Application of New Media Technology in Safety Warning Education to Reduce the Incidence of Unsafe Behaviors Based on Pearson Correlation Coefficient

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Abstract: With the popularization of the Internet, big data analysis has been widely applied to today's education. In the study, the correlation between the incidence of unsafe behavior and the usage of new media in warning education were evaluated, by retrieving big data from the large-scale new employee training of Enterprise S for Pearson Correlation Coefficient analysis. Based on the correlation analysis, the "Three New" model of new media safety education was constructed and implemented to arouse trainees' active participation in warning education and raise their alert coverage of the consequences of unsafe behavior. The study shows that making full use of new media technology to carry out safety education effectively reduces the incidence of unsafe behavior.

1 INTRODUCTION

To promote the strategy of "cultivating talents to strengthen the enterprise" in the new era, most large enterprises conduct comprehensive centralized training for new employees (Su, 2010). On the whole, new employees are active in thinking but poor in safety awareness, and some of them are even "safety illiterate" (Zhang, 2004). Then the process of new employee training is dotted with trainees' unsafe behaviors in violation of training disciplines, healthy lifestyle, or ethical principles with potential risks, such as alcohol drinking, staying up late or making inappropriate remarks on the Internet. Some of these even lead to sudden illness, negative network public opinion or other safety incidents, seriously affecting the training's stability and the new employees' healthy growth.

As an indicator of unsafe behavior density proportional to safety incidents, the incidence of unsafe behavior refers to the ratio between the number of unsafe behaviors and the total number of trainees within a specific training period. With the purpose of improving the safety literacy of new employees, Enterprise S, a large state-owned enterprise in China, put forward the requirement to reduce the incidence of unsafe behavior in the new-employee training to less than 2%，referring to the all-time best level. However, according to safety inspection data for the first training phase of 2021 (from January to March), the average monthly incidence of unsafe behaviors was 3.12%.

As to how to lower the incidence of unsafe behavior, comprehensive research has been conducted from the aspects of innovating safety education, perfecting a safety management system and strengthening safety behavior supervision (Zhang, 2003; Ouyang, 2019; Wang, 2020). Particularly, with the development of new media technology, much research has been carried out from the perspective of applying new media to improve safety warning education, which generally refers to safety case education by warning people against conducting unsafe behavior with the punishment consequences of unsafe behavior cases. As Li Yina pointed out, new media which appear in people's cognitive world through video, animation and other forms, is of great significance in safety warning education (Li, 2020). Li Lu further asserted that making full use of new media platforms will maximize the effectiveness of safety warning education (Deng 2019).

From the perspective of applying new media to improve safety warning education, the study takes trainees from Enterprise S' 5 phases of new employee training classes in 2021 as research objects. Based on

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Pearson Correlation Coefficient between new media usage in warning education and the incidence of unsafe behaviors, the “Three New" model of warning education was constructed and implemented by updating the new media courseware covering unsafe behavior cases related to new-employee training, building the new media platform for warning education based on mobile Internet, and constructing the long-term new media mechanism warning education. The implementation results of the "Three New" model of warning education show that making full use of new media to enhance the effect of warning education successfully lowers the incidence of unsafe behavior in new employ training.

2 CORRELATIONAL ANALYSIS BETWEEN THE NEW MEDIA USAGE IN WARNING EDUCATION AND THE INCIDENCE OF UNSAFE BEHAVIOR

Data about the new media usage in warning education and the incidence of unsafe behavior were obtained through questionnaire surveys and interviews, and their correlation was analyzed based on Pearson Correlation Coefficient.

2.1 Investigation Into the Causes of Trainees' Unsafe Behavior

An online questionnaire was designed to investigate the causes of unsafe behaviors among 176 trainees who conducted unsafe behaviors in the second phase of 2021 training. According to the result, 68% of them were not aware of the consequences of unsafe behavior. Then, 50 of them were randomly selected for interviews about their participation in warning education. 86.7% of them stated that they were not impressed by the warning education. They stated the reason as follows: currently, the warning education is primarily the speech statement of the head teacher, which cannot attract their attention. On the contrary, they are more willing to embrace the new media-based interactive education model. Based on the investigation, it can be concluded that compared with the expectations of the trainees, new media usage in warning education is not sufficient.

2.2 Investigation Into the New Media Usage in Warning Education

In this research, the new media usage refers to the ratio between the actual numbers of new media elements utilized and the numbers that can be used in warning education, including the numbers of new media courseware forms, new media platforms, new media tweets, etc.. According to data from warning education, the overall new media usage in warning education for the first phase of training is summarized as follows.

As shown Table 1, the average new media usage in general warning education is 33%, which implies big space for increasing new media usage in warning education.

2.3 Correlation Analysis of The New Media Usage in Warning Education and The Incidence of Trainees' Unsafe Behavior

To further analyze the correlation between new media usage in warning education and the incidence of trainees’ unsafe behavior, we took 93 new staff training classes as samples, and counted new media usage and unsafe behavior incidence for each class.

Table 1: Statistical table of new media usage in safety warning education (Original).

Items	Capable Use	Actual use	Usage	Average Usage
Forms of new media courseware	3	1	33%	33%
Types of unsafe behavior covered	12	4	33%	
New media platforms	4	1	25%	
New media tweets	8	4	50%	
New media-based activities	8	2	25%	

2.3.1 Statistics of The New Media Usage in Warning Education, Trainees' Active Participation and Trainees' Alert Coverage of Unsafe Behaviors Types

Based on work records, we first counted the different new media usages in warning education in all class, which were divided into 13 grades, ranging from 28 to 78%. By referring to the class work records, we computed trainees' active participation by "number of active participants/number of all trainees " for each class. Last, with the following question: "Among the following unsafe behaviors, please select the types that you think are likely to cause a security incident", we conducted a survey among trainees to compute trainees' alert coverage of unsafe behaviors. The results are shown in the following table.

As shown in Table 2, trainees' active participation and alert coverage of unsafe behavior types are positively correlated to the new media usage in warning education.

2.3.2 Correlation Coefficient Between New Media Usage in Warning Education and the Incidence of Unsafe Behavior

Combined with the safety inspection data, we counted the average incidence of unsafe behavior. Pearson Correlation Coefficient Calculator was used to calculate the correlation coefficient between the new media usage in warning education and the incidence of trainees' unsafe behavior for each group, as shown in Fig.1.

Referring to *Table of Critical Values: Pearson Correlation*, when the N-2=11 and the significance

Table 2: New media usage, trainees' active participation and alert coverage (Original).

Group	Class	New Media Usage (%)	Active participation (%)	Alert coverage (%)
Group	Class1	28	19	15
	Class5		19	16
Group2	Class6	33	25	34
	Class51		26	36
…Group5	Class68	48	39	43
	Class74		38	42
…Group11	Class88	68	61	77
	Class90		62	77
…Group13	Class93	78	63	79
Average		41	39	43

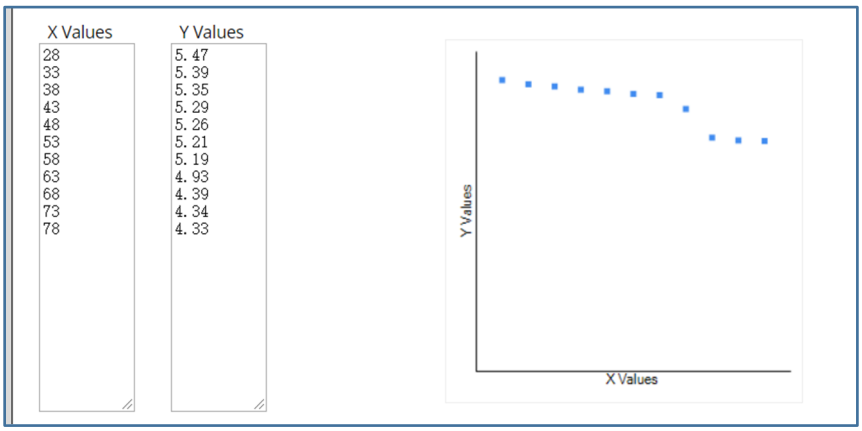

Figure 1: Correlation coefficient between the new media usage and the unsafe behavior incidence (Pearson Correlation Coefficient Calculator).

level a=0.05, |R|>0.553 indicates a strongly negative correlation of X and Y. According to Fig.1, |R| is 0.977 and R2 is 95.5%, suggesting that the new media usage in warning education is strongly, negatively correlated with unsafe behavior incidence for each group. Moreover, as shown in the XY scatter plot, the unsafe behavior incidence is no longer clearly reduced when the new media usage rises above 68%.

3 CONSTRUCTING AND IMPLEMENTING THE "THREE NEW" MODEL OF NEW MEDIA WARNING EDUCATION

Based on the above analysis, we set the goal as new media usage above 70%. And trainees' alert coverage of types of unsafe behavior above 80%. Guided by the new media communication theory of "experience is king" [8], we make full use of new media to conduct warning education by constructing and implementing the "Three New" model. This model consists of updating new media courseware covering unsafe behavior cases, conducting new media education activities based on the mobile Internet platform and constructing the long-term mechanism of new media warning education, with the focus on raising trainees' alert coverage of unsafe behavior types.

3.1 Updating The New Media Courseware Covering Unsafe Behavior Cases

We created and updated new media courseware which covers the main types of unsafe behaviors cases in the new staff training for warning education to arouse the trainees' high alert to the consequences of unsafe behaviors.

First, we collected typical cases of unsafe behavior during the training and dynamically added recently occurring unsafe behaviors of new type. With sensitive information removed and warning significance highlighted, we conducted a compilation of cases covering all types of major unsafe behavior in new employee training such as floating smoking, alcohol drinking, nonstandard electricity consumption, rumor spreading, staying up late, etc. With the cases as the material, we further produced new media courseware for warning education in the living way of micro video, which was presented in the weekly safety-themed class meeting to show the severe consequences of unsafe behaviors. In this way, warning education was conducted with the latest vivid cases to arouse the trainees' awareness of the consequences of unsafe behavior.

3.2 Conducting New Media Activities Based on Mobile Internet Platform

Supported by mobile Internet platform, we carried out warning education activities with the theme of "Building the foundation of safety" by combining " Everyone protects safety" lecture sharing with " Safe Campus Corridor" micro works competition.

First, we attracted more trainees to participate in the activities by investigating their expectations and issuing activity notices online. Then, the class meetings with the theme of "Everyone protects safety" were held offline and relevant tweets were posted online to involve all trainees in warning education. On this basis, trainees were organized to participate in "Safe Campus Micro Corridor" competition by creating micro works with their understanding of safety. The outstanding micro works were broadcast on mobile Internet platforms such as *Palm Academy* APP and the official Wechat account. With the widespread dissemination of micro works, we have created a new trend of warning education with multi-directional interaction based on new media.

3.3 Constructing The Long-Term Mechanism of New Media Warning Education

We built a long-term mechanism of new media warning education by compiling the operating instructions, improving the public opinion monitoring mechanism and optimizing the evaluation system.

First, we compiled the operating instructions and solidified the organization standards for new media warning education. At the same time, we established the information supervision mechanism to strengthen the detection of communication. On the one hand, we set up a team that was responsible for reviewing the warning education courseware or micro-works to ensure the safety of information release; On the other hand, we made positive responses to guide public opinions, creating a positive and healthy warning education environment. Then, we made full use of new media to optimize the evaluation system by constructing an objective assessing mechanism, smoothing interactive feedback channels and improving the education methods according to trainees' feedback so as to achieve the long-term development of warning education.

Table 3: The new media usage in unified safety warning education (Original).

Items	Capable Use	Actual use	Usage	Average Usage
Forms of new media courseware	3	3	100%	90%
Types of unsafe behavior covered	12	12	100%	
New media platforms	4	4	100%	
New media tweets	12	12	100%	
New media based activities	12	6	50%	

4 RESULTS OF CONDUCTING "THREE NEW" MODEL OF WARNING EDUCATION

The first round implementation of "Three New" model of warning education was completed at the end of August 2021. Based on safety inspection data, we calculated new media usage in warning education, trainees' active participation and the incidence of trainees' unsafe behaviors from June to August 2021 as follows.

4.1 The New Media Usage in Warning Education

We made statistics on the new media usage in unified warning education and in each class through retrieving new media data, as shown in the following tables.

Table 4: The average new media usage for each class warning education (Original).

Number	New media usage	Number of Classes	Number of all classes
1	87%	3	87
2	92%	65	
3	97%	19	
Average new media usage	(85%×3+90%×65+95%×19)÷87=90.9%		

From the above tables, it can be concluded that new media usage in unified warning education has increased to 90%, and the average new media usage in warning education of each class has reached 90.9%, which are all above the target value of 70%.

4.2 The Trainees' Alert Coverage of Unsafe Behavior Types

An online questionnaire survey was conducted among 3521 trainees, and 3389 pieces of data were obtained. According to the survey, after the implementation, trainees' alert coverage of unsafe behaviors' consequences was counted as shown in Table 5:

Table 5: Statistical table of trainees' alert coverage of unsafe behavior types (Original).

Items	Numbers		
Types of unsafe behaviors that are alerted to	11	12	13
Trainees who are alert	156	1023	2210
Average Types of unsafe behaviors that are alerted to	(156×11+1023×12+2210×13)÷3389=12.6		
Types of unsafe behaviors that exist	13		
Alert coverage of types of unsafe behaviors	12.6÷13=96.9%		

As displayed in the above table, trainees' alert coverage of types of unsafe behavior was 96.9%, which was higher than the target value of 90%.

4.3 The Incidence of Unsafe Behavior

The "Three New" Model of New media warning education ran for three months from September to November 2021. On December, 2021, according to the three months of normalized safety inspection data, we calculated the incidence of trainees' unsafe behaviors from September to November 2021 as follows:

Table 6: Trainees' incidence of unsafe behaviors from September to November 2021(Original).

Month	Number of Trainees	Number of unsafe behaviors	Incidence of unsafe behavior
September	3697	70	1.88%
October	3697	69	1.86%
November	3342	62	1.85%
Average	3579	67	1.87%

As shown in the above table, after implementing the "Three New" model, the incidence of unsafe behaviors of trainees decreased from 3.12% to 1.87%, achieving the goal of reducing the incidence of unsafe behaviors to less than 2%.

In summary, the effect examination suggests after implementing the "Three New" model of warning education, trainees' alert coverage of unsafe behavior types and the incidence of unsafe behavior conducted by trainees all achieved the target values.

5 CONCLUSION

The Three New Model of new media safety warning education has been applied to educating more than 20,000 trainees in the centralized new employee training classes by Enterprise S, leading the trainees to continuously strengthen their safety awareness and reduce their unsafe behaviors. In the long run, with the improvement of trainees' safety literacy, trainees will reduce the probability of production safety incidents caused by weak consciousness of safety at work, thereby reducing the economic losses and improving the social credibility of the enterprise.

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