

Comparative Study on the Effectiveness of Civic Civilization Education Based on the Fuzzy Analytic Hierarchy Process (FAHP)

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Abstract: This study employs the Fuzzy Analytic Hierarchy Process (FAHP) to compare the effectiveness of civic civility education programs, responding to national initiatives to enhance public literacy. An evaluation framework encompassing coverage, operability, influence, and credibility was developed to quantitatively assess four educational methods: short videos, WeChat (Weibo), online lectures (activities), and offline lectures (activities). Results indicate that short videos deliver the most effective dissemination, followed by WeChat (Weibo) and online lectures (activities), while offline lectures (activities) show relatively weaker outcomes. The study recommends integrating media resources to leverage synergistic advantages and optimize educational effectiveness, providing theoretical support and practical guidance for civic civility education research.

Keywords: Civic civility; Educational methods; Educational effectiveness

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1. Introduction

With accelerating urbanization, enhancing civic civility has become crucial for local governments to boost urban competitiveness and build civilized cities. The national civilized city selection process highlights its importance by making civic civility a core indicator^[1]. Citizen civility directly influences urban public order, living environments, and social atmosphere, embodying the city's spiritual character. To enhance civic civility, governments employ diverse educational and promotional methods. However, in the era of converged media, effectively selecting and integrating educational communication methods to achieve optimal outcomes has become a critical research topic.

Shenzhen, a national model for civilized cities, offers instructive insights through its innovative practices. The Shenzhen Municipal Government has introduced action guidelines integrating new media platforms to elevate civic civility. Building upon this, this study employs the Fuzzy Analytic Hierarchy Process (FAHP) to evaluate four educational methods: short videos, WeChat (Weibo), online lectures (events), and offline lectures (events). An

evaluation framework encompassing coverage, operability, influence, and credibility was constructed^[2]. Through quantitative comparison, this study determines the optimal ranking of educational methods, providing theoretical foundations and practical guidance for civic civility education. Simultaneously, it aims to offer valuable references for other cities, collectively advancing the creation and development of national model cities of civility.

2. Construction of factors influencing the effectiveness of civic civilization education

As a specialized communication activity, the effectiveness of civic civility education is influenced by multiple factors. Drawing from the “5W” model in communication studies—namely, communicator, content, medium, audience, and effect—the study establishes a theoretical framework for constructing the influencing factors system^[3]. Through practical analysis, the study identifies four core determinants.

First, coverage. This measures the scope of citizens reached by educational activities. In the information age, it encompasses not only the number of citizens receiving education and their geographic distribution but also the potential audience reached through new media platforms. High coverage enables widespread dissemination of civic literacy knowledge, influencing the behaviors and attitudes of more citizens^[4].

Second, operability. This factor focuses on the ease and convenience of implementing and participating in educational activities, encompassing both the difficulty for educational institutions to organize events and the accessibility for citizens to participate. Highly operable educational methods lower barriers, increasing accessibility and participation rates.

Third, impact. This is a key factor in measuring the extent to which educational activities alter citizens' attitudes and behaviors. It can be reflected through citizen feedback (such as likes, comments, shares) and actual behavioral changes (such as increased civilized conduct), directly indicating the practical effectiveness and social value of the educational activities^[5].

Fourth, credibility. This pertains to citizens' trust in the educational institution and their recognition of the knowledge being disseminated. In the information age, the authenticity and authority of information influence citizens' receptiveness. Highly credible educational methods can more effectively convey knowledge, enhancing citizens' sense of identification and motivation to act.

3. Education construction of factors influencing the effectiveness of civic civilization education

The theoretical framework is the basis and purpose of all research. Thus, researchers are trying to find an appropriate theoretical perspective to analyze the construction process of Master Teacher Studios^[6]. According to relevant literature and monographs, the commonly used theoretical analysis perspectives in existing studies include professional learning community, learning organization theory, cooperative learning theory, situational learning theory, group dynamics theory, etc., or some researchers adopt professional capital theory, social constructivist theory, distributed leadership theory, action learning theory, plan-do-check-act theory^[7].

From further review of relevant literature, it can be seen that most researchers tend to position the theoretical basis of Master Teacher Studio in the community model, that is, the Master Teacher Studios are essentially a kind of professional learning community, which is the localization practice in China. The common vision is accompanied by frequent interpersonal views.

This paper applies the Fuzzy Hierarchical Analysis Method to analyze and calculate the educational

effectiveness of four civic civility education approaches.

3.1. Constructing the hierarchical structure

Based on the principle of hierarchical structures, a top-down hierarchical structure with sequential dominance relationships was constructed.

First, the educational effectiveness of civic civility cultivation is established as the research objective, designated as the goal layer (denoted as O).

Second, the factors influencing educational effectiveness—coverage (P1), operability (P2), influence (P3), and credibility (P4)—were grouped into the criterion layer.

Third, the implementation layer comprises different educational methods: offline instruction (activities) (M1), online instruction (activities) (M2), WeChat (Weibo) dissemination (M3), and short video dissemination (M4). A hierarchical progression diagram is drawn (Figure 1).

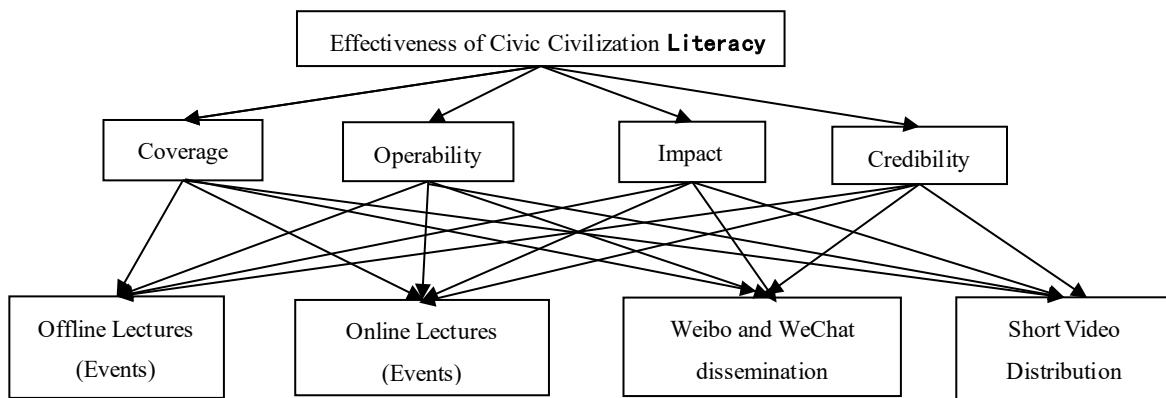


Figure 1. Hierarchical model of the effectiveness of civic civility education

3.2. Calculation of single-level and overall hierarchical rankings

Using ranking principles, calculate the single-level ranking and overall hierarchical ranking to determine the educational effectiveness ranking of different approaches for enhancing citizens' civic literacy.

3.2.1. Single-level ranking

Employ the geometric mean method (root-sum-of-squares method) to compute the fuzzy judgment matrices for each level, then normalize them to obtain the ranking of each factor's importance relative to the preceding level^[8].

(1) Hierarchical single-ranking calculation of each influencing factor on educational outcomes

$$S_0 = [0.3502 \ 0.2168 \ 0.2506 \ 0.1824]^T$$

The weights of the influencing factors are as follows:

Coverage: 0.3502; Influence: 0.2506; Operability: 0.2168; Reliability: 0.1824.

Therefore, the ranking of importance for educational outcomes is: Coverage > Influence > Operability > Reliability.

(2) Hierarchical single-ranking calculation of educational methods for influencing factors

$$\text{Coverage: } S_{P_1} = [0.1452 \ 0.2168 \ 0.2853 \ 0.3543]^T$$

$$\text{Operability: } S_{P_2} = [0.1480 \ 0.2170 \ 0.3175 \ 0.3175]^T$$

$$\text{Impact: } S_{P_3} = [0.1480 \ 0.2170 \ 0.3175 \ 0.3175]^T$$

$$\text{Credibility: } S_{P_4} = [0.3170 \ 0.3170 \ 0.1830 \ 0.1830]^T$$

3.2.2. Hierarchical total ranking

Using the results from the single-level sorting above, the overall hierarchical ranking is calculated as follows:

$$\begin{aligned} T &= [S_{P_1} \ S_{P_2} \ S_{P_3} \ S_{P_4}] * S_0 \\ &= \begin{bmatrix} 0.1452 & 0.1480 & 0.1480 & 0.3170 \\ 0.2168 & 0.2170 & 0.2170 & 0.3170 \\ 0.2853 & 0.3175 & 0.3175 & 0.1830 \\ 0.3543 & 0.3175 & 0.3175 & 0.1830 \end{bmatrix} \begin{bmatrix} 0.3502 \\ 0.2168 \\ 0.2505 \\ 0.1824 \end{bmatrix} = \begin{bmatrix} 0.1778 \\ 0.2352 \\ 0.2817 \\ 0.3059 \end{bmatrix} \end{aligned}$$

The weights for the effectiveness of each educational method are:

Short video dissemination: 0.3059; WeChat (Weibo) dissemination: 0.2817; Online instruction (activities): 0.2352; Offline instruction (activities): 0.1778.

The ranking of educational effectiveness by method is:

Short Video Dissemination > WeChat (Weibo) Dissemination > Online Instruction (Activities) > Offline Instruction (Activities)

That is, short video dissemination yields superior educational outcomes compared to WeChat (Weibo) dissemination; WeChat (Weibo) dissemination outperforms online instruction (events); and online instruction (events) is more effective than offline instruction (events).

The findings indicate that utilizing new media for civic civility education yields superior results compared to traditional methods.

According to the 48th Statistical Report on China's Internet Development released by the China Internet Network Information Center (CNNIC), as of June 2021, China's online video (including short video) user base reached 944 million, accounting for 93.4% of all internet users. Among these, short video users numbered 888 million, representing 87.8% of all internet users ²². This demonstrates the growing reach and influence of short video dissemination. Many Party and government agencies, as well as mainstream media outlets, have registered WeChat Official Accounts and Douyin short video accounts, joining the ranks of those utilizing short video platforms for publicity and education ^[9-10]. This further validates the effectiveness of short video communication.

4. Conclusions

This study employed the fuzzy analytic hierarchy process (FAHP) to rank the importance of civic literacy education methods. It proposes prioritizing new media platforms like short videos and WeChat for civic education, though this does not negate or diminish the role of traditional media. As shown in **Figure 1**, traditional media channels such as on-site activities and offline lectures (classes) remain the primary methods for civic literacy education. In today's era of converged media, the optimal approach to civic literacy education lies in organically integrating traditional and new media, fully leveraging the strengths of each to achieve resource sharing, cross-

platform dissemination, and content compatibility.

This study has several limitations, such as insufficient consideration of differences among educated citizen groups and a lack of detailed classification of educational content. These shortcomings, however, provide valuable insights and direction for future research.

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