

Application of Fuzzy Logic in Assessing English Writing Skill at School Level: A Study

Sravana Jyothi Doddapaneni¹, Alpa Singh Rajput^{*2}

(1)Department of Sciences and Humanities, Vignan Foundation for Science, Technology and Research, Guntur, 522213, India, Sravani.alapati3@gmail.com

(2)Department of Sciences and Humanities, Vignan Foundation for Science, Technology and Research, Guntur, 522213, India, alpasinghrajput09@gmail.com

Received 2022 March 25; **Revised** 2022 April 28; **Accepted** 2022 May 15

Abstract

This paper is aiming to evaluate the learners' proficiency in writing skills at primary level in the English Language by centering five major content areas: Fluency, Content, Conventions, Syntax and Vocabulary. Fuzzy logic is the way of organizing idea that cannot be defined specifically but which depends upon their contexts – different ways of human thoughts and interpretation. In this framework, the fuzzy logic is a contribution for us that is suitable in a narrow range of different schooling applications. The analysis between the performances of primary level school going students of private schools, by using Fuzzy Logic. Finally, paper provides a proposal of utilizing the technology in English writing skills as an application for future design and development.

Key words: Writing Skill, Competency, Performance, Fuzzy Logic, Interpretation, Assessment

Introduction

A teacher's principal duty is to provide opportunities to create on their own and support in return with valid feedback. The educator does this via cautiously observing student's work to evaluate merits and inadequacies, showing explicit abilities and methodologies because of understudy needs, and giving cautious criticism that will support recently mastered abilities and right repeating issues. These obligations uncover, upon study, that evaluation is obviously a fundamental piece of good guidance. In their audit of the current examination on powerful guidance Christenson, Ysseldyke, and Thurlow (1983) found that, notwithstanding different elements, the accompanying circumstances were emphatically related to understudy accomplishment:

- How much there is a proper educational match between student qualities and errand attributes (all in all, teachers should review the students' earlier information and current degree of abilities to match them to an undertaking that is significant and fitting to their aptitudes);
- How much the instructor effectively observes students' comprehension and progress; and how much students' execution is assessed often and relevantly (consistent with what is educated).

[16] The idea of fuzzy logic was given by Lotfi Zadeh in 1965. Fuzzy logic is area of logic in particular calculated for expressive facts and human interpretation in such a technique so as to it is acquiescent to processing by a PC. Accordingly, it is valid to A.I., control and expert systems. [11] A. C. Boclin and R. D. Mello, (2006) are developed a method of fuzzy logic computational for making assessment though performing environmental assessment, This concepts was with the intention of assure the stakeholders in a way to get fuzzy and crisp value and build presumption from resultant ideals of environmental, language, cultural, social and economic indicators.

In Yadav and Singh [12] accessible a process call Fuzzy Expert System (FES) for evaluating performance of academic assessment based on fuzzy. Fuzzy logic is handling vagueness, and improbability in accepted method via providing a human oriented in order illustration possible, but it is not so strong in learning by self and simplification rules. This research, we used techniques of fuzzy logic for student's performance of English writing skills assessment.

Simple methods to evaluate the practice

The analytical purposes of evaluation (deciding the explanations behind composing issues and the understudy's informative requirements) are best met by taking a gander at the most common way of composing, i.e., the means learners go through and work on it by putting their ideas in organised manner. What extent arranging ensures by the learner as individual? Does she or he have a system for coordinating thoughts? What appear to be the snags to writing considerations down? How does the understudy endeavour to spell words she doesn't have the foggiest idea? Does the understudy rehash what they have composed? Do they discuss or impart work to others while composing? In fact, the assessor should concentrate on a reasonable model that provide innovativeseries by mentioningimportant observable facts. Teachers have arrived at little agreement in regards to the quantity of steps in the creative cycle. Composing specialists have proposed as not many as two (Elbow, 1981) and upwards of nine (Plain, 1979).

Simple ways to assess the writing

A compelling inspired cycle ought to lead to aproductivething. A writingarticle satisfies its open goal in the event that it is of proper length, is sensible and rational, and has a clear structure. It is a delight to peruse on the off chance that it is made out of very much developed structure and a rich assortment of words that obviously express the creator's importance. At the point when different applied models of composing are analysed next to each other (Isaacson, 1984) five item factors appear to arise: familiarity, content, shows, punctuation, and jargon. Time after time instructors concentrate basically on surface highlights of a student'ssynthesis connected with the mechanical parts of composing, or shows. A fair evaluation ought to check out at every one of the five parts of an understudy's composition. Coming up next are basic strategies for surveying every item factor. In certain examples quantifiable measures are utilized; in others, subjective appraisals appear to be more suitable.

Fluency

The principal writing expertise an instructorpossibly willstudy with a starting statement of the writer to understand his fluency: using the selection to create an analysis of one's viewpoints into refineinto refine created words. As ideas of print and fine coordinated movements create, the student ought to turn out to be more capable at recording lexis and writing into arrangements of progressively expanding the argument. The formative course of exceptionally youthful journalists includes attempting to comprehend what's going on with composed language as they see records, convert mindful of natural print, and use outlinemethod(Earth, 1982). Therefore, at that point, kids attempt to relate their encounters recorded as a hard copy utilizing created spelling. As they build simple stories they uncovernew vocabulary and substituteto different dialect designs.

A straightforward courseplan is all out total of vocabulary composed all through of simple writing task. A subsequent IEP goal may be composed this way: Once prewriting collected, instructor will developdistinctivestructuresof [40] verses or the other. A general instruction for finalising the basis can be placed from the study revealed by Deno, Mirkin, and Wesson (1982) and Parker and Tindal:

- In the event that the absolute number of words is under 20, go for doubling theactivity before the end of the academic year.
- In the event that the quantity of words is somewhere in the range of 25 and 30, aim for the rise of 50%.
- In the event that the quantity of words is somewhere in the range of 35 and 45, go for the rise of 25%.
- Assuming that the quantity of lexis is more prominent than 50, pick alternative goal.

Content

Content is the next component to think about in the writingarticle. Content highlights incorporate the structure's association, attachment, exactness (in explanatory composition), and inventiveness (in exploratory writing). General inquiries the homeroom instructor can pose with respect to a structure's association comprise:

- Is it having a decent starting sentence?

- Can we see a flawless conclusion?
- Can we locate a coherent grouping of subtopics or events?

Attachment questions include:

- Does the essayist adhere to the point?
- Does the essayist utilize sayings that signal the reader to the course of the talk (First..., Then, at that point..., in this manner..., Then again...)?

Creativity is evaluated through questions like:

- Did the author endeavour humour?
- Did the writer introduce a novel perspective?

Conventions

To fulfil the communicative competency of writing, the detail should be apparent. Creators should comply with the rule shows of made English: right spelling, complement, and language and coherent handwriting. Subsequently, regardless of whether the message is conveyed, per users will generally be adversely inclined toward arrangements that are not adequate in their structure or appearance. Counting right word successions is one quantitative strategy for estimating and checking understudies' utilization of shows. Right word arrangements (Collaborative Writing Strategy) are two neighbouring, perfectly signified vocabulary that are syntactically OK inside the setting of the expression (Videen, Deno, and Marston, 1981). Capitalization and accentuation likewise can be viewed as inside the arrangement. To ascertain the extent of CWS:

- Put a large dot between each incorrect sequence. Place dots before and after misspelled words.

Examples: What you're saying sounds like a bunch of nonsense.

"See you later, alligator!" Grandma said to Fiona.

- Put a caret (^) above each accurate arrangement between the two words that form the order.
- To regulate for length of piece either (a) period the composing test for 3 minutes or potentially
- (b) partition the quantity of CWS by the total number of groupings (right and erroneous), which gives the extent of CWS.

Syntax

As examined beforehand, a child's initial efforts to compose change from composing distinct words to composing lexis gatherings and sentences (Clay, 1993). Starting authors frequently write sentences by following a rehashed subject-action word (S-V) or subject-action word object (S-V-O) pattern. Powers and Wilgus (1983) analysed three boundaries of syntactic development: (a) varieties in the utilization of sentence designs, (b) first extensions (six fundamental sentence designs framed by the expansion of word intensifying expressions and item supplements, and the development of basic compound sentences), and (c) changes that outcome in family member and secondary provisos. Adjusting Power and Wilgus' investigation of examples recommends a basic pattern for assessing the syntactic development of an understudy's composition:

Piece: A collection of words simply doesn't create a meaningful sentence.

Models: Her overused skirt. Nina and Flora as well.

- Level 1 Repetitious utilization of a solitary example (straightforward sentences)

Model: I like my pony. I like my canine. I like my kitty. I like to take care of my kitty.

- Level 2 Use of an assortment of straightforward sentence designs.

Models: I have another toy. (S-V-O) It is huge. (S-Vbe - Adj) It came via the post office. (S-V-PP)

- Level 3 First extensions: (a) expansion of a verb-modifying or "ing" word expression, or (b) the creation of a compound sentence by consolidating two straightforward statements with the expression.

Models: Our babysitter breaks constantly. To hurry up, we push it.

- Level 4 Difficulty increases (changes in which one sentence is implanted inside one more as a subordinate statement) changes in which single sentence is embedded inside one more as a secondary statement.

Models: The lady needs to reside where no contagion. Since Joyal was late, we needed to start leaving him.

Rarely a learner composes sentences at just a single degree of syntactic development. One decides a phrase structure by dissecting every one of the sentences in the example and summing up them as per the sort most frequently utilized. Once in a while one could describe an understudy's syntactic level similar to a temporary Level 2/Level 3 or Level 3/Level 4. A subsequent IEP objective for punctuation could peruse: Daniel will design, compose, and re-examine an unmistakable passage utilizing mature sentences, half containing implanted statements or word intensifying expressions.

Lexis

The lexis utilized in a learner's writing could be assessed by the distinctiveness or development of the words utilized in the synthesis. Mutually quantifiable and subjective techniques can be utilized to assess jargon. Assessable strategies incorporate counting the exceptional words comparable to the entire number of words, like Morris and Crump's (1982) revised type-token proportion. An easier classroom based strategy for seeing jargon is to just make note of words utilized tediously (over-utilized words) along with different and appropriate words the understudy utilizes.

Example: Stereotyped Words: Substitute Words

- Great
- Motivating

A subsequent IEP objective for jargon could peruse: Diana will change her interpretive structures, subbing no less than five over-utilized words (e.g., is) for seriously fascinating activity words.

The approach of fuzzy logic applications for primary level student performance of English writing skills assessment is in wide-ranging innovative. Yet, it has grasped a extensive vary of presentation areas in learning systems besides evaluation of primary level performance of writing in English, together with the assessment of program and that of the instructors for instance professors and instructors [13, 14, 15].

Fuzzy set & membership:

A is fuzzy set over of universe X defined as , $A = \{ \mu_A(n) : n \in X \}$ Where μ is a mapping. Membership function $\mu_A(n)$ is called the degree of belongingness in A. In present paper, we have triangular membership for converting the crisp value into fuzzy value. This membership functions are precised by 3 parameters (u, v, w) as follows

$$(m, u, v, w) = \max\left(\min\left(\frac{m-u}{v-u}, \frac{w-m}{w-v}\right), 0\right).$$

Because of this formula and computational effectiveness, the triangular functions have proven popular and used broadly in performance of student's assessment.

Expert system:

We have wished-for design of system of Fuzzy Expert for student English Language performance (FESEP) valuation due to techniques of this logic. It introduces ethics following fuzzy logic and illustrates how these ideology could be useful by Teachers to evaluating performance of student's English writing skills. The idea of proposed to the Fuzzy expert system for FESEP to adaptively regulate guidance for all exacting students on origin of his or her individual rapidity of knowledge. The way of FESEP will observe the student's improvement and include ability to make conclusion about next step. Numerous approaches by means of this techniques have been planned to supply a convenient method for evaluating performance of students and measure up to the results (performance) with existing statistical method.

Proposed method

Here drawbacks of existing performance valuation methods need of in sequence following evaluation methods that have used IEP model for the 'concluding result'. So, a fuzzy come close to has used to execute the proposed method of performance estimate. Its essential to exposed that the aim of the proposed method is not to replace the existing traditional method of assessment, in its place it will build up the present system by providing one-time information to be used for decision making with the user.

Figure-1 shows the FESEP method of student performance of English writing skills assessment.

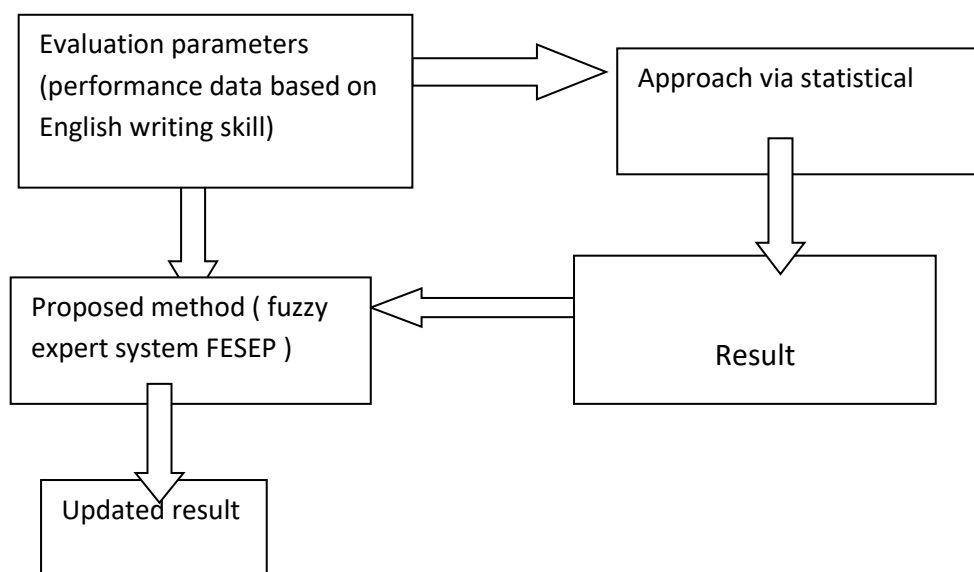


Figure 1: Proposed method

The structure of proposed method FESEP is known in Figure-2:

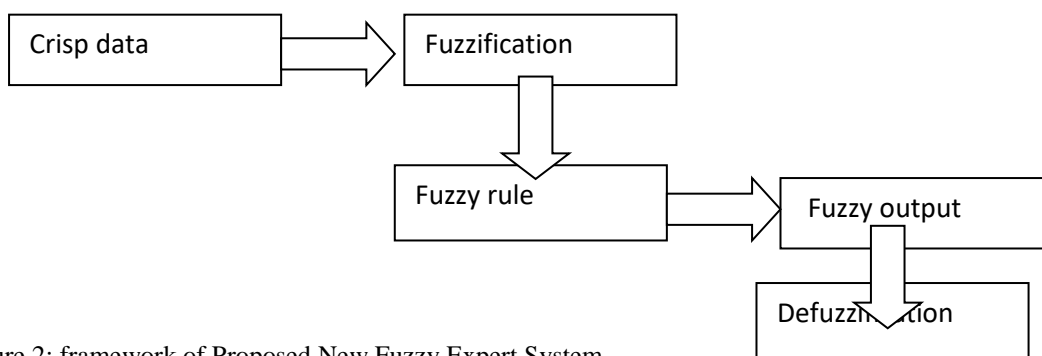


Figure 2: framework of Proposed New Fuzzy Expert System

1. Crisp data: This data is obtained by students in primary level examination.
2. Fuzzification: Means crisp data is changed into Fuzzy data by fitting triangular membership function.
3. Inference method: classify dissimilar kind fuzzy rule ("If Then") for student performance of English writing skills assessment.
4. Fuzzy Output: determine output value of membership function for each rule ("If Then" rule).
5. Defuzzification (English writing skills Performances): calculate the final Performance data by using proper method of Defuzzification.

Fuzzy expert system for assessing English writingskills:

In the present study, we have planned FESEP as suitable one to assess student performance of English writing skills and that is shown in Figure-3. The FESEP is based on triangular membership functions.

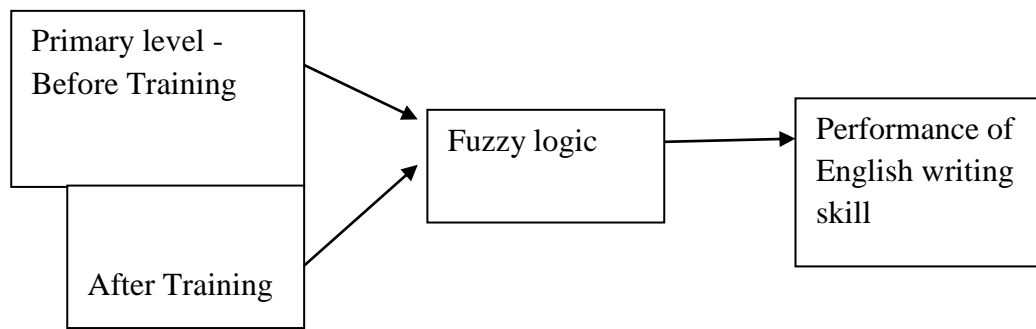


Figure 3: FESEP System for performance evaluation

By using the IEP model the new scale was developed with five traits like Fluency, Content, Conventions, Syntax and Vocabulary. The scripts 200 analysed using the developed traits by following the above mentioned measures. In the training clear instructions practice exercises were provided to meet the individual educational policy model. The findings of individual traits showed on the new scales in the table 1.

Table 1: The findings of individual traits showed on the new scales

IEP Scale	Band Levels (Before Training)	New Scale	Band Levels (After Training)
Cohesion	4	Cohesion	6
Content	4	Content	6
Conventions	5	Conventions	6
Grammatical Accuracy	5	Grammatical Accuracy	6
Vocabulary and Spelling	4	Vocabulary and Spelling	6

This model (FESEP) is presented for the assessment of students performance. With the range of methods in work for study, this method involves the fuzzy logic wherein the concert is approximate in an effective technique. This process eliminates formula for the process.

Conclusion:

Taking everything into account, on-going evaluation of writing is indispensable to great training. A trainer could not develop a proper educational counterpart between an apprentice's abilities and suitable undertakings without evaluation. Moreover, an educator cannot promise a student's prosperity and make essential changes in guidance without taking part in continuous evaluation. Cautious, exhaustive evaluation of a schoolchild's writing expects that the instructor has a sound reasonable model of composed articulation by considering process of writing in detail. An attempt has been made in this paper to inspire the reader to appreciate the use of fuzzy logic as an innovative logical tool that is instrumental in handling problems with ambiguities and where the information is imprecise and non-numerical.

References:

1. Graden, J., Thurlow, M., & Ysseldyke, J. (1983). Instructional ecology and academic responding time for students at three levels of teacher-perceived behavioural competence. *Journal of Experimental Child Psychology*, 36(2), 241-256.
2. Marston, D., & Deno, S. (1981). The Reliability of Simple, Direct Measures of Written Expression.
3. Tindal, G. (1982). A Data-Based Special Education Delivery System: The Pine County Model.
4. Powers, A. R., & Wilgus, S. (1983). Linguistic complexity in the written language of hearing-impaired children. *The Volta Review*.
5. Morris, N. T., & Crump, W. D. (1982). Syntactic and vocabulary development in the written language of learning disabled and non-learning disabled students at four age levels. *Learning Disability Quarterly*, 5(2), 163-172.
6. Stephen L. Isaacson Portland State University This article is adapted for LD Online from a similar article by Isaacson published in *The Volta Review*, 1996, Vol. 98, No. 1, pp. 183-199.
7. Chuen Chiien Lee, 'Fuzzy Logic in control System: Fuzzy Logic Controller- Ports I & II', IEEE
8. A B. PATKI, G. V. RAGHUNATHAN, 'Trends in Fuzzy Logic Hardware', *JCIS*, Sep. 28-Oct.1, 1995 North Carolina U.S.A.
9. HIROYUKI WATANABE AND WAYNE D. DETTLOFF, KATHY E. YOUNT. 'A VLSI Fuzzy Logic Controller with Reconfigurable, Cascadable Architecture', *IEEE Journal of Solid State Circuit*, Vol.25, No.2, April 1990.
10. Masaki Togai and Stephen Chiu, 'A Fuzzy Logic Chip and a Fuzzy Inference Accelerator for Real-Time Approximate Reasoning'.
11. Boclin A. S. and R. D. Mello, (2006) A decision support method for EIA using a fuzzy logic approach. *Ecological Economics* 58, 170-182.
12. R.S. Yadav and V.P. Singh. Modeling Academic Performance Evaluation Using Soft Computing Techniques: A Fuzzy Logic Approach. *International Journal on Computer Science and Engineering*, 3(2), pp. 676-686, 2011.
13. S..M. Bai and S.M. Chen. A new method for students' learning achievement evaluation using fuzzy membership functions. *Proceeding of the 11th Conference of Artificial Intelligence and Applications*, Kaohsiung, Taiwan, Republic of China, pp. 177-184, 2006
14. S. Pavani, P.V.S.S. Gangadhar and K. K. Gulhare. Evaluation of Teacher's Performance Evaluation Using Fuzzy Logic Techniques. *International Journal of Computer Trends and Technology*, 3(2), pp. 200-205, 2012.
15. K. A. Rasmani and Q. Shen. Data-Driven Fuzzy Rule Generation and its Application for Student Academic Performance Evaluation. *International Journal of Applied Intelligence*, 25(3), pp. 305-319, 2006.
16. Zadeh, L.A. (1965) Fuzzy Sets. *Information and Control*, 8, 338-353.