

The Perceptions of Teachers and Principals on Utilization of The Industry Experts in Korean Vocational High Schools

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ABSTRACT

The purpose of this study is to investigate the perceptions of teachers and principals on Utilization of The Industrial-educational Adjunct Teachers System at vocational high schools in Korea. To achieve this, a survey was conducted through an online questionnaire system, targeting principals and teachers at 506 schools. A basic statistical analysis and a t-test were conducted using the SPSS 23.0 for Windows program. The main research results are as follows. First, it is necessary for the both principals and teachers working in vocational high schools to utilize the industry sector expert to enhance their ability in the fields of information and communication, electricity, electronics, culture, art, design, broadcasting, and machinery. In particular, it is especially necessary in the areas that require the sharing of field experience or practical guidance rather than theoretical lectures. Second, despite the high demand for industrial-educational adjunct teachers in vocational high schools, both teachers and principals recognize that schools are having difficulties in securing manpower, and the main reasons for the difficulties are low wages and the location of the school. Third, both teachers and principals recognize the necessity of issuing teacher qualifications to increase the utilization of industry experts in vocational high schools in order to match the current teacher training system with equity. Fourth, both teachers and principals recognize that it is appropriate to introduce a special admission program to teacher training institutes for industry sector experts and grant them extra points when selecting the teachers in order to expand the participation of industry sector experts in vocational high school.

Keywords: Korean vocational high schools, principal, teacher, industrial-educational adjunct teachers

INTRODUCTION

Efforts to improve the industrial field of secondary vocational education help students acquire practical skills in the field, increase job satisfaction and field adaptability after employment, and resolve skills mismatches through curriculum development that reflects industrial field demands. Ultimately, such efforts are expected to cultivate excellent industrial manpower and contribute to the enhancement of national competitiveness. To achieve this, developed countries are promoting various policies and systems concerning teachers to enhance the practical skills of vocational education (European Commission, 2020; Kampylis & Devine, 2015; Kluzer & Priego, 2018). However, secondary vocational education in Korea is provided in specialized high schools and vocational high schools called Meister high schools. Problems related to field expertise such as the lack of functional competency of teachers and poor teacher training systems have been continuously raised. To solve these problems, various improvement measures related to teacher training, and qualifications have been suggested (Kim, 2018; Kim et al., 2001; Jang et al., 2014; Choi et al., 2008) but have not effectively been applied to actual school sites. This shows that there are still limitations to the practicality of the vocational high school curriculum.

As an effort to improve this condition, industry field experts are being used as teachers through a system called 'industrial-educational adjunct teachers (IEAT)' in Korea; however, this has been subject to criticism. Such criticism includes the insufficient teaching skills of industrial-educational adjunct teachers and their ability to guide students, a lack of screening processes for teachers' qualities, and an insufficient budget and condition for securing good resources (Kim et al., 2018; Byun et al., 2012; Jang & Byun, 2016). In addition, since industrial-educational adjunct teachers do not have official qualifications, they cannot take charge of independent classes under the Korean laws and regulations. As a result, they are used as guest lecturers paid per hour or as team teachers supporting the existing teachers.

Accordingly, in order to respond to changes in the new industry and labor market, the Ministry of Education of Korea proposed an active reorganization plan in 2018. This included the development of a system to grant official teacher qualifications to industrial-educational adjunct teachers and allow independent classes, limited to new industries. However, this was not implemented due to an opposition from the existing teachers. Recently, in Korea, a related policy has been implemented to introduce the credit system (Ministry of Education in Korea, 2017), which is a curriculum completion and operation system that allows students to select and complete various subjects according to their career paths and graduate when the cumulative credits reach the standard (Ministry of Education in Korea, 2017). It is expected that additional diverse subjects will be offered under this plan, depending on the students' needs. Therefore, it is expected that there will be a greater demand for industry sector experts, such as industrial-educational adjunct teachers, with field experience. As such, various plans need to be developed to improve the utilization of industrial-educational adjunct teachers.

Accordingly, the purpose of this study is to investigate the differing perceptions of the existing teachers and principals on the use of external industry sector experts. It is expected that insights can be obtained into the consideration of industrial-educational adjunct teachers in this regard.

LITERATURE REVIEW

Pre-service program and qualification for vocational high school teachers

Vocational high schools in Korea include 'specialized high schools' and 'meister high schools'. They are divided into schools providing general subjects that teach basic knowledge and specialized subjects that teach specialized contents for each major. Among them, teachers in specialized subjects are trained in various ways based on the relevant laws and regulations. The vocational high school teacher training system has been in operation for a long period of time and has undergone many changes. When the law on the training of teachers was amended in 1990, the hiring system for teachers was also changed. Due to these changes, since 1992, the path of acquiring teacher qualifications has been diversified to include teaching profession courses at universities of education, colleges of education, and general universities. A hiring exam is administered for the hiring of teachers in public schools, such that the educational path has become irrelevant in the hiring process. More than half of the vocational high school teachers are cultivated through teaching courses at general universities (Korean Educational Development Institute, 2020). Ahn et al. (2020) identified

the scale of teacher training for vocational high schools and showed that teacher training courses are being conducted in the specialized subjects of machinery and metal; commercial information; plant resources and landscape; electricity, electronics, and communication; information and computer; chemical engineering and textile; and environment at the College of Education. However, training courses in the specialized subjects of physical education, arts such as design and photography, and refrigeration and institutions are insufficient.

Non-examination tests are subdivided into major courses and teaching credits, grade standards, teaching aptitude and personality tests, first aid and CPR, industrial experience field practice, and licenses. This is applicable only to the acquisition of qualifications for teachers in specialized subjects in the industrial field. Licenses are also used as a standard for acquiring certain teacher qualifications such as for nutrition and public health teachers. In the case of major courses, a total of 50 credits must be completed, including 21 credits or more in the basic courses that correspond to those indicated in the teacher's certificate. Marked subjects refer to specialized subjects that can be taught with a teacher's license. According to the Ministry of Education in 2020, there are 32 marked subjects that correspond to specialized subjects, such as design, crafts, machinery, electricity, electronics, and communication. Studies on the teaching profession are divided into three sub-elements: teaching profession theory, teaching knowledge, and educational practice. When a total of 22 credits are completed, the passing criteria is met. This is achieved by completing 12 credits or more of teaching profession theory, six or more of teaching knowledge, and four or more of educational practice. If candidates meet all of the above criteria for passing the non-examination test, they can acquire teaching certificates in a specialized subject that corresponds to their major subjects.

Research related to vocational high school teacher training and qualification testing is being continuously conducted in Korea, many of which have suggested various problems in the teacher training process and appointment system and identified subjects and suggestions for improvement.

Kim et al. (2001) identified difficulties in securing excellent pre-service teachers due to problems in training vocational high school teachers, inappropriate teacher training curriculums and teaching methods, and imbalance in the supply and demand of teachers. As a way to improve this, Kim (2001) proposed the specialization of training teachers in protected industry sectors or in subjects with high demand at a national level. Jang et al. (2014) pointed out the problems of training teachers in specialized subjects which include the operation of integrated teaching courses, the limitations of offering new demand-labeled subjects due to frequent department convergence or department integration, and the development of teacher competency. Among the problems highlighted, is that it is necessary to review the mandatory industrial field practice when nurturing professional subject teachers in all fields, given that perception of the problem was high in the majority of fields other than industrial field training. Choi et al. (2008) identified the problems of teacher training, hiring difficulties, and teachers' professionalism in engineering, which may be due to the integration of teaching qualifications in the industrial field, and suggested improvement measures. As a major improvement plan, it was emphasized that the integrated labeling subjects should be treated separately. The study of Kim and Cha (2001) identified that the problems of teacher training and appointment were due to the operation of integrated labeled courses, and suggested a plan to separate establish new courses. Also, in order to train teachers who can be in charge of subjects, the use of the linked major system to complete related subjects, rather than create separate majors at university was suggested. Kim et al. (2016) conducted a study on how to improve the laws related to teachers based on the NCS-based curriculum that was fully introduced in vocational high schools in the 2015 revised curriculum. The key result was the presentation of a plan to provide opportunities for industry-based teachers to work in the educational field by strengthening the qualifications of teachers in charge of specialized subjects and introducing a flexible teacher recruitment system to attract manpower with extensive field experience. In relation to the strengthening of the practical competency of teachers, it was also suggested that practical and experimental evaluations be compulsory during appointment, and preferential treatment for industrial careers and related qualifications be provided (Kim, 2018).

In summary, regarding the issuance of teacher qualifications for specialized subjects, there are difficulties in hiring teachers and teaching subjects in the field due to the integration of subjects. Discussions regarding the field expertise of teachers in specialized subjects are progressively conducted. In order to solve these difficulties, the suggestion is to separate newly established integrated courses, to conduct practical evaluations during appointments, and to perform mandatory field training in industries. However, although the above improvement measures have been continuously discussed, they are not well applied in the actual field and there are limitations in operating new industry-related courses. Therefore, it is necessary for the teacher training system and the subject matter to be operated more flexibly so that students can acquire

knowledge and skills in newly emerging industries. In addition, measures to resolve the low field expertise of vocational high school teachers should also be devised.

'Industrial-Educational Adjunct Teacher(IEAT)' system to utilize industry experts

Vocational high school students are placed into the field after graduation. In this respect, low field expertise raised as a problem for vocational high school teachers can directly or indirectly negatively affect students. To solve this problem, Korea established the system of industrial-educational adjunct teacher in 1997. An industrial-educational adjunct teacher has worked in industries, businesses, and arts/physical fields, who has certain qualifications, concurrently instructs and instructs subjects in schools similar to those in charge of the field (Lee & Choi, 2005). The type, appointment, treatment, and quota of industrial-educational adjunct teachers are suggested in the laws related to vocational high school teachers. Therefore, industrial-educational adjunct teachers can be hired as school teachers on a part-time or contractual basis at schools based on their work experience in industries, etc. In order to become an industrial-educational adjunct teacher, certain qualification standards must be met. They must have an academic background at a junior college or higher, or as an industrial engineer or higher in the technical/functional field according to the National Qualification Act, possess a certificate in business services or a specialized office field, must have engaged in international and domestic competitions (in the field of culture, arts, physical education, or other skills), must meet the requirements for a prize winner and have at least three years of work experience in a related field.

In Korea, among the qualification standards for industrial-educational adjunct teachers, there is a plan to utilize industrial-educational adjunct teachers for winners of international and domestic competitions (in the fields of culture, arts, sports, and skills). This is to prepare a path for awarding teachers' qualifications by completing minimum majors and teaching courses based on the expertise of winning international competitions in the field of physical education. This was called the special training course for teachers in the field of physical education, and the winner of the international competition in the field of physical education can complete the special training course for teachers after being appointed as an industrial-educational adjunct teacher for one year. At this time, 18 credits must be completed through the special teacher training course, which is converted into 270 hours. All students are required to complete 10 credits (150 hours) during the semester and 8 credits (120 hours) for group training during vacation (Ministry of Education in Korea, 2014). This will recognize expertise in the field and they must complete the minimum major and teaching courses, which is very low compared to the major teaching credits required by existing vocational high school teachers.

Meanwhile, vocational high schools have been promoting various systems related to the use of industrial-educational adjunct teachers in order to provide classes with field content using experts who have direct experience in field jobs. In 2018, the Ministry of Education presented the innovation direction and major requirements of vocational education and training, including secondary vocational education, in response to social change. The main tasks included those related to industrial-educational adjunct teachers. In addition to improving the treatment of industrial-educational adjunct teachers and improving the system to enable independent classes, a plan to grant teacher qualifications focused on new industries was proposed. In addition, a plan was proposed to introduce a special selection for incumbent teachers in specialized subjects so that excellent experts in the field could flow into vocational high schools. The model was not introduced or implemented.

As of July 2021, a total of 785 industrial-educational adjunct teachers were employed in 224 vocational high schools in Korea (Ministry of Education in Korea, 2021b). They are mainly in charge of mechanical, electrical/electronic, information and communication subjects, and collectively have on average 15 years of experience in the industry. In addition, although most of them have certificates related to the subject they are in charge of, 652 people do not have the qualifications to teach the subject. Regarding classes, industrial-educational adjunct teachers are in charge of regular classes and after-school classes, and most of them do not evaluate students because they conduct cooperative classes rather than individual classes. With regard to employment and working methods, industrial-educational adjunct teachers are usually hired as contract workers, with most of them working part-time.

In particular, the recent paradigm of Korean education has shifted away from competition-oriented education and allows students to select a curriculum and take responsibility accordingly, motivating learning and promoting self-directed growth. The credit system was introduced as an effort to change and provide flexible and individualized education through diversification of curriculum operation. The credit system is a curriculum completion and operation system in which students select and complete various subjects

according to their career path, and when the accumulated credits reach the standard, graduation is recognized (Ministry of Education in Korea, 2017). The Ministry of Education in Korea (2021) proposed again to support the acquisition of teacher qualifications through the 'Teacher Training Special Course' for industrial-educational adjunct teachers in new industries that do not have labelled subjects following the full introduction of the vocational high school credit system. To this end, the necessity of preparing a system to revise related laws was also suggested. However, at present, no concrete plan has been proposed, and further discussion is required on the future direction. At the national level, efforts are being made to resolve the low field professionalism of vocational high school teachers and the rigidity of the teacher training process and marked subjects by using industrial-educational adjunct teachers. However, the most important factor will be the ability to consider the current situation of industrial-educational adjunct teachers. Therefore, it will be important to know the actual situation at the school sites where industrial-educational adjunct teachers are being used.

DATA AND METHODOLOGY

Research subject

The purpose of this study was to investigate the perceptions of the use of industry experts school administrators (principals) and teachers working in vocational high schools in Korea. Principals and teachers working in schools were set as the survey population representing the vocational high school. As of 2020, a total of 506 vocational high schools in Korea are in operation. Exactly 461 specialized high schools and 45 Meister high schools are distributed at a ratio of 9:1, in provincial and metropolitan cities at about 6:4 (Ministry of Education in Korea, 2020). The sample were teachers who could represent the opinions of each school, and the sampling was made for 1,021 samples, 1 school administrator and 1 affiliated teacher, for a total of 2 per school.

Instruments

Questionnaires was used as a survey tool for data collection. The questionnaire comprised a review of previous studies related to the use of industry sector experts in vocational high schools as industrial-educational adjunct teachers (Kim & Cha, 2001; Kim, 2018; Kim et al., 2016; Kim et al., 2001; Jang et al., 2014; Choi et al., 2008). Based on the results, a process of draft development, expert review, and revision was undertaken. The expert was selected as a professor and researcher in the field of vocational education and conducted a review of the survey tools in collaboration with officials from the Ministry of Education. As a result, the questionnaire was finally composed of a total of 15 items as shown in Table 1 on the current status and perception of industrial-educational adjunct teachers, methods to grant teacher qualifications, and plans to expand the participation of industry sector experts in vocational high schools.

Table 1 Composition of questionnaires

| Category | Item |
|--|--|
| Status and perceptions on the utilization of industrial-educational adjunct teachers | Necessity of using industrial-educational adjunct teachers in vocational high schools |
| | Industries and job fields that require the use of industrial-educational adjunct teachers |
| | Teaching and learning methods and contents that require the use of industrial-educational adjunct teachers |
| | Main role of industrial-educational adjunct teachers |
| | Problems in the use of industrial-educational adjunct teachers |

| | |
|--|--|
| Measures for granting qualifications for industrial-educational adjunct teachers | Necessity for issuing qualifications for industrial-educational adjunct teachers |
| | Issuance of Teacher Qualifications for industrial-educational adjunct teachers |
| Special course operation plan for issuance of qualifications for industrial-educational adjunct teachers | |
| Measures for expanding the participation of industry sector experts in vocational high schools | Separate qualification issuance plan |
| | Measures to improve the teacher training and selection system |
| Demographic characteristics | Position, school type, industry sector, location |

Data collection and analysis

Data collection was conducted for about two weeks from September 13 to September 24, 2021 through an online survey system. In consideration of the possible survey recovery rate, non-response and insincere responses, school administrators and representative teachers from 506 vocational high schools were encouraged to participate in the survey. Of the 1,021 distributed questionnaires, 440 were recovered and used for analysis. The general characteristics of vocational high school administrators and teachers who finally responded are shown in Table 2.

Table 2 General Characteristics of Respondents

| Category | n | % | |
|---------------------------|-------------------------|--------|-------|
| Position | Teacher | 16 | 3.64 |
| | Head Teacher | 257 | 58.41 |
| | Vice Principal | 134 | 30.45 |
| | Principal | 33 | 7.50 |
| Type of School | Specialized high school | 372 | 84.55 |
| | Meister high school | 54 | 12.27 |
| | Others | 14 | 3.18 |
| Industry Sector of School | Industry | 213 | 48.41 |
| | Agriculture | 36 | 8.18 |
| | Commerce | 137 | 31.14 |
| | Fisheries and Oceans | 13 | 2.95 |
| | Others | 41 | 9.32 |
| Location of School | Province | 265 | 60.22 |
| | Metropolitan cities | 175 | 39.78 |
| | No | 197 | 44.77 |
| Total | 440 | 100.00 | |

The distribution of respondents shows that 327 students (84.55%) are in specialized high schools and 54 students (12.27%) in Meister high schools. In terms of school location, 265 students (60.21%) live in provinces and 175 (39.785) in metropolitan and special cities. The sample was similar to the school type and location distribution ratio of vocational high schools in Korea, which is the subject of the study. Respondents comprised 167 (37.95%) of principals and vice-principal managers and 273 (62.05%) teachers such as general teachers.

Data analysis was performed using the SPSS 23.0 for Windows program, and basic statistical values of frequency, ratio, mean and standard deviation were analyzed and difference verification (t-test) was performed as the main analysis methods. For all analyses, the statistical significance level (α -level) was set to 5%.

RESULTS

Perception of the utilization and problems for industrial-educational adjunct teachers(IEAT)

The t-test result showed that there was no significant difference between the necessity for industrial-educational adjunct teachers. The results of Tables confirm that there is no difference between the teacher group and the school administrator group in the perception of the need for industrial-educational adjunct teachers in vocational high schools. Teachers and school administrators both evaluated the overall need for industrial-educational adjunct teachers highly with an average of 4.07 and 4.19. Although the need is particularly high in the vocational education field, it has been confirmed that the need is even higher in new industrial fields.

Table 3 Results of analysis the perception of the necessity for IEAT

| Item | Group | n | M | S.D. | df | t | p-value |
|--|-----------|-----|------|------|---------|-------|---------|
| Necessity of industrial-educational adjunct teachers | Teacher | 273 | 4.07 | .970 | 361.246 | 1.263 | .207 |
| | Principal | 167 | 4.19 | .925 | | | |

Specifically, it was analyzed that the perceptions of the teacher group and the school manager group did not show a significant difference even in industries and job fields that require industrial-educational adjunct teachers. When comparing the average perceptions of industry and job fields, both groups scored an average of 4.3, indicating that information and communication fields require the most industrial-educational adjunct teachers. Differently, electrical/electronic fields (teacher group: 4.34, school administrator group: 4.29), culture, art, design, broadcasting field (teacher group: 4.27, school administrator group: 4.25), mechanical field (teacher group: 4.29, school administrators) Group: 4.20), food service sector (teacher group: 4.16, school administrator group: 4.13), and construction sector (teacher group: 4.14, school administrator group: 4.04), in that order, both groups had the same results in terms of manifested rank. In both groups, the fields with the least need were business administration, accounting, and office work (teacher group: 3.95, school administrator group: 3.90).

Table 4 Results of analysis the perception of the job fields requiring IEAT

| Item | Group | n | M | S.D. | df | t | P-value |
|-------------------------------------|-----------|-----|------|-------|---------|-------|---------|
| Machines | Teacher | 273 | 4.29 | .845 | 364.033 | 1.053 | .293 |
| | Principal | 167 | 4.20 | .798 | | | |
| Electricity and Electronics | Teacher | 273 | 4.34 | .788 | 368.996 | .645 | .519 |
| | Principal | 167 | 4.29 | .731 | | | |
| Information and Communications | Teacher | 273 | 4.36 | .778 | 368.188 | .084 | .933 |
| | Principal | 167 | 4.36 | .723 | | | |
| Construction | Teacher | 273 | 4.14 | .907 | 377.404 | 1.043 | .298 |
| | Principal | 167 | 4.05 | .815 | | | |
| Food Services | Teacher | 273 | 4.16 | .857 | 336.466 | .442 | .659 |
| | Principal | 167 | 4.13 | .896 | | | |
| Management, accounting, office work | Teacher | 273 | 3.95 | 1.037 | 382.795 | .579 | .563 |
| | Principal | 167 | 3.90 | .912 | | | |
| Culture, art, design, broadcasting | Teacher | 273 | 4.27 | .826 | 345.685 | .250 | .803 |
| | Principal | 167 | 4.25 | .834 | | | |
| Agriculture, forestry and fishing | Teacher | 273 | 4.07 | .939 | 359.689 | 1.040 | .299 |
| | Principal | 167 | 3.98 | .901 | | | |

According to the teaching and learning method and content, both school administrators and teachers recognized that an industry sector teacher was necessary when operating the field experience sharing program (teacher group: 4.63, manager group: 4.54), and recognized that their necessary for practical classes (teacher group: 4.44, manager group: 4.42). Relatively, theoretical lectures showed a low need for industrial-educational adjunct teachers (teacher group: 3.50, manager group: 3.44).

Table 5 Results of analysis the perception of the teaching methods requiring IEAT

| Item | Group | n | M | S.D. | df | t | P-value |
|-------------------------------------|-----------|-----|------|-------|---------|-------|---------|
| Practical exercise classes | Teacher | 273 | 4.44 | .731 | 978.923 | .410 | .682 |
| | Principal | 167 | 4.42 | .653 | | | |
| Lectures on theory | Teacher | 273 | 3.50 | 1.118 | 359.114 | .543 | .587 |
| | Principal | 167 | 3.44 | 1.076 | | | |
| A program to share field experience | Teacher | 273 | 4.63 | .528 | 329.045 | 1.547 | .123 |
| | Principal | 167 | 4.54 | .568 | | | |

Table 6 is the t-test result on the difference in perception of problems when using industrial-educational adjunct teachers. There was a statistical difference between the teacher group and the manager group in terms of the perception that utilization is lowered due to the inability to teach alone ($p < .10$). In other words, the teacher group was relatively higher than the school administrator group in the perception that problems occurred because the industrial-educational adjunct teachers were unable to conduct classes alone. In addition, there was also a difference between the teacher and manager groups in their perception of the problem that industry field experts did not know the system of industry sector teacher well and that they could not use this system properly because they had relatively little interest ($p < .05$). Teachers perceived the lack of interest

from industry sector experts as a bigger problem than managers.

There was also a difference in the level of problem perception between the teacher group and the manager group in terms of ranking. In the case of teachers, the biggest problem (average 4.02) was that it was difficult to secure manpower when the school was located outside the city (lack of industry sector experts according to local conditions such as township units). In the case of the school administrator group, the biggest problem (average 3.89) was the lack of budget to provide for industrial-educational adjunct teachers and the decrease in utilization due to low hourly wages (difficulty in hiring due to low hourly wages).

Table 6 Results of analysis on the perception for use and problems of IEAT

| Item | Group | n | M | S.D. | df | t | p-value |
|---|-----------|-----|------|-------|---------|-------|---------|
| Lack of Teacher's competency/ability | Teacher | 273 | 2.79 | 1.294 | 358.956 | 1.536 | .125 |
| | Principal | 167 | 2.60 | 1.245 | | | |
| Decreased utilization due to the impossibility of private lessons | Teacher | 273 | 3.24 | 1.393 | 356.828 | 1.815 | .070* |
| | Principal | 167 | 2.99 | 1.351 | | | |
| Lack of difference between normal teachers | Teacher | 273 | 2.88 | 1.297 | 355.188 | .926 | .355 |
| | Principal | 167 | 2.76 | 1.266 | | | |
| Lack of recognition and interest in the policy related to the industry sector experts | Teacher | 273 | 3.29 | 1.240 | 333.730 | 2.338 | .020** |
| | Principal | 167 | 2.99 | 1.310 | | | |
| Low wages | Teacher | 273 | 3.89 | 1.078 | 364.280 | .041 | .968 |
| | Principal | 167 | 3.89 | 1.017 | | | |
| Low access to schools | Teacher | 273 | 4.02 | 1.071 | 324.461 | 1.349 | .178 |
| | Principal | 167 | 3.87 | 1.173 | | | |
| Problems related to contract | Teacher | 273 | 3.64 | 1.238 | 352.967 | .090 | .928 |
| | Principal | 167 | 3.63 | 1.218 | | | |

**p<.05, *p<.10

Perception of qualifying teacher and courses to industrial-educational adjunct teachers(IEAT)

Table 7 is the t-test result on the difference in perceptions on whether and specifically what qualifications should be granted to industrial-educational adjunct teachers. The necessity for issuance of teacher qualifications for industrial-educational adjunct teachers was found to be relatively low in both groups, and there was no statistically significant difference (teacher group: 2.43, school administrator group: 2.60). Most of the current teachers and managers are those who have been issued teacher qualifications through the long-term teacher training system such as the existing college of education and teaching courses, and this result can be seen in terms of equity and differentiation.

On the other hand, it was analyzed that there was an average difference between the groups in the perception of which qualification would be issued if a teacher qualification was issued to an industry sector teacher ($p < 0.05$). Regarding the method of granting the same qualifications as the current marked subject assignment method, but additionally specifying the details of the specific major field, the school administrator group recognized that it was a more suitable method than the teacher group (teacher group: 3.20, school administrator group: 3.58). The method of creating a new qualification for a new labeled subject called 'new industry' and marking detailed major fields together was also recognized as a more suitable method for the school administrator group than the teacher group (teacher group: 3.42, school administrator group: 3.69). On the other hand, when comparing the average size of each group's perception on the issuance of teacher qualifications for industrial-educational adjunct teachers, both groups considered the most appropriate method to mark detailed major fields after newly establishing new industry-labeled subject qualifications (teacher group: 3.42, school administrator group: 3.69). It was the least preferred to grant qualifications for existing marked subjects (teacher group: 2.79, school administrator group: 2.98).

Table 7 Results of analysis on perception of qualifying teacher to IEAT

| Item | Group | n | M | S.D. | df | t | p-value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------|-----|------|-------|---------|-------|---------|---|---------|-----|------|-------|---------|-------|--------|-----------|-----|------|-------|---|---------|-----|------|-------|---------|-------|--------|-----------|-----|------|-------|---|---------|-----|------|-------|---------|-------|--------|
| The necessity of issuing teaching qualifications for industrial-educational adjunct teachers | Teacher | 273 | 2.43 | 1.310 | 338.045 | 1.270 | .205 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Principal | 167 | 2.60 | 1.362 | | | | Grant of qualifications for existing marked subjects ※ Machinery, metal, electricity, electronics, etc. | Teacher | 273 | 2.79 | 1.350 | 358.238 | 1.449 | .148 | principal | 167 | 2.98 | 1.302 | Measure of issuing qualifications for industrial-educational adjunct teachers | Teacher | 273 | 3.20 | 1.272 | 368.454 | 3.198 | .002** | principal | 167 | 3.58 | 1.181 | New industry-labeled subject qualifications and detailed major fields marked ※ New industry (drone), new industry (artificial intelligence), etc. | Teacher | 273 | 3.42 | 1.219 | 360.048 | 2.353 | .019** |
| Grant of qualifications for existing marked subjects ※ Machinery, metal, electricity, electronics, etc. | Teacher | 273 | 2.79 | 1.350 | 358.238 | 1.449 | .148 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 2.98 | 1.302 | | | | Measure of issuing qualifications for industrial-educational adjunct teachers | Teacher | 273 | 3.20 | 1.272 | 368.454 | 3.198 | .002** | principal | 167 | 3.58 | 1.181 | New industry-labeled subject qualifications and detailed major fields marked ※ New industry (drone), new industry (artificial intelligence), etc. | Teacher | 273 | 3.42 | 1.219 | 360.048 | 2.353 | .019** | principal | 167 | 3.69 | 1.169 | | | | | | | | |
| Measure of issuing qualifications for industrial-educational adjunct teachers | Teacher | 273 | 3.20 | 1.272 | 368.454 | 3.198 | .002** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 3.58 | 1.181 | | | | New industry-labeled subject qualifications and detailed major fields marked ※ New industry (drone), new industry (artificial intelligence), etc. | Teacher | 273 | 3.42 | 1.219 | 360.048 | 2.353 | .019** | principal | 167 | 3.69 | 1.169 | | | | | | | | | | | | | | | | | | | | |
| New industry-labeled subject qualifications and detailed major fields marked ※ New industry (drone), new industry (artificial intelligence), etc. | Teacher | 273 | 3.42 | 1.219 | 360.048 | 2.353 | .019** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 3.69 | 1.169 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**p<.05

Table 8 shows differences in perceptions about the specific time, method, and composition of the curriculum when operating a special course for the issuance of teacher qualifications. The teacher and manager groups recognized that the vacation intensive system was the most appropriate time, and there was no significant difference between the operation through offline education and the perception of the blended (online + offline) method. In the case of curriculum composition, teachers and administrators had similar perceptions. They answered that 'teaching profession theory, teaching knowledge, teaching practice, and major(industry sector) course completion,' which contains the most content, was the most appropriate composition, and was similar to the minor training course that existing teachers must complete when acquiring a minor. It was recognized that the process had to be implemented.

Table 8 Results of analysis on perception of curriculum operation for qualifying teacher to IEAT

| Item | Group | n | % | Total | Chi2 | |
|---|--|-----------|-----|-------|------|-------|
| Operation Period (Multiple answers were permitted) | Intensive vacation system (seasonal system) | Teacher | 192 | 70.33 | 562 | 0.128 |
| | | Principal | 132 | 79.04 | | |
| | Weekend system | Teacher | 79 | 28.94 | | |
| | | Principal | 46 | 27.54 | | |
| | Night system | Teacher | 79 | 28.94 | | |
| | | Principal | 34 | 20.36 | | |
| Operation Methods (multiple answers were permitted) | Group education and training (offline) | Teacher | 165 | 60.44 | 467 | 0.335 |
| | | Principal | 90 | 53.89 | | |
| | Blended (offline + online) | Teacher | 123 | 45.05 | | |
| | | Principal | 89 | 53.29 | | |
| Composition of Educational Course | Upon completion of teaching profession theory and teaching literacy courses, Issuance of teacher qualification | Teacher | 23 | 8.42 | 405 | 0.858 |
| | | Principal | 13 | 7.78 | | |
| | Upon completion of teaching profession theory, teaching literacy, and teaching practice courses, issuance of teacher qualifications | Teacher | 33 | 12.09 | | |
| | | Principal | 21 | 12.57 | | |
| | Upon completion of teaching profession theory, teaching literacy, teaching practice and major(industry sector) courses, issuance of teacher qualifications | Teacher | 192 | 70.33 | | |
| | | principal | 123 | 73.65 | | |

Perception of ways to expand the participation of industry experts

Table 9 presents the result of analyzing the differences in the perceptions of specific measures to enable industry field experts to participate more actively in addition to the consideration of the industrial-educational adjunct teacher system.

Table 9 Results of analysis on perception of ways to expand the participation of industry experts

| Item | Group | n | M | S. D. | df | t | p-value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------|-----|------|-------|---------|-------|---------|--|---------|-----|------|-------|---------|-------|-------|-----------|-----|------|-------|--|---------|-----|------|-------|---------|-------|-------|-----------|-----|------|-------|--|---------|-----|------|-------|---------|-------|-------|-----------|-----|------|-------|--|---------|-----|------|-------|---------|-------|-------|-----------|-----|------|-------|--|---------|-----|------|-------|---------|-------|-------|
| Issuance of temporary teacher qualifications (classes are available only for a certain period of time, then renewed if necessary) | Teacher | 273 | 3.12 | 1.318 | 338.463 | .206 | .837 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 3.14 | 1.367 | | | | Improvement and issuance of the existing para-teacher qualification system | Teacher | 273 | 2.96 | 1.277 | 347.112 | .062 | .951 | principal | 167 | 2.96 | 1.283 | Establishment and issuance of separate qualifications for independent classes | Teacher | 273 | 3.03 | 1.347 | 339.150 | .083 | .934 | principal | 167 | 3.02 | 1.395 | Establishment of special selection for incumbents at the College of Education for nurturing vocational teachers | Teacher | 273 | 3.46 | 1.185 | 338.459 | .423 | .672 | principal | 167 | 3.51 | 1.230 | Establishment of special recruitment for teachers for industry field experts | Teacher | 273 | 2.94 | 1.312 | 345.763 | 1.175 | .241 | principal | 167 | 3.09 | 1.325 | Additional points are given for field expertise such as industry experience and related qualifications during the secondary school teacher recruitment test (appointment test) | Teacher | 273 | 3.38 | 1.234 | 350.257 | 1.731 | .084* |
| Improvement and issuance of the existing para-teacher qualification system | Teacher | 273 | 2.96 | 1.277 | 347.112 | .062 | .951 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 2.96 | 1.283 | | | | Establishment and issuance of separate qualifications for independent classes | Teacher | 273 | 3.03 | 1.347 | 339.150 | .083 | .934 | principal | 167 | 3.02 | 1.395 | Establishment of special selection for incumbents at the College of Education for nurturing vocational teachers | Teacher | 273 | 3.46 | 1.185 | 338.459 | .423 | .672 | principal | 167 | 3.51 | 1.230 | Establishment of special recruitment for teachers for industry field experts | Teacher | 273 | 2.94 | 1.312 | 345.763 | 1.175 | .241 | principal | 167 | 3.09 | 1.325 | Additional points are given for field expertise such as industry experience and related qualifications during the secondary school teacher recruitment test (appointment test) | Teacher | 273 | 3.38 | 1.234 | 350.257 | 1.731 | .084* | principal | 167 | 3.59 | 1.226 | | | | | | | | |
| Establishment and issuance of separate qualifications for independent classes | Teacher | 273 | 3.03 | 1.347 | 339.150 | .083 | .934 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 3.02 | 1.395 | | | | Establishment of special selection for incumbents at the College of Education for nurturing vocational teachers | Teacher | 273 | 3.46 | 1.185 | 338.459 | .423 | .672 | principal | 167 | 3.51 | 1.230 | Establishment of special recruitment for teachers for industry field experts | Teacher | 273 | 2.94 | 1.312 | 345.763 | 1.175 | .241 | principal | 167 | 3.09 | 1.325 | Additional points are given for field expertise such as industry experience and related qualifications during the secondary school teacher recruitment test (appointment test) | Teacher | 273 | 3.38 | 1.234 | 350.257 | 1.731 | .084* | principal | 167 | 3.59 | 1.226 | | | | | | | | | | | | | | | | | | | | |
| Establishment of special selection for incumbents at the College of Education for nurturing vocational teachers | Teacher | 273 | 3.46 | 1.185 | 338.459 | .423 | .672 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 3.51 | 1.230 | | | | Establishment of special recruitment for teachers for industry field experts | Teacher | 273 | 2.94 | 1.312 | 345.763 | 1.175 | .241 | principal | 167 | 3.09 | 1.325 | Additional points are given for field expertise such as industry experience and related qualifications during the secondary school teacher recruitment test (appointment test) | Teacher | 273 | 3.38 | 1.234 | 350.257 | 1.731 | .084* | principal | 167 | 3.59 | 1.226 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Establishment of special recruitment for teachers for industry field experts | Teacher | 273 | 2.94 | 1.312 | 345.763 | 1.175 | .241 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 3.09 | 1.325 | | | | Additional points are given for field expertise such as industry experience and related qualifications during the secondary school teacher recruitment test (appointment test) | Teacher | 273 | 3.38 | 1.234 | 350.257 | 1.731 | .084* | principal | 167 | 3.59 | 1.226 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional points are given for field expertise such as industry experience and related qualifications during the secondary school teacher recruitment test (appointment test) | Teacher | 273 | 3.38 | 1.234 | 350.257 | 1.731 | .084* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | principal | 167 | 3.59 | 1.226 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*p<.10

In the case of the teacher group, as a specific way to expand the participation of industry sector experts, it was recognized that the most appropriate method was to set up a special selection for incumbent teachers at the College of Education for nurturing professional teachers (average score of 3.46). After that, it was recognized that the method of ‘granting additional points for field expertise during the appointment test’ was appropriate (average of 3.38 points), and the method of temporarily issuing teacher qualifications followed with an average of 3.12 points. The method that was recognized as unsuitable was the method of ‘establishing special recruitment of teachers for industrial field experts’ (average of 2.94). In the case of the manager group, similar to the teacher group, when taking the appointment test, the method of giving additional points for industry experience and related qualifications was considered the most appropriate with an average of 3.59 points, and the method of establishing special selection for incumbents at the College of Education was on average 3.51. The existing ‘Improvement and Issuance of the Associate Teacher Qualification System’ was recognized as the most unsuitable method with an average score of 2.96. Above all, there was a difference in perception between the manager group and the teacher group about the method of granting additional points for field expertise in the recruitment exam, which is a competitive exam for selecting secondary school teachers. That is, the manager group perceived that the method was more appropriate than the teacher group, and it was found that this was significant at the significance level of .10. Although there are differences in the methods, it can be seen that various measures need to be prepared and implemented to enhance the industrial field performance of vocational high schools and the quality of education by increasing the participation of industry experts and using them appropriately, such as the industrial-educational adjunct teacher system.

CONCLUSION

Through The purpose of this study was to investigate the differing perceptions of principals and teachers working in vocational high schools in Korea regarding the use of external industry sector experts. The conclusions derived from the main research results and discussions are as follows.

First, it is necessary for both the school administrators and teachers working in vocational high schools to utilize the industry sector teacher system to enhance industrial field ability. It is necessary in all industrial fields such as machinery; it is recognized that the necessity is high especially in fields that require the sharing of field experience or practical guidance, rather than theoretical lectures.

Second, despite the high demand for industrial-educational adjunct teachers in vocational high schools, both teachers and managers recognize difficulties in securing manpower due to low school access and hiring difficulties because of low wages. In particular, teachers recognize the lack of interest and awareness of stakeholders about the current qualifications and related systems, which do not permit industrial-educational adjunct teachers to conduct classes independently. This is not recognized by the school administrators such as vice principals and principals.

Third, both teachers and managers have a low awareness of the necessity of issuing official teacher qualifications to the existing industrial-educational adjunct teachers in order to enhance the utilization of industry sector experts in vocational high schools for reasons such as equality with the current teacher training system. Nevertheless, if teacher qualifications are issued to them, the method of establishing a separate qualification in a new industry field or adding a detailed major field to the existing qualification is considered to be moderately appropriate. In addition, when operating a special course for the issuance of teacher qualifications, to solve the issue of equity with the existing teacher qualification acquisition process, it is recommended that the course is operated in an intensive vacation system and offline format. In addition, students should be required to complete both teaching related subjects and major content subjects.

Fourth, considering the measures to expand the participation of industry sector experts in vocational high schools other than the industry sector system, both teachers and managers are moderately in agreement with the establishment of a special selection for incumbents to the teacher training institute targeting industry sector experts and the provision of additional points when selecting teachers. With regards to the method of allocating additional points when selecting teachers, it is recognized that the managers are more appropriate for this purpose than teachers.

Fifth, It is necessary to consider the fact that it has a characteristic that it is difficult to meet the educational demand with the existing curriculum, such as in a new industry field, and there is a difficulty in nurturing teachers. These industrial-educational adjunct teachers should be encouraged to take charge of content outside the scope of what existing teachers can teach, and the curriculum will need to be organized to pursue more on-the-ground education.

Korea's system for the use of industry experts, such as the industrial-educational adjunct teacher system, is actively used in vocational high schools, and the vocational high school managers and teachers are aware of the need. It also appears that they are, to some extent, doing their part in the school field. However, the following suggestions are made to further enhance the utilization of industry sector experts, such as industrial-educational adjunct teachers, and improve the industrial field-ability of vocational high schools.

First, it may be difficult in reality to issue a full-time teacher qualification after having an industrial-educational adjunct teacher complete a certain curriculum due to backlash from the school site. However, as the current law allows the operation of a special teacher training course, it is necessary to promote the related system.

Second, in order to minimize discrimination and dissatisfaction with teachers who have been trained through the Colleges of Education, teaching courses, and graduate schools of education, it is necessary to structure the curriculum so that students can complete teaching related subjects and major subjects corresponding to each marked subject. However, for efficient operation, it is necessary to consider a method for the accreditation of credits. In particular, in addition to grasping the current status of industry-educational adjunct teachers, specific measures for the criteria for selecting subjects for the special teacher training course and the method of marking subjects for new industries should be presented together.

Third, it is necessary to prepare practical improvement plans by piloting a special teacher training course for some industrial-educational adjunct teachers and analyzing the differences with existing teachers who have completed the course.

Fourth, it is necessary to consider ways to utilize experts from various industries other than the

industry sector teacher system. It is realistically possible to establish a special course to become a teacher for worker in the existing college of education and to give additional points to the recruitment test. In this regard, specific standards should be established.

Fifth, Considering the limitations of the promotion and utilization of the industry-educational adjunct teacher system, it is necessary to make efforts to enhance the field expertise of the existing specialized subject teachers. As a specific measure, it may be possible to consider operating a special training program (learning and research year system) for more than 6 months for teachers of specialized subjects.

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