

*Education Plan According to Age and Experience to Reduce  
Human Error of Construction Workers*

Sung-Hoon An, Daegu University, South Korea

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**Abstract**

In Korea, as construction projects become increasingly large and complex, many construction accidents are occurring. According to the Ministry of Employment and Labor, as of 2021, the number of accident victims in the construction industry is the second highest after other industries, and the number of accident deaths accounts for about 50%, ranking first in Korea. When analyzing accident victims in the Korean construction industry in 2021, those over the age of 60 or older account for 41% of the total. Also, based on experience, less than 6 months accounted for 91% of the total. Therefore, the purpose of this study is to find education plan according to age and experience to reduce the human errors of construction workers. As a result of this study, memory error and action error appeared in both analysis according to age and experience. So, education plan is needed to focus on training to comply with these safety work procedures and improving education methods to remember them for a long time.

Keywords: Safety Education, Human Error, Construction Accident

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## Introduction

In Korea, as construction projects become increasingly large and complex, many construction accidents are occurring. According to the Ministry of Employment and Labor, as of 2021, the number of accident victims in the construction industry is the second highest after other industries, and the number of accident deaths accounts for about 50%, ranking first in Korea. Researches to prevent accidents in construction projects have been conducted in various areas, and recently, researches are being conducted to reduce accidents by reducing human errors in construction projects (Park, 2011).

When analyzing accident victims in the Korean construction industry in 2021 (Ministry of Employment and Labor, 2021), those over the age of 60 or older account for 41% of the total. Also, based on experience, less than 6 months accounted for 91% of the total. So, in order to conduct education to reduce human errors of construction workers, it is necessary to find different ways according to age and experience.

Therefore, the purpose of this study is to find education plan according to age and experience to reduce the human errors of construction workers. The results of this study will be used as basic data on how education should be conducted according to the age and experience of construction workers.

## Status of Accident Victims of Korean Construction Industry

As shown Table 1 and Table 2, the number of accident victims in the Korean construction industry shows a large difference according to age and experience (Ministry of Employment and Labor, 2021). By age, those under the age of 40 accounted for 9.7%, those aged between 40 and 50 accounted for 14.8%, and those aged between 50 and 60 accounted for 34.2%. In other words, in the Korean construction industry, the older the age, the higher the number of accident victims.

In terms of experience, less than 3 years accounted for 97.9%, followed by 3-10 years with 1.7% and 10 years or more with 0.4%. In the Korean construction industry, it can be seen that the shorter the experience, the higher the number of accident victims.

| Total  | Under 18 ages | 18 ~ 24 ages | 25 ~ 29 ages | 30 ~ 34 ages | 35 ~ 39 ages | 40 ~ 44 ages | 45 ~ 49 ages | 50 ~ 54 ages | 55 ~ 59 ages | 60 ages more |
|--------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 26,888 | 1             | 169          | 588          | 800          | 1,060        | 1,577        | 2,406        | 4,080        | 5,121        | 11,086       |
| 100%   | 0.0%          | 0.6%         | 2.2%         | 3.0%         | 3.9%         | 5.9%         | 8.9%         | 15.2%        | 19.0%        | 41.2%        |

Table 1: Status of accident victims of Korean construction industry according to ages.

| Total  | Less than 6 months | 6 months to less than 1 year | 1 year to less than 2 years | 2 year to less than 3 years | 3 year to less than 4 years | 4 year to less than 5 years | 5 year to less than 10 years | More than 10 years |
|--------|--------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|--------------------|
| 26,888 | 24,441             | 1,010                        | 617                         | 252                         | 146                         | 107                         | 209                          | 106                |
| 100%   | 90.9%              | 3.8%                         | 2.3%                        | 0.9%                        | 0.5%                        | 0.4%                        | 0.8%                         | 0.4%               |

Table 2: Status of accident victims of Korean construction industry according to experiences.

## Human Error in Information Processing of Human

One of the most important causes of accidents in the accident occurrence mechanism can be said to be unsafe behavior of human (AIK, 2010). Human error is one of the fundamental causes of unsafe behavior by human (OSHRI, 2002). It is when humans fail to achieve a goal regardless of their will while cognizing, decision-making and acting to achieve a specific goal.

Human behavior is accomplished through a series of processes. When a stimulus is given, humans cognize it and determine which stimulus it is. In this process, when appropriate information is obtained through stimulation, information is processed based on the information and decision-making is made, and at this time, the human memory is used. When decision-making is complete, humans decide their own actions (Park, 2016).

In summary, it can be divided into four stages: (1) cognition of information or stimulation (2) information storage and memory (3) information processing and decision-making (4) action. In detail, it can be divided into cognitive checking errors (information delivery error, information checking error), thinking and memory errors (thinking error, decision-making error, memory error), and action operation errors (action error, operation error, operation checking error).

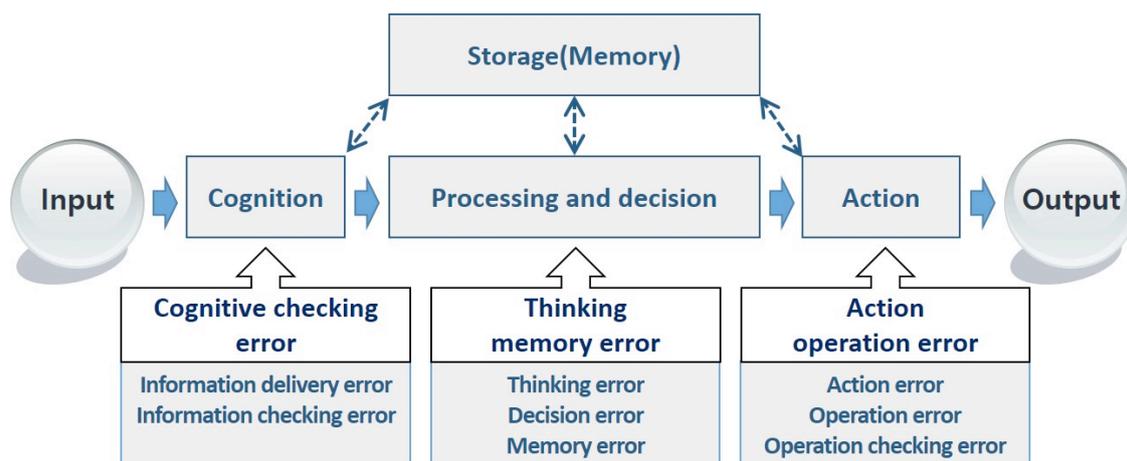


Figure 1: Type of human error in information processing of human.

## Analysis of Human Error According to Age and Experience

Construction workers' human error according to age and experience was measured on a 5-point Likert scale using a questionnaire at construction sites of large construction companies in Korea. Excluding insincere respondents, a total of 142 survey results were used for analysis. The average age of the survey respondents was 50.5 years old, and the average experience was 15 years.

In this study, age was divided into less than 40 age, 40-49 ages, 50-59 ages, and 60 ages more. The reason is that the distribution of the number of accident victims in the construction industry showed an inflection point in which the number of victims increased slightly at the 40 age and 50 age, and it was found that it increased rapidly when the 60 ages more.

Although the distribution of the number of accident victims in the construction industry showed that the number of victims with less than 6 months of experience was

overwhelmingly high, the experiences of construction workers were analyzed by dividing them into less than 3 years, 3 to 10 less than years and more than 10 years. The reason is there were actually very few (3 people) survey respondents who had less than 6 months of experience, and looking at the distribution of the number of victims in the construction industry, after 3 years, the number of victims tended to decrease gradually until 10 years.

| Ages          | Freq. (%)  | information delivery error | information checking error | thinking error | decision-making error | memory error | action error | operation error | operation checking error |
|---------------|------------|----------------------------|----------------------------|----------------|-----------------------|--------------|--------------|-----------------|--------------------------|
| Under 40 ages | 29 (20.4%) | 2.04                       | <b>1.83</b>                | 2.14           | <b>2</b>              | 2.09         | <b>2</b>     | 2.12            | 1.9                      |
| 40 ~ 49 ages  | 21 (14.8%) | 2.06                       | <b>2.06</b>                | 2.11           | <b>1.88</b>           | 2.11         | <b>2.02</b>  | 2.04            | 2                        |
| 50 ~ 59 ages  | 57 (40.1%) | 1.79                       | <b>1.98</b>                | 1.95           | <b>1.77</b>           | 1.93         | <b>1.75</b>  | 1.88            | 1.79                     |
| 60 ages more  | 35 (24.6%) | 2.01                       | <b>2.06</b>                | 2.14           | <b>2.1</b>            | 2.08         | <b>2.07</b>  | 2.09            | 1.86                     |

Table 3: Results of construction workers' human error according to ages.

| Ages                    | Freq. (%)  | information delivery error | information checking error | thinking error | decision-making error | memory error | action error | operation error | operation checking error |
|-------------------------|------------|----------------------------|----------------------------|----------------|-----------------------|--------------|--------------|-----------------|--------------------------|
| Less than 3 years       | 17 (12.0%) | 1.91                       | 1.69                       | 2              | <b>2.06</b>           | 2.01         | <b>2</b>     | <b>2.07</b>     | 1.71                     |
| 3 to less than 10 years | 27 (19.0%) | 2.14                       | 2.04                       | 2.12           | <b>1.98</b>           | 2.1          | <b>1.98</b>  | <b>2.02</b>     | 1.93                     |
| More than 10 years      | 98 (69.0%) | 1.88                       | 2.01                       | 2.06           | <b>1.87</b>           | 2.01         | <b>1.89</b>  | <b>1.99</b>     | 1.87                     |

Table 4: Results of construction workers' human error according to experiences.

In Table 3, information checking error, memory error, and action error showed higher scores in those 60 ages more those under 40 ages. In other words, it can be seen that construction workers 60 ages more likely to cause information checking error, memory error, and action error than workers than under 40 ages. In addition, in Table 4, memory error, action error, and operation error showed higher scores as the experience was lower. In other words, it can be seen that those with less than 3 years of experience are more likely to cause memory error, action error, and operation error than those with more than 10 years of experience.

## Conclusion

As a result of this study, memory error and action error appeared in both analysis according to age and analysis according to experience. Memory error is an error in forgetting or misremembering work contents, and action error is an error in habitually misbehaving during work or unconsciously working. Therefore, it is thought that accidents can be reduced by focusing on training to comply with these safety work procedures and improving education methods to remember them for a long time. The results of this study will be helpful as basic data on how education should be conducted according to the age and experience of construction workers.

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**Contact email:** shan@daegu.ac.kr