

Combined Probabilistic Linguistic Group Decision-Making for Quality Evaluation of Continuing Education for Primary and Secondary School Teachers

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ABSTRACT

With the advancement of material and spiritual aspects of society, alongside improvements in economic, political, technological, and educational systems, continuing education for primary and secondary school teachers has developed rapidly. Evaluating the quality of continuing education programs is a complex task that falls under the category of multiple attribute group decision-making (MAGDM). Recently, methods like Exponential TODIM (ExpTODIM) and grey relational analysis (GRA) have been used to address such challenges, providing effective tools for handling decisions involving multiple criteria. This manuscript proposes a novel method, the probabilistic linguistic ExpTODIM-GRA (PL-ExpTODIM-GRA) approach, to tackle MAGDM problems under PLTSs. By combining the advantages of ExpTODIM and GRA, this method provides a robust framework for evaluating the quality of continuing education for primary and secondary school teachers. To validate the proposed method, a numerical case study is presented, demonstrating its application in real-world evaluations of teacher education programs.

KEYWORDS

Multiple Attribute Group Decision Making (MAGDM), Probabilistic Linguistic Term Sets (PLTSs), ExpTODIM Method, GRA Method, Quality Evaluation of Continuing Education

INTRODUCTION

Continuing education for teachers is a necessary requirement for advancing education reform, promoting balanced educational development, and improving the overall quality of education in the modern era (Fontelo, 1995; Messerle, 1991; Pérez-Cuevas et al., 2000). The Chinese government has emphasized the need to enhance the teacher training system, ensure that funds for teacher training are included in the government budget, and implement comprehensive training for all teachers every five years (Li et al., 2017; Zhu & Zhou, 2009).

To better understand the current state of continuing education for middle school teachers in China, we conducted surveys, research, and interviews with middle school educators in Henan, Zhejiang, and Guangxi between 2020 and 2021. Following initial tests and adjustments, we developed

DOI: 10.4018/IJDSST.368248

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the “Research Questionnaire on the New Development of Teacher Learning Needs and Innovation of Continuing Education Curriculum System.” This questionnaire primarily explores primary and secondary school teachers' attitudes toward the current national training system and models as well as their evaluations and expectations regarding the goals, structure, implementation, and assessment of continuing education programs. Out of 1,710 valid responses, we focused on 350 middle school science teachers (teaching physics, chemistry, and biology). These included 59 teachers with less than five years of experience, 79 with 6–10 years, 70 with 11–15 years, 77 with 16–20 years, and 65 with over 21 years of experience. Among them, 53 had participated in new teacher training, 210 in full staff training, and 59 in backbone teacher training (An et al., 2022).

At present, China stipulates that continuing education for primary and secondary school teachers is done in a five-year cycle. New teachers must complete 120 class hours during the probationary period of five years, and teacher position (full staff) training must accumulate 240 class hours of continuing education course training. We found that 42.6% of respondents believe that this requirement is appropriate, 45.4% believe that the class hours are “too much,” and 11.8% believe that they are “too little.” In terms of the right to choose training courses, 74.9% of teachers believe that they do not have the right to choose independently, while only 24.3% of teachers say they have the right to choose training courses independently. The most prominent problem in the implementation of teachers' continuing education curriculum is the lack of practicality, followed by the lack of research and multi-end, with selection rates of 67.1%, 17.1%, and 13.7%, respectively; the general response was that there is not a significant difference in the depth of content between continuing education training courses and preemployment training courses. According to the survey, middle school science teachers believe that the biggest shortcomings of university teachers in implementing teacher continuing education courses are “detachment from reality” and “inflexibility of teaching methods.” Next are “outdated knowledge” and “lack of professional dedication,” with 44.6% and 21.7% of respondents choosing “detachment from reality” and “inflexibility of teaching methods” and 17.1% and 10.9% of teachers choosing “outdated knowledge” and “lack of professional dedication,” respectively. The main shortcomings of middle school teachers receiving continuing education courses in their in-service schools are “inability to truly solve teaching problems” and “inability to comprehensively improve the quality of teachers,” with 53.1% and 24.9% of teachers choosing these two options, respectively.

From the survey results, it can be seen that middle school science teachers tend to agree with the scheduling of continuing education hours, but most teachers believe that they do not have the right to independently choose training courses (Scheuermeyer et al., 2013; Smith et al., 2014; Trogon et al., 2011). In fact, teachers with different experiences and professional development stages have different professional insights and abilities. They have different development needs in terms of knowledge structure, ability, and professional emotions. For middle school science teachers, in the early stages of professional growth, they may be more familiar with the cutting-edge knowledge of their subject field, but they are not good at summarizing and reflecting, and their actual teaching abilities urgently need guidance. Teachers in the more mature stage of professional development have accumulated a lot of experience and strong abilities in classroom regulation (Abraukhova et al., 2020; Athavale & Murnion, 2019; Jaunay et al., 2019). Although their teaching philosophy is relatively stable, they also need to achieve new breakthroughs. Therefore, the curriculum development of continuing education should combine the goals of meeting professional needs with promoting long-term professional development, follow the laws of teacher professional development, and combine multiple curriculum modules in content, time, and form based on the actual needs of teachers at different levels and stages of development. Based on the constraints of relevant management units, teachers should be given the right to choose and arrange the training courses independently. Only then can a scientific curriculum system for continuing education for middle school science teachers be established, allowing teachers from different groups to meet their own needs and effectively improve their professional levels.

Continuing education courses are formed on the basis of research on students' work needs. The curriculum design revolves around those needs, and needed courses are set up while unneeded

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