THE CONDITION AND COMPETENCY OF MULTI-ENTRANCES FOR PERSONNEL TRAINING OF INDUSTRIAL DESIGN ENGINEER IN TAIWAN

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Index: Industrial Design Education, Multi-Entrances, Learning Effectiveness

Abstract: The policy of college multi-entrances would enable students to select favorite departments and majors according to their interest and abilities, and also to increase the opportunities of being selected. This study tries to find the relationship between the channel of multi-entrances and learning effectiveness, then it sorts out the proper entrance channel and the requirements in personality and competency for students in industrial design department. Furthermore, instructors can refer the study results to improve students' learning effectiveness and further promote the personnel training of industrial design engineer in industrial design education to achieve a successful education quality and performance.

INTRODUCTION

The joint college entrance exam is the only channel for entering colleges in the past in Taiwan. Due to the lack of interest testing, students would not be properly instructed with regard to major field of study according to their interest and therefore causes the waste of educational resources for those departments requiring special disposition and basic technique. In 1998, the Ministry of Education announced that the ways of entering college for college bound students would change to "multi-entrances" instead of depending on only one-time examination in order to popularize compulsory education and to promote people's educational capacity. At present, the channels of entering colleges become more and more flexible. However, people question whether or not students coming from different channels have similar performance in learning effectiveness. In other words, is there any positive relationship between learning performance and entering channels? Furthermore, what are the main required factors influencing students' learning effectiveness? The above-mentioned questions should be highly concerned and addressed with the best solution possible.

The Ministry of Education adopted “multi-entrances” including application, recommended exam and joint-exam. All colleges can decide their own requirements of selecting students, especially majors in creative design and art. For example, extra design practice exam, portfolio review and oral interview can be used for further advanced choice to achieve the goal of selecting right person for the right field.

Therefore, the purpose of this study is to investigate the extent to which characteristics of personality and competency would be required for students in industrial design in order to have better learning performance. Furthermore, the study focuses on analyzing the relationship between these required characteristics and different channels of entrance.
LITERATURE REVIEW

Based on the opinions of scholar and expert, “creativity”, “expression capability”, “aesthetics general capability” are the required competencies for the students majored in industrial design engineering. Furthermore, “form capability”, “analysis capability”, “imaginative power”, “planning ability”, “observation ability”, “sensibility” are also very important to those students as well.

After comparing the required competencies of industrial design students with types of personnel attributes, the study found that there are three types of attributes associated with requirements and competencies for industrial design students according to Holland’s personnel attributes:

1. **Artistic** - It is the most important requirement attributable for industrial design students. It includes the ability of art, creation, innovation, and sense. Students can express beauty, thought and feeling through text, action, voice and color.

2. **Investigative** – It is also an important requirement next to artistic. This type of students can utilize their intelligence and analytical ability to observe, evaluate, judge and solve problems.

3. **Enterprising** – This type is as important as investigative. People of enterprising can utilize their abilities of planning and leadership to arrange affairs and manage peoples for promoting the benefits of organization, politics, economy and society.

RESEARCH METHODOLOGY

The study selects students from industrial design department as samples in survey. The study first adopts literature review method to sort out the essential characteristics such as the ability of creation, innovation and analysis for industrial design students, and then utilizes those requirements to compare with Holland’s personnel attributes in order to summarize the required characteristics for industrial design students. The relationship between students' characteristics and learning effectiveness in industrial design field from different ways of entrance is further analyzed. In addition, the factors affecting students' learning effectiveness are also investigated as well. Finally, the study proceeds statistical analysis based on grade evaluation from related industrial design courses to understand the relationship between the learning effectiveness and multi-entrances.

The research tools include three parts in the study:

1. Questionnaire of personnel attributes based on Holland's six attributes from the literature.
2. Questionnaire survey of effective learning from students.- according to student's opinions, the result of study would show the effective learning in different courses. The survey adopts Likert scale measurement, from 1 to 5 for “very bad” to “very good”.
3. Grades of related design courses.- course grades include fundamental design, color study, sketching, engineering drawing.

RESULT AND DISCUSSION

Related numbers are shown as box plots and relevant analysis with SPSS software is used to perform the analysis. The upper and lower lines in the box plots chart stand for the largest and the smallest numbers. The middle bold line stands for the media; the shadow stands for the deviation; the middle of shadow stands for the mean; entrance method 1 stands for joint entrance exam, method 2
stands for recommended interview, and method 3 stands for application of entrance. The analysis is as following:

(1) Comparison of student's interest and characteristic from different types of entrances

The comparison of student's personnel attributes on artistic, investigative, and enterprising types from different types of entrances are shown in figures 1. The study obviously appears that the mean and media of three types of personalities for students from "recommended-exam" and "application entrance". In addition, the scatter of personality for "Joint-exam" students is wider than the others.

Figure1. Students’ personnel attributes on artistic type from different entrance methods
(1 stand for Joint entrance exam, 2 stand for recommended exam, 3 stand for application entrance)

(2) Comparison of student's learning performance from different types of entrances

Figures 2 illustrate the comparison of student's learning performance on fundamental design, sketching, engineering drawing and color study classes from different types of entrances. It appears that students from "application entrance" have the best performance in the classes of fundamental design, sketching and engineering drawing within three different groups. Furthermore, "recommended-exam" students rank the second. Students from "Joint entrance exam" don't have a good performance in the classes, especially in the sketching and fundamental design. The result further indicates that learning and training of fundamental art and design in the past for those students from each of the three cohorts would be considered to be basic components necessary to help with the link of associated classes in college.

Figure2. Grades of fundamental-design course from different entrance methods
(3) Teaching evaluation from students of different types of entrance

Students from the channel of “application-entrance” have higher learning evaluation for study of fundamental design, sketching and color courses than the other groups. (see figures 3). In figure 11, the result shows that the different groups from the three types of entrances have a similar teaching evaluation for study of drawing. As a result, students from the channels of “application” and “recommended exam” entrances have the better performance and acceptance of classes than students from the entrance of “joint exam”. The study found that students from “application” and “recommended exam” entrances have good evaluation for the study of fundamental design, sketching and color study because basically they are equipped with better fundamentals of drawing and art.

![Figure3](image)

Figure3. Teaching evaluation for fundamental-design course from different entrance methods

(4) The relationship between learning performance and personnel attributes

Table 1 illustrates a significant relationship between the performance in sketching class and personality of artistic type. In addition, the result shows that there is a positive relationship between the performance of sketching and fundamental design. The strong relationship between sketching and artistic characteristics is also shown in Figure 4. However, the study shows there is no relationship between fundamental design and artistic characteristic. Furthermore, it found that fundamental design class requires not only aesthetics but also the creation of physical concept so students with artistic personality can not totally raise their performance.

![Figure4](image)

Figure4. The relationship between sketching grade and artistic characteristics
The relationship between evaluation of design course and characteristics of personality

Table 2 reveals a significant relationship between the characteristics of artistic personality and learning evaluation for the study of fundamental design, sketching, and color courses. The result indicates that students with characteristics of artistic personality have a better acceptance of learning in the classes of artistic creation such as fundamental design, sketching and color courses.

Table 1. The relationship between the course performance and the personality of artistic type

<table>
<thead>
<tr>
<th>Artistic</th>
<th>Sketching grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correl. Coef.</td>
<td>0.320</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>0.157</td>
</tr>
<tr>
<td>Pearson Correl. Coef.</td>
<td>0.585**</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>-0.279</td>
</tr>
<tr>
<td>Pearson Correl. Coef.</td>
<td>-0.279</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>0.220</td>
</tr>
<tr>
<td>Pearson Correl. Coef.</td>
<td>0.234</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>-0.279</td>
</tr>
</tbody>
</table>

** Statistically significant, p=0.01, ( Two tail)
* Statistically significant, p=0.05, ( Two tail)

Table 2. The relationship between evaluation of Design Course and Artistic Personality

<table>
<thead>
<tr>
<th>Design Course</th>
<th>Artistic Personality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental design</td>
<td>Pearson Correl. Coef.</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>0.000</td>
</tr>
<tr>
<td>Sketching</td>
<td>Pearson Correl. Coef.</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>0.031</td>
</tr>
<tr>
<td>Color courses</td>
<td>Pearson Correl. Coef.</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>0.014</td>
</tr>
<tr>
<td>Drawing</td>
<td>Pearson Correl. Coef.</td>
</tr>
<tr>
<td>Significant ( Two tail)</td>
<td>0.584</td>
</tr>
</tbody>
</table>

** Statistically significant, p<0.01, ( Two tail)
* Statistically significant, p=0.05, ( Two tail)

CONCLUSION AND SUGGESTION

(1) The study reveals that there is a positive relationship between performance of sketching class and characteristics of artistic personality for industrial design students. But, the study also shows that it is necessary for further research on the performance of fundamental design and color study.
classes and the characteristics of artistic personality because the study showed that there is no relationship between them.

(2) The study concludes that students with “application entrance” have the highest performance in design related classes except for color study class; the students with “recommended exam – entrance” is next, and the students with “Joint exam – entrance” is the last. In the aspect of personality characteristics, the average and medium score for students in artistic, investigative and enterprising for “joint-exam-entrance” is lower than students with entrances of recommended – exam and application. In addition, students with “joint exam” entrance are more spreading out in personality characteristics. Furthermore, in the aspect of class evaluation, students from the “application – entrance” have the highest evaluation in the artistic classes than the other groups. For the “engineering drawing class”, there is a similar evaluation in the three different groups of students. In conclusion, the study shows that students from the entrance channels of “recommended – exam” and “application” have a proper foundation of art and have more interest in major of design and art before entering school. And, they have better performance, artistic characteristic and acceptance of the classes than students coming from the “joint – exam “ entrance.

(3) As a result of statistical analysis, students from the “joint-exam” entrance have wide dispersion in studying courses, and it shows that some of students may be suitable for major in industrial design but some others don’t. Therefore, teachers should pay more attention to students’ personality and characteristics and give more instruction to high quality students so that they would have better opportunity to enhance their further learning.

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5. J. C. Lin, 1995, The basic concepts and methods of career consultant, proceeding of career consultant for college students in committee of younger consultant, pp24-44.