International Journal of Computer Information Systems and Industrial Management Applications
ISSN 2150-7988 Volume 18 (2026) pp. 1-14

https://doi.org/10.70917/ijcisim-2026-1788
Article

A Systematic Analysis of the Construction Strategies and Implementation Effects of Students' Oral Technical Communication Competence in the Field of TVET in the M-learning Environment

Jie Liang[1], Marlissa Omar[1,*] and Intan Farahana Kamsin[1]

[1] Faculty of Education, Universiti Kebangsaan Malaysia, Bangi, 43600, Malaysia
* Correspondence author: marlissa@ukm.edu.my

Abstract: With the rapid development of Internet technology, emerging concepts such as mobile learning (M-learning), cloud computing, and technical and vocational education and training (TVET) have gained increasing attention in the field of education. Based on the existing research results, this study adopts WeChat as a platform for students' oral technical communication and proposes a strategy for building their oral technical communication competence from three different dimensions. Subsequently, the target of strategy implementation is selected, and a detailed implementation plan is also formulated. In order to systematically and intuitively demonstrate the implementation effect of oral communication strategy in TVET domain under the M-learning environment, the Analytical Hierarchy Process (AHP), Entropy Weighting Method (EWM), and cloud model-based comprehensive evaluation are employed to carry out in-depth exploration and analysis. The results yield a comprehensive evaluation cloud of (79.27, 3.29, 1.82), which is closest to the "good" level corresponding to the standard cloud (80.5, 2.5, 0.5). This indicates that the implementation effect of the proposed oral communication strategy is good, demonstrating its practical effectiveness in the TVET context under an M-learning environment.

Keywords: analytical hierarchy process; entropy weighting method; cloud model-based comprehensive evaluation; M-learning; TVET domain; oral technical communication

1. Introduction

In recent years, with the widespread use of smart devices and the rapid development of mobile Internet technology, mobile learning (M-learning) has become an integral part of the learning environment of secondary school students [1-2]. According to data from several authoritative surveys, over 90% of secondary school students own smartphones or tablets, and 71.14% of them primarily use mobile phones for learning activities [3-4]. This trend not only reflects the increased availability of technological devices, but also signals a fundamental shift in learning styles. In this context, Technical and Vocational Education and Training (TVET) faces the urgent need to reform the teaching mode and enhance students' core competencies.

For TVET students, strong oral technical communication skills are crucial to their achievements in real work and daily routine [5-6]. With the development of social media and mobile communication technologies, the pace of information dissemination has accelerated significantly, requiring greater demands on individual communication abilities [7-8]. Students with insufficient oral technical communication skills may face difficulties in workplace communication interactions and formal conference presentations. Meanwhile, the modern workplace is full of fierce competition, and an individual's oral technical communication competence is often a key factor in achieving professional success [9-10]. The traditional oral technical communication ability cultivation mainly relies on teachers' guidance and supervision, prompting students to speak, practice and imitate more in their daily life and study, which is not only inefficient and unsatisfactory but also prone to trigger students' complaint psychology [11-13]. In contrast, within an M-learning environment, smartphones and other mobile devices can overcome spatial constraints and provide real-time feedback and interactive simulation for oral technical communication training in the field of TVET. This approach effectively enhances students' learning motivation, oral technical communication and workplace adaptability [14-17].

In this study, the M-learning environment is integrated with theoretical perspectives from the TVET domain to propose a strategy for developing students' oral technical communication skills using WeChat as the main platform. The strategy is constructed from three dimensions: voice interaction, communication group, and public platform engagement. Based on this framework, English major students at College H were selected as the target group, and the proposed strategy was implemented in English language courses. In order to evaluate the effectiveness of the strategy, an evaluation index system was developed based on existing research results, which consists of 4 primary indicators and 16 secondary indicators. Finally, with the support of empirical data, the Analytical Hierarchy Process (AHP), Entropy Weighting Method (EWM), and cloud model-based comprehensive evaluation were used to for systematic analysis. The study aims to promote the intelligent and digital development of oral communication instruction in higher education.

2. An Exploration of Oral Communication in TVET Domain in M-learning Environment

2.1. M-Learning and TVET domains

2.1.1. M-Learning

M-learning (M-learning) is a form of learning enabled by mobile and wireless communication technologies. It originates from a key principle in distance education research: the success of distance education lies not in the inherent instructional suitability of technology itself, but in its widespread accessibility of the general public. M-learning refers to a learning approach that utilizes wireless communication networks and mobile communication devices (such as smartphones, tablets, and personal digital assistants) to access educational information, resources, and services. As illustrated in Fig. 1, M-Learning exhibits several distinctive characteristics.

Compared with traditional learning modes, it offers advantages including convenience, individualized teaching, immediacy, portability, non-linearity, mobility, rich interactivity, and contextual relevance.

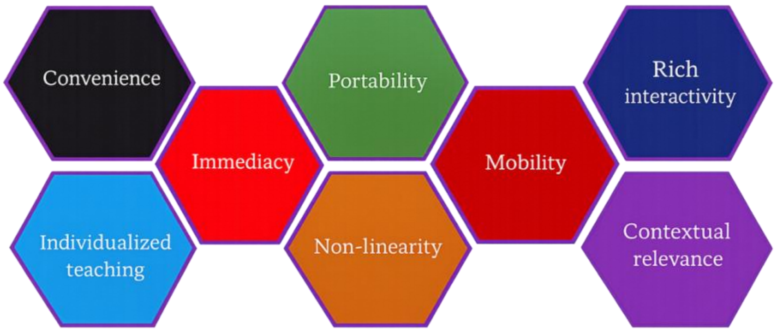

Figure 1. Characteristics of M-learning

2.1.2. TVET Area

Technical and Vocational Education and Training (TVET) refers to an education and training system aimed at developing learners' practical skills, technical knowledge, and employability for specific occupations. It typically includes both pre-service education and in-service training, forming a continuous and integrated process of vocational development.

Within this context, vocational teacher education plays a crucial role and generally includes three phases: pre-service preparation, induction, and ongoing professional development. These stages are relatively independent yet interconnected, reflecting the principle of lifelong learning and the continuous nature of teachers' professional development.

2.2. WeChat-based Mobile Learning Strategies for Improving Spoken English

WeChat provides a platform for mobile learning, and its basic functions support diverse forms of communication and interaction, as illustrated in Figure 2. It enables both one-to-one and group-based voice communication, allowing real-time interaction among multiple users. In addition, WeChat supports the sharing of multimedia content, including voice messages, text, images, and videos. Furthermore, features such as Moments and learning materials push facilitate the dissemination of learning-related content, enabling users to share and access English learning material within their social networks. The WeChat Official Accounts allow users to subscribe to educational content by scanning QR codes, thereby expanding access to structured learning sources. These integrated functionalities create a flexible and interactive environment that supports the development of spoken English skills within an M-learning context.

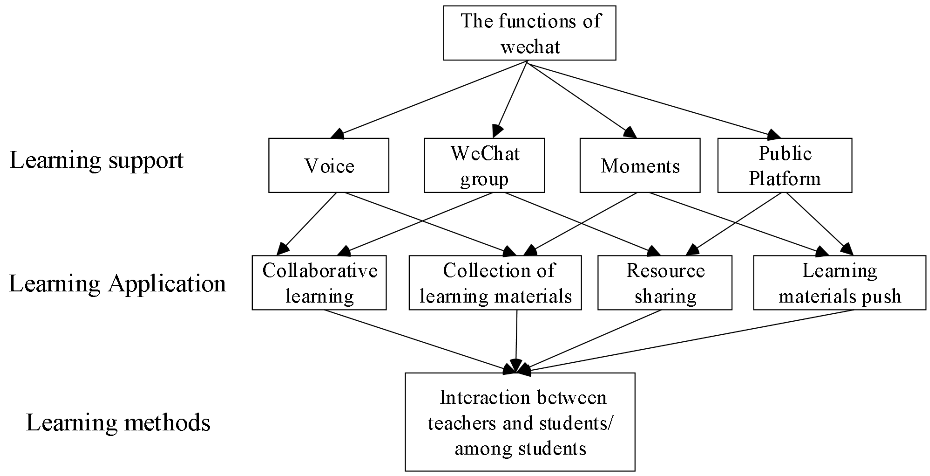

Figure 2. Support functions for mobile learning based on WeChat

2.2.1. Application of WeChat Voice

Difficult language input may frustrate students' confidence and motivation, whereas overly simple input may lead to complacency. Therefore, in order to improve spoken English, it is necessary to match learning materials with students' actual proficiency levels, which is a step-by-step gradual progression from simple to more complex tasks.

WeChat voice functions enable multimodal input and output, engaging mutiple senses and thereby enhancing learners' interest and participation. Through structured and level-appropriate voice-based activities, students can develop their oral English proficiency and improve learning efficiency.

2.2.2. Application of WeChat Groups

WeChat groups provide an interactive platform for students to practice speaking on their own, and WeChat-based interactive English speaking mobile learning is shown in Figure 3. Teachers can post topics of greater interest to their classmates in the form of questions or pictures through WeChat groups for students to participate in communication and discussion, and students can also provide feedback to teachers on a group basis. Teachers can send their own insights through WeChat to guide students to learn speaking easily, inadvertently improving students' speaking, enhancing the relationship between teachers and students, and forming a teacher-student communication circle of oral English communication under the WeChat-based network platform. After a period of time, students can review and make a summary of their pronunciation, grammatical errors to help them achieve speaking fluency. In this way, WeChat group sharing records the whole process of learners' oral communication. Through WeChat's mobile learning, students take the initiative to establish a second classroom, making learning a habitual motivation.

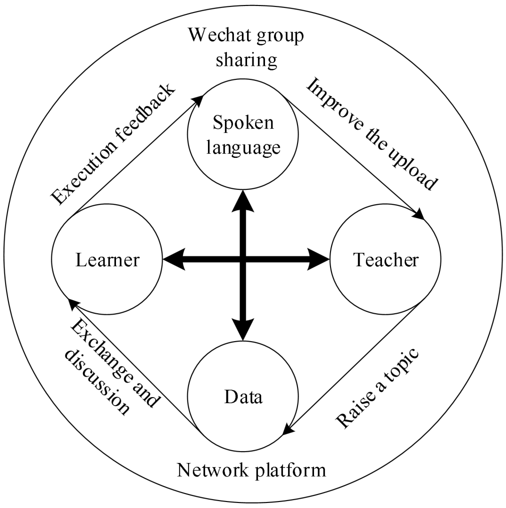

Figure 3. Interactive mobile learning of spoken English based on wechat

2.2.3. Mobile Learning Application Design for WeChat Public Platform

Based on the functions of the WeChat platform, the design of the mobile learning application of the WeChat public platform is shown in Figure 4. Focusing on the public number of English speaking learning, the public number of the support class, etc., can realize voice-text interaction, subscription push, automatic reply. WeChat public platform with a variety of content push services, according to the Tencent official WeChat website on the education statistics, the use of public accounts for English speaking services, there are 134 platforms. Examples include the BEC English Speaking WeChat public platform, English Speaking Bar, and many other English speaking learning platforms. Teachers can create a college public number and any student can join this platform. The learning of English is not limited to the classroom, but can happen everywhere, introduce WeChat into the classroom, use WeChat to have a good microclass, and also establish a WeChat English speaking contest on the WeChat public platform, which will enable students to practice spoken English in an entertaining way.

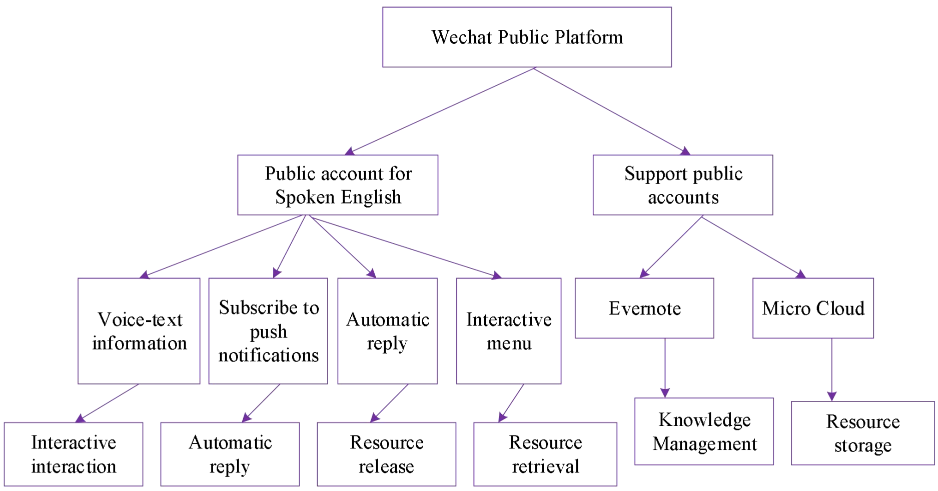

Figure 4. The design of mobile learning applications for the WeChat Public Platform

3. Systematic Evaluation Program on the Effectiveness of Strategy Implementation

3.1. Objects and Processes of Strategy Implementation

3.1.1. Objects of Strategy Implementation

To evaluate the effectiveness of oral communication strategies in the TVET field under an

M-learning environment, this study selected first-year English major students from H University as the target subjects. First-year students are typically characterized by strong curiosity and a desire for exploration of new learning approaches. They have already been exposed to English oral communication in their daily lives, but they lack the ability to apply the knowledge of English oral communication to real life. By leveraging students' active learning attitudes, thinking and eagerness to try new technologies, integrating M-learning and TVET into oral communication is beneficial for stimulating their imagination and creativity. Based on these considerations, this study selected one English major class as the experimental group for implementing their proposed strategy. All instruction was delivered by the same English teacher to ensure consistency, and the effectiveness of the strategy was systematically observed and evaluated.

3.1.2. Strategy Implementation Process

Teachers serve as the designers, facilitators and evaluators of the learning process, and they provide scaffolding to students at all stages of throughout the instructional workflow. Teachers deliver targeted interventions across pre-class, in-class, and post-class phrases and can effectively improve students' extrinsic and intrinsic motivation for speaking. The implementation of timely remediation for specific learning gaps not only encourages the students' motivation, but also make the collaborative teacher-student relationship closer. Through the oral communication strategy in the TVET M-learning environment, students are empowered to asynchronous and synchronous interactive activities and group discussions without time and space constraints. The students are encouraged to make use of the authentic interpersonal communication with peers in a natural way. Peer assessment mechanisms enable teachers to possess multi-dimensional and more objective evaluation data and further enhance student' motivation in oral communication.

3.2. Assessment Models

3.2.1. Evaluation of the Indicator System

The evaluation framework incorporates four primary dimensions—Awareness, Recognition, Execution degree, and Degree of benefit—as the first-level indicators to assess the effectiveness of the proposed strategies. These dimensions (labeld A through D) correspond to the cognitive and behavioral stages of strategy implementation. The secondary indicators were refined and supplemented by aligning the specific objectives of strategy implementation with established criteria from evaluation theories. Each primary dimension is operationalized through four granular secondary indicators, totaling 16 metrics (A1-D4). For instance, Awareness (A) evaluates the students' conceptual understanding, while Executive degree (C) assesses the practical application and cooperation during the M-learning tasks. Degree of benefit (D) serves as the ultimate outcome measure, focusing on students' professional growth and communicative proficiency. Follwoing a systematic process of categorization and theoretical alignment, the finalized hierarchical structure of the evaluation index system is shown in Table 1.

Table 1. Evaluation index system

First-level indicators	Symbol	Secondary indicators	Symbol
Awareness	A	Awareness of the strategy name	A1
		Understanding of the strategy content	A2
		The scope of benefits of the strategy	A3
		The comprehensibility within the strategy	A4
Recognition	B	The feasibility of the strategy	B1
		The continuity of strategy content	B2
		The fairness of the strategy	B3
		Satisfaction with the strategy	B4
Execution degree	C	The capabilities of strategy execution personnel	C1
		The feasibility of strategy implementation	C2
		The degree of cooperation of the strategic target group	C3
		The coordination of the strategic target group	C4
Degree of benefit	D	Comprehensive quality of students	D1
		Students' professional knowledge and skills	D2
		Student social status	D3
		Students' oral communication skills	D4

3.2.2. Calculation of Subjective Weights

The Analytical Hierarchy Process (AHP) is a systematic decision-making method that integrates qualitative judgement and quantitative evaluation by decomposing complex problems into a hierarchical structure of three layers, namely, goal layer, criteria layer and alternative layer.

(1) Scale Definition and Judgment Matrix Construction

In this study, the Saaty 1-9 scale is employed to conduct pairwise comparisons between indicators at each level. This scale, along with its reciprocals, quantifies the relative importance of one indicator over another. The specific definitions of these scales are shown in Table 2.

To construct the judgment matrix, a panel of experts was invited to perform pairwise comparisons for all indicators within the same hierarchy. This process transforms subjetive expert opinions into a structured numerical matrix, providing a foundation for the calculation of weight coefficients.

Table 2. Satty's 1-9 Scale of Pairwise comparisons

Scale value	Definition	Meaning
1	Equal importance	Two factors contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one factor over another.
5	Strong importance	Experience and judgment strongly favor one factor over another.
7	Very strong importance	A factor is favored very strongly over another; its dominace is demonstrated in practice.
9	Extreme importance	The evidence favoring one factor over another is of the highest possible order of affirmation.
2, 4, 6, 8	Intermediate values	Used when a compromise between the above judgments is needed. For example, a value of 2 is between equal and moderate importance.

(2) Hierarchical single ranking

Hierarchical ordering involves determining the relative weights of the evaluation indicators at each level and conducting consistency tests. In this process, experts compare the criterion level indicators with each other's scores to generate a judgment matrix of criterion level indicators for the target level.

The weights of each criterion level indicator are first calculated in three steps.

In the first step, the judgment matrix is normalized by columns to obtain the criterion judgment matrix:

$$\overline{b}_{ij} = \frac{a_{ij}}{\sum_{k=1}^{n} a_{kj}} \tag{1}$$

In the second step, the resulting standard judgment matrix is summed by rows:

$$\overline{W}_i = \sum_{j=1}^{n} \overline{b}_{ij} \tag{2}$$

In the third step, the sum of each row of the standard judgment matrix is normalized to obtain the weights of each indicator:

$$W_i = \frac{\overline{W}_i}{\sum_{j=1}^{n} \overline{W}_i} \tag{3}$$

This judgment matrix is then tested for consistency, again divided into three steps.

The first step is to calculate the consistency index CI, which is calculated by the following formula:

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{4}$$

where n represents the number of indicators and $\lambda_{\max}$ denotes the maximum eigenvalue of this judgment matrix, calculated as follows:

$$\lambda_{\max} = \sum_{i=1}^{n} \frac{\sum_{j=1}^{n} a_{ij} W_i}{n W_i} \tag{5}$$

The second step is to find the random consistency indicator RI. The standard value of the random consistency indicator RI is obtained by looking up the table. The standard value of the random consistency indicator RI is shown in Table 3.

Table 3. Standard Value of Random Index (RI) for Consistency Measurement

n	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46

Since the criterion level indicator relative to the target level judgment matrix is a 5th order matrix, therefore, in this judgment matrix, $RI = 1.12$.

In the third step, the consistency ratio CR is calculated.The formula for the consistency ratio CR is as follows:

$$CR = \frac{CI}{RI} \tag{6}$$

If the value of CR is less than 0.1, it means that this judgment matrix passes the consistency test. Find in this judgment matrix, $CR = 0.0274$, less than 0.1, through the consistency test.

By analogy, the relative weights of the indicators and the consistency test results of the indicator level are obtained.

(3) Hierarchical total sorting

By combining the relative weights of the indicators at each indicator level with the weights of the indicators at the corresponding guideline level, the comprehensive weights of the indicators at the indicator level for the highest level (total goal) are calculated.

3.2.3. Calculation of Objective Weights

(1) Data normalization

Given that all indicator data are derived from expert ratings, there is no inconsistency in the scale, so the step of data normalization can be omitted. The following formula is directly applied to normalize the raw data:

$$p_{ij} = \frac{Y_{ij}}{\sum_{i=1}^{n} Y_{ij}} \tag{7}$$

Note: Y_{ij} is the original data of the indicator and p_{ij} is the normalized data.

(2) Solve for the information entropy value of each indicator:

$$E_j = -\frac{1}{\ln(n)} \sum_{i=1}^{n} p_{ij} \ln p_{ij} \tag{8}$$

Note: n is the number of evaluation objects and E_j is the information entropy value of the indicator.

(3) Calculate the weight of each indicator

According to the calculated information entropy value to find the coefficient of variation of each indicator:

$$g_j = 1 - E_j \tag{9}$$

Note: g_j is the coefficient of variation;

Then find the indicator weights, which are calculated by the following formula:

$$W_j = \frac{g_j}{\sum_{j=1}^{m} g_j} \tag{10}$$

Note: m is the number of indicators and W_j is the j th indicator weight.

3.2.4. Determination of Portfolio Weights

In accordance with the principle of linear combination, the results of entropy weighting method and hierarchical analysis method are integrated to implement the comprehensive weight allocation for each indicator, and the specific calculation formula is as follows:

$$W_j = \alpha W_j^1 + (1-\alpha) W_j^2 \tag{11}$$

Note: W_j^1 denotes the weight of each indicator in the guideline layer obtained by the entropy weight method, W_j^2 denotes the weight of each indicator obtained by the hierarchical analysis method, and W_j is the combination weight. In the framework of this study, entropy weight method and hierarchical analysis method are given equal importance, so their weight coefficients are set to 0.5. The combined weight of each guideline layer indicator is derived by the accumulation of the combined weights of the indicators in the corresponding indicator layer.

3.2.5. Mathematical Modeling

(1) Constructing the evaluation level cloud scale

Five evaluation grades are set as the rubrics for evaluating the implementation effectiveness of oral communication strategies in the TVET domain under the M-learning environment, specifically, poor, poor, fair, good and excellent, and the corresponding range of values of the corresponding thesis domains are [0,25], [25,50], [50,75], [75,90], and [90,100], respectively. According to the value range of each evaluation level, the data are converted to the corresponding cloud numerical feature parameters, which are expected value Ex, entropy En and hyperentropy He, through the formulas as follows:

$$\begin{aligned} E_x &= \left(V_{\max} + V_{\min}\right)/2 \\ E_n &= \left(V_{\max} - V_{\min}\right)/6 \\ H_e &= k \end{aligned} \tag{12}$$

Note: k is a constant and the superentropy He is generally taken as 0.1.

(2) Determine the evaluation cloud of indicator layer indicators

Based on the evaluation indicator cloud scale constructed above, after obtaining the experts' scores on the evaluation indicators, it is transformed into three cloud digital eigenvalues of the cloud model according to the inverse cloud generator, and the calculation formula is shown below:

a) Calculate the sample expectation value:

$$Ex = \overline{X} = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{13}$$

Note: x_i is the score of each expert and Ex is the sample expectation.

b) Calculate the sample variance:

$$S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \overline{X}) \tag{14}$$

Note: S^2 is the sample variance.

c) Calculate the entropy of the cloud droplet:

$$En = \sqrt{\frac{\pi}{2}} \times \frac{1}{n}\sum_{i=1}^{n}\left|x_i - Ex\right| \tag{15}$$

Note: En is the entropy of the cloud droplet.

d) Calculate the superentropy of the cloud droplet:

$$He = \sqrt{\left|S^2 - En^2\right|} \tag{16}$$

Note: He is the superentropy of cloud droplets.

(3) Determine the evaluation cloud of guideline layer indicators

On the basis of calculating the cloud digital eigenvalue of the indicator layer indicators obtained, the cloud digital eigenvalue of each criterion layer indicator is calculated in turn based on the following formula:

$$\begin{cases} Ex = \frac{W_1}{W_1 + W_2 + \cdots + W_n} Ex_1 + \frac{W_1}{W_1 + W_2 + \cdots + W_n} Ex_2 \\ \quad + \cdots + \frac{W_1}{W_1 + W_2 + \cdots + W_n} Ex_n \\ En = \frac{W_1^2}{W_1^2 + W_2^2 + \cdots + W_n^2} En_1 + \frac{W_1^2}{W_1^2 + W_2^2 + \cdots + W_n^2} En_2 \\ \quad + \cdots + \frac{W_1^2}{W_1^2 + W_2^2 + \cdots + W_n^2} En_n \\ He = \frac{W_1^2}{W_1^2 + W_2^2 + \cdots + W_n^2} He_1 + \frac{W_1^2}{W_1^2 + W_2^2 + \cdots + W_n^2} He_2 \\ \quad + \cdots + \frac{W_1^2}{W_1^2 + W_2^2 + \cdots + W_n^2} He_n \end{cases} \tag{17}$$

The cloud digital eigenvalues of the guideline layer indicators are sequentially input into a forward cloud generator, programmed in MATLAB. This generated evaluation cloud diagrams for each indicator. We plotted each diagram on its corresponding cloud scale for visual comparison.

4. Empirical Studies

4.1. Calculation of Weights

4.1.1. Subjective Weighting Results

(1) Clarify the problem and establish a structural diagram using the Analytical Hierarchy Process (AHP). The purpose of using the APH method is to assess the evaluation indicators of oral communication strategies in the TVET M-learning environment, setting the awareness indicators, recognition indicators, implementation indicators, and benefit indicators as the guideline layer, and setting the specific indicators contained in each major category as the second layer.

(2) Construction of the Pairwise Comparison Matrix. This study utilized a structured weighting questionnaire to enhance the objectivity and scientific rigor of the Analytical Hierarchy Process weight determination process. On July 22, 2025, an online survey was conducted via the Wenjuanxing platform, inviting ten experts from relevant fields to evaluate the relative importance of the indicators. Respondents performed pairwise comparisons based on their professional expertise and industry knowledge. After screening, ten valid responses were obtained. To establish the consensus judgment matrix, the geometric mean of these expert ratings was calculated.

(3) Calculation of Results and Consistency Verification

We constructed initial judgment matrices following the AHP to evaluate the effectiveness of oral communication strategies in TVET mobile learning. Yaahp software recorded expert judgments by calculating the geometric mean of pairwise comparison matrices. This yielded subjective weights for each indicator and allowed consistency verification. Figure 5 presents the judgment matrices, where (a)-(e) show the overall indicators and indicators A-D respectively. Table 4 summarized the computed weights at both first and secondary layers.

All judgment matrices passed the consistency test (CR<0.1), confirming acceptable consistency. Table 4 shows that degree of benefit (D) carries the greatest weight among primary indicators (0.3738). Secondary indicator weights appear in the same table.

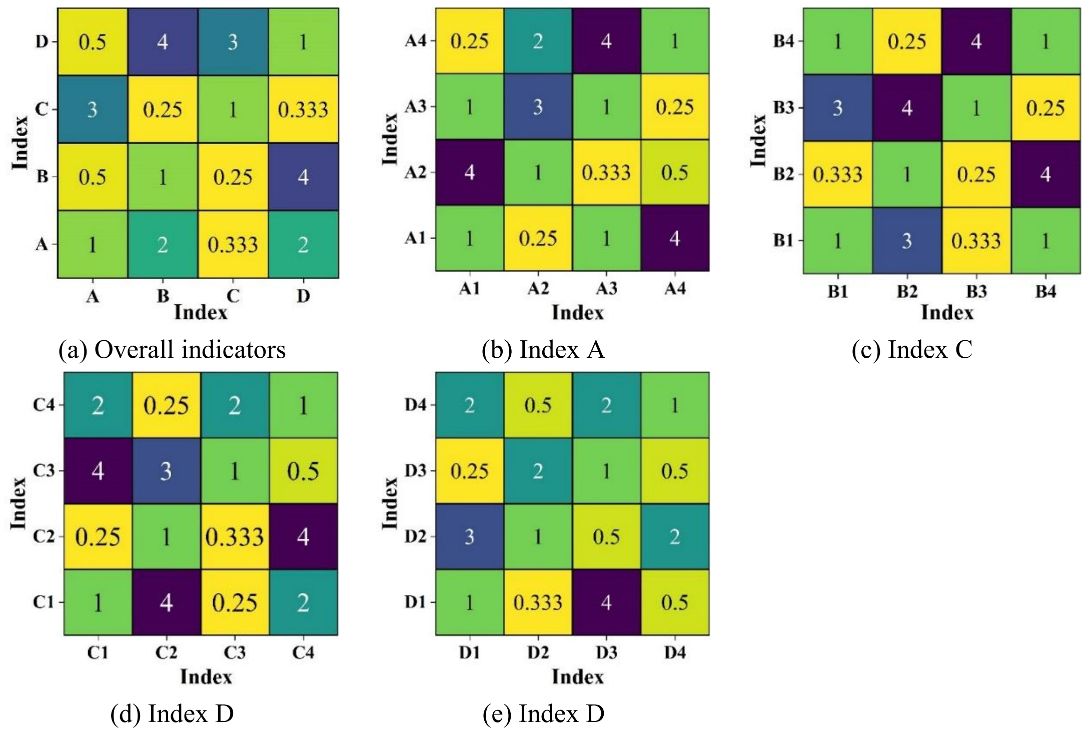

Figure 5. Judgment matrix

Table 4. Subjective weight result

First-level indicators	Weight	Secondary indicators	Weight
A	0.2566	A1	0.0638
		A2	0.0576
		A3	0.0594
		A4	0.0759
B	0.2008	B1	0.0493
		B2	0.0374
		B3	0.0648
		B4	0.0493
C	0.1688	C1	0.0445
		C2	0.0284
		C3	0.0585
		C4	0.0374
D	0.3738	D1	0.0820
		D2	0.1195
		D3	0.0642
		D4	0.1080

4.1.2. Objective Weighting Results

As with the AHP method, 10 questionnaires were distributed to the research experts, totaling 10 questionnaires, and the valid questionnaires totaled 10, so that these 10 survey respondents scored each of the 16 secondary indicators according to the degree of importance of the indicators from 1 to 9, and then the entropy weights of the indicators were evaluated according to the returned questionnaires, and then calculated with the software MATLAB, and the results of the objective weights are shown in Table 5. Combined with the data performance in the table, it can be seen that students' comprehensive quality (D1), students' professional knowledge and skills (D2), students' social status (D3), and students' oral communication ability (D4) have a more obvious influence on the implementation effectiveness of oral communication strategies in TVET domain under M-learning environment, and their objective weight values are 0.0862, 0.0795, 0.0843, and 0.0786.

Table 5. Objective weight result

Secondary indicators	Entropy value	Coefficient of difference	Weight
A1	0.9997	0.0003	0.0028
A2	0.9951	0.0049	0.0464
A3	0.9924	0.0076	0.0720
A4	0.9948	0.0052	0.0492
B1	0.9927	0.0073	0.0691
B2	0.9939	0.0061	0.0578
B3	0.9929	0.0071	0.0672
B4	0.9921	0.0079	0.0748
C1	0.9918	0.0082	0.0777
C2	0.9973	0.0027	0.0256
C3	0.9919	0.0081	0.0767
C4	0.9945	0.0055	0.0521
D1	0.9909	0.0091	0.0862
D2	0.9916	0.0084	0.0795
D3	0.9911	0.0089	0.0843
D4	0.9917	0.0083	0.0786

4.1.3. Combined Weighting Results

By integrating the subjective weights obtained from the Analytical Hierarchy Process (AHP) with the objective weights calculated via the Entropy Weight Method (as shown in Table 5), the final combined wights for evaluation index system were determined. The specific weighting results, summarized in Table 6, provide a basis for evaluating the implementation effectiveness of oral communication strategies.

The data indicates that among the secondary indicators, Students' Comprehensive Quality (D1) exerts the most significant influence, with an objective weight of 0.0862. This is closely followed by Students Social Status (D3, 0.0843) and Professional Knowledge and Skills (D2, 0.0795). These findings suggest that while technical skills are essential, the overall multifaceted quality of students plays a more decisive role in the successful implementation of communication strategies within the TVET M-learning environment. These combined weights provide essential empirical support for the subsequent comprehensive cloud model analysis.

Table 6. Combined weight result

Secondary indicators	AHP	Entropy weight	Combined weight
A1	0.0638	0.0028	0.0333
A2	0.0576	0.0464	0.0520
A3	0.0594	0.0720	0.0657
A4	0.0759	0.0492	0.0626
B1	0.0493	0.0691	0.0592
B2	0.0374	0.0578	0.0476
B3	0.0648	0.0672	0.0660
B4	0.0493	0.0748	0.0621
C1	0.0445	0.0777	0.0611
C2	0.0284	0.0256	0.0270
C3	0.0585	0.0767	0.0676
C4	0.0374	0.0521	0.0448
D1	0.0820	0.0862	0.0841
D2	0.1195	0.0795	0.0995
D3	0.0642	0.0843	0.0743
D4	0.1080	0.0786	0.0933

4.2. Evaluation and Analysis of Strategy Implementation Effectiveness

4.2.1. Definition of the Evaluation Rubric and Cloud Model Parameterization

By conducting expert consultations and considering language expression conventions, this study adopts five linguistic levels of "bad", "poor", "average", "good", and "excellent" to describe the evaluation outcomes. The corresponding score range is set within [0, 100], with higher scores indicating better performance. A corresponding evaluation scale is thus established. Scores in [0, 25) represent a "bad" level of implementation, [25, 50) indicate "poor", [50, 75) indicate "average", [75, 90) indicate "good", and [90, 100] indicate "excellent". Based on this evaluation set, the parameters of the cloud model are derived through a forward cloud generator, thereby constructing the evaluation standard cloud model. The standard model serves as a reference scale in the evaluation process. After quantifying the implementation effectiveness of the oral communication strategies in the TVET field under the M-learning environment, the obtained score can be compared with the standard cloud model to determine the corresponding evaluation grade. The characteristic parameters of the standard cloud models are shown in Table 7.

Table 7. Evaluation standard grade classification and corresponding cloud model

Evaluation grade	Grade range	Cloud model characteristic parameters
Bad	[0.0, 25.0)	(12.25, 4.23, 0.54)
Poor	[25.0, 50.0)	(37.26, 4.23, 0.54)
Average	[50.0, 75.0)	(62.31, 4.23, 0.54)
Good	[75.0, 90.0)	(82.33, 4.23, 0.54)
Excellent	[90.0, 100.0]	(94.71, 4.23, 0.54)

4.2.2. Calculation of Evaluation Indicator Clouds and Synthesis Clouds

In this paper, an expert scoring table was designed, and experts were invited to evaluate each indicator using a score system with a maximum of 100 points. The scores given to each indicator represent the relative effectiveness of the implementation. The evaluation matrix is constructed according to the scores in the returned questionnaires, and the numerical features of the cloud model for each indicator were calculated by the inverse cloud generator, and the comprehensive evaluation cloud of the implementation effect of oral communication strategy in TVET domain under M-learning environment was obtained. The evaluation matrix is shown in Table 8, and the comprehensive evaluation cloud is presented in Figure 6.

By substituting the comprehensive weight W and the indicator cloud $C_j\left(Ex_j, En_j, He_j\right)$ into the calculation formula, the comprehensive evaluation cloud for the oral communication strategies in the TVET M-learning environment was determined as (79.27, 3.29, 1.82). Subsequently, the evaluation cloud graph was generated through MATLAB based on these characteristic parameters. This established cloud was then compared against the standard benchmark clouds to identify the highest degree of similarity..After comparing the similarity values, it can be concluded that the evaluation comprehensive cloud lies between the grades "average" and "good". The "good" grade, represented by Cloud 4 (80.5, 2.5, 0.5), is closest to the calculated comprehensive cloud (79.27, 3.29, 1.82). Therefore, it can be determined that the final implementation effectiveness of oral communication strategies in the TVET M-learning environment is rated as "good". These evaluation results are consistent with the empirical observations of the project, indicating that the proposed oral communication strategies demonstrate strong practical effectiveness.

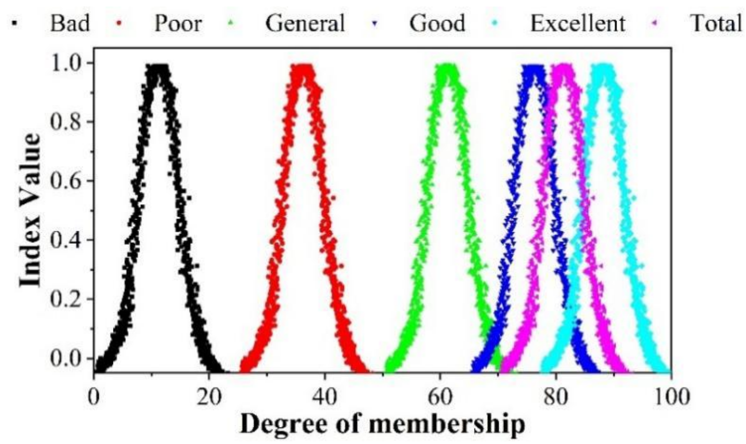

Figure 6. Comprehensive evaluation cloud map

Table 8. Summary of Index Evaluation

Index	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	C_j
A1	86	88	81	81	62	67	70	69	75	69	(76.05,2.46,1.05)
A2	76	77	62	75	70	85	77	75	60	67	(72.23,3.37,0.89)
A3	70	69	84	63	65	61	66	72	72	77	(74.82,3.58,1.08)
A4	70	75	62	72	87	88	63	62	82	68	(67.38,2.26,0.37)
B1	83	62	64	75	85	69	72	79	82	72	(66.33,4.38,0.32)
B2	89	68	63	71	66	89	70	65	80	85	(73.62,2.38,0.88)
B3	80	79	65	83	79	61	62	72	65	76	(70.35,2.26,0.22)
B4	87	68	68	79	89	70	85	87	73	66	(70.44,2.26,0.37)
C1	84	66	80	78	60	67	70	76	71	79	(74.33,2.26,1.05)
C2	63	90	61	88	78	67	84	80	65	84	(72.61,2.13,1.21)
C3	63	76	81	82	85	68	79	73	61	65	(71.37,1.92,1.02)
C4	77	89	70	84	89	71	85	85	87	60	(73.24,1.37,1.14)
D1	85	77	81	83	82	72	65	90	78	60	(75.37,2.34,0.75)
D2	74	82	85	70	86	85	87	66	80	70	(76.72,1.99,0.46)
D3	78	73	78	81	89	73	86	80	85	80	(74.33,3.56,0.66)
D4	73	75	82	67	71	77	78	69	88	81	(78.25,2.38,0.38)

5. Conclusion

In this study, WeChat was used as the main mobile learning platform within the TVET and M-learning context to propose three strategies for developing students' oral technical communication competence and construct a comprehensive evaluation model by integrating the Analytical Hierarchy Process (AHP), Entropy Weighting Method (EWM), and cloud model. Synthesizing relevant research data, the model was used to evaluate and analyze the implementation effect of students' oral technical communication competence development strategies. Its research results are shown below:

First, among the secondary indicators, students' comprehensive quality (D1), professional knowledge and skills (D2), social status (D3), and oral communication ability (D4) exert prominent influence on the implementation effectiveness of the oral communication strategies, with weights of 0.0862, 0.0795, 0.0843, and 0.0786, respectively. These findings not only highlight the critical impact of these dimensions on pedagogical outcomes but also provide a theoretical foundation for the subsequent comprehensive assessment and analysis.

Second, by integrating the indicator weights with the corresponding cloud models, the comprehensive cloud for evaluating the overall implementation effectiveness was calculated as (79.27, 3.29, 1.82). This result falls between "average" and "good" grades and is closest to the sandard cloud parameters of the "good" grade (80.5, 2.5, 0.5). Consequently, the study indicates that the oral communication strategies implemented in the TVET M-learning environment have a practical effect. Further research could explore to validate the model's effectiveness through larger-scale empirical studies or its applicability across different vocational and cultural contexts.

References

1. Sönmez, A., Göçmez, L., Uygun, D., & Ataizi, M. (2018). A review of current studies of mobile learning. Journal of Educational Technology and Online Learning, 1(1), 12-27.
2. Torres Diaz, J. C., Infante Moro, A., & Torres Carrión, P. V. (2015). Mobile learning: perspectives. International Journal of Educational Technology in Higher Education, 12(1), 38-49.
3. Ansarin, A. A., Farrokhi, F., Mahboudi, H. R., & Jam, Z. A. (2017). Attitudes towards smart phones and tablets. International Journal of Applied Linguistics & English Literature, 6(5), 66.
4. Lang, V., & Šorgo, A. (2023). Recognition of the perceived benefits of smartphones and tablets and their influence on the quality of learning outcomes by students in lower secondary biology classes. Applied Sciences, 13(6), 3379.
5. López, F., Contreras, M., Nussbaum, M., Paredes, R., Gelerstein, D., Alvares, D., & Chiuminatto, P. (2023). Developing critical thinking in technical and vocational education and training. Education Sciences, 13(6), 590.

6. Greculescu, A., Todorescu, L. L., Popescu-Mitroi, M. M., & Fekete, A. C. (2014). Oral communication competence and higher technical engineering. Procedia-Social and Behavioral Sciences, 128, 169-174.
7. Palos, R., & Petrovici, M. C. (2014). Perceived importance of communication skills and their predictive value for academic performance. Revista de Cercetare si Interventie Sociala, 46, 85.
8. Saxena, S., Rastogi, P., Gupta, S. S., & Nesamony, S. R. (2022). Role of Communication Skills: A Review. World Journal of English Language, 12(3), 18.
9. Choren, A. (2015). The importance of communication in the workplace. IEEE Potentials, 34(3), 10-11.
10. Wahid, R., Halim, S., & Halim, T. (2024). Positive communication skills in the workplace. Migration Letters, 21(S8), 59-70.
11. Costigan, R. D., & Brink, K. E. (2020). Developing listening and oral expression skills: Pillars of influential oral communication. Journal of Management Education, 44(2), 129-164.
12. Taillefer, L., & Munoz-Luna, R. (2014). Developing oral skills through Skype: A language project analysis. Procedia-social and behavioral sciences, 141, 260-264.
13. Pinto, F. B., & Tyulkina, S. (2025). Oral communication skills discourse and higher education pedagogy: The underexplored role of students’ spoken language in the global law classroom. European Journal of Legal Education, 6(1), 79-100.
14. Hsu, K. C., & Liu, G. Z. (2023). A systematic review of mobile-assisted oral communication development from selected papers published between 2010 and 2019. Interactive Learning Environments, 31(6), 3851-3867.
15. Asiimwe, E., & Hatakka, M. (2017). Practices and challenges in an emerging m-learning environment. International Journal of Education and Development using ICT, 13(1).
16. Ironsi, C. S., & Bensen Bostancı, H. (2023). Utilizing mobile-learning and CAP (E) lesson framework in improving the productive skills of learners in a hybrid environment. Education+ Training, 65(2), 232-252.
17. Chaya, P., & Inpin, B. (2020). Effects of Integrating Movie-Based Mobile Learning Instruction for Enhancing Thai University Students' Speaking Skills and Intercultural Communicative Competence. English Language Teaching, 13(7), 27-45.