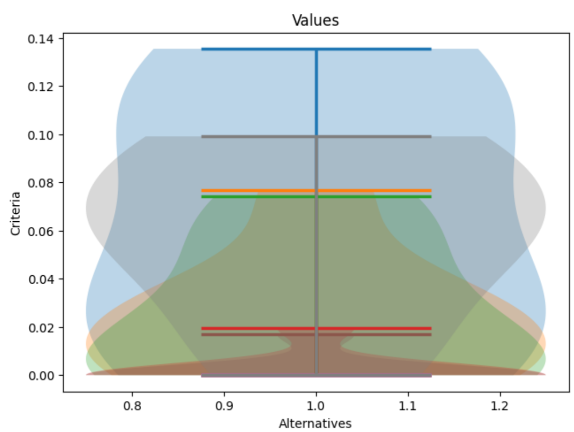

Fig 5-1. Weighted preference values.

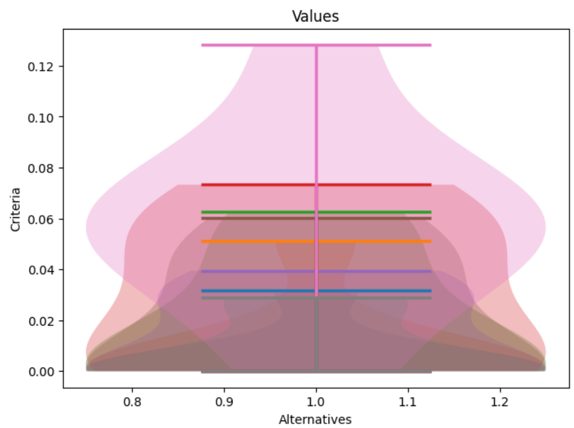

Fig 5-2. Weighted preference values.

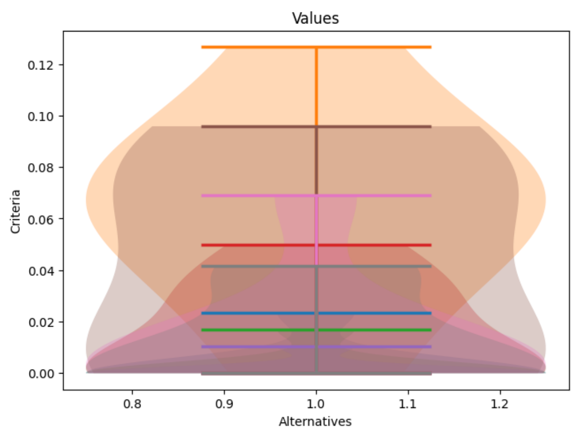

Fig 5-3. Weighted preference values.

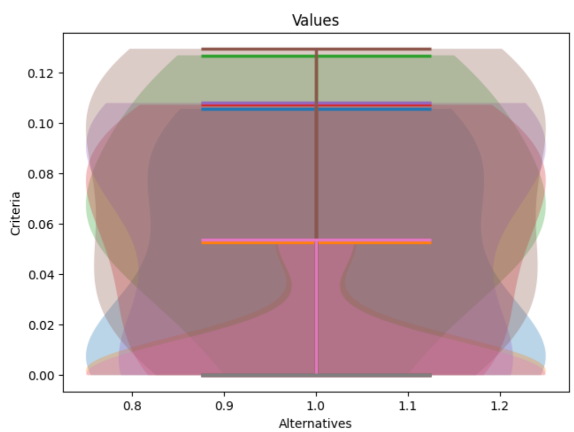

Fig 5-4. Weighted preference values.

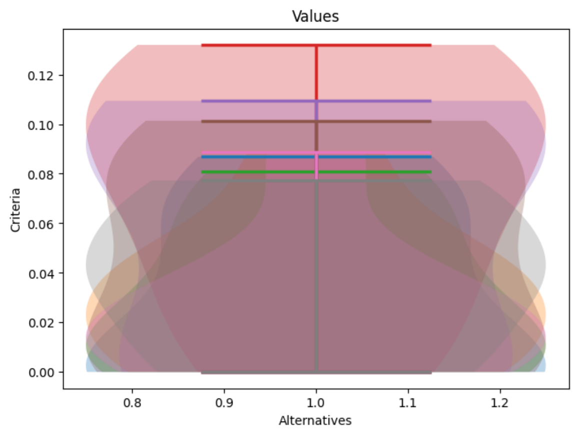

Fig 5-5. Weighted preference values.

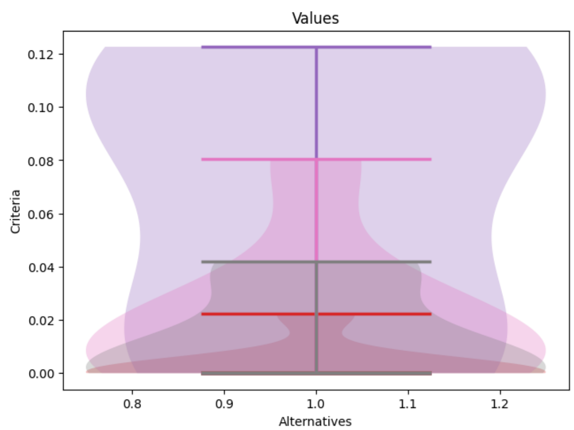

Fig 5-6. Weighted preference values.

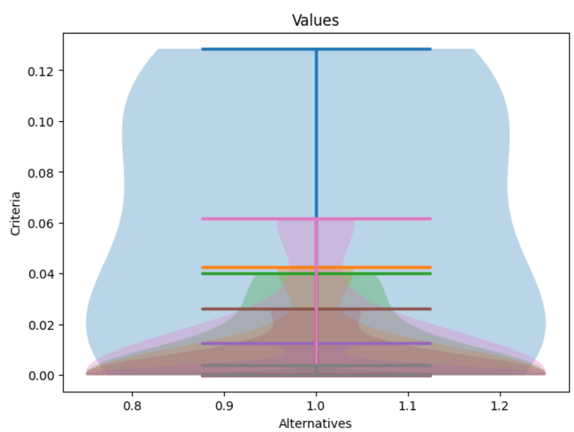

Fig 5-7. Weighted preference values.

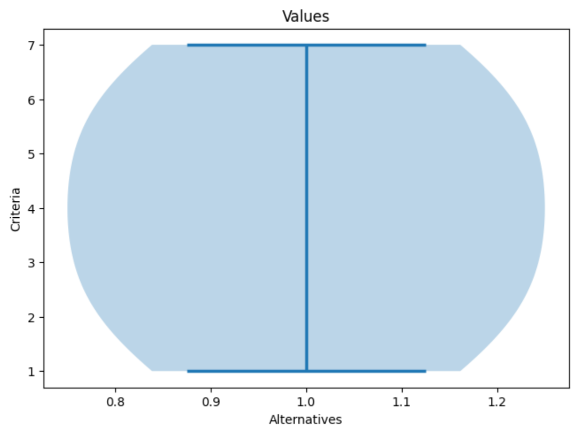

Fig 6. The rank of alternatives.

5. Conclusions

The transition from classroom to profession in English translation education demands a strategic integration of academic instruction with industry realities. By aligning curriculum with the needs of the job market—through practical training, technological integration, and employer collaboration—vocational institutions can equip students with both the linguistic proficiency and professional agility required for success. This holistic assessment approach not only enhances employability but also ensures sustainable education practices that evolve with changing market demands. Future reforms should continue to emphasize adaptability, innovation, and inclusiveness to maintain relevance and effectiveness in translation education. This study used single valued Neutrosophic numbers to evaluate the criteria and alternatives with overcoming the uncertainty and vague information. The Einstein operator is used to combine the decision matrix into a single matrix. Four experts have evaluated the criteria and alternatives. Case study with eight criteria and seven alternatives are conducted.

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