Abstract

We are being asked to respond quickly to digital transformation.Digital data has made it possible for us to communicate with the rest of the world in an instant. In particular, we are living in an era in which 3D data enables even physical objects to be moved instantaneously. The spread of digital data is expected to bring about new innovations in digital fabrication technology, as typified by 3D printers, and in fact, a society in which digital manufacturing based on sensitivity and creativity is truly utilized is expected.

However, there are only a certain number ofengineers who have the skills to create 3D data, both in companies and among the general public, making the development of digital human resources an urgent task. Among digital human resources, this survey focuses on 3D CAD, which can be utilized in the manufacturing industry and for 3D printing. First, we explored the problems of users in fab facilities, and then conducted a practical survey in actual 3D CAD lectures. We believe that practical education on 3D CAD education can accelerate user innovation and contribute to the development of digital human resources through the use of digital fabrication technology. The research aimed to clarify the influence of hand-drawn drawings on creativity in 3D CAD education, specifically, the influence of drawings onrealization and expression in 3D CAD practical education. The subjects were students majoring in product design who belonged to the Faculty of Art, and they were asked about their "ability to realize 3D data shapes" to create data that can be 3D printed and about their "ability to create new shapes that have never existed before" created with 3D CAD. The survey was conducted on two points: "the ability to realize 3D data shapes" to create 3D printable data, and "the ability to express 3D data shapes" created with 3D CAD. In the process of learning 3D CAD, we will investigate how two types of drawings, hand-drawn three-dimensional drawings and hand-drawn drawings, affect 3D CAD. The research method was to compare the two methods, drawing three-view diagrams and free drawing, respectively, in order to create ideas conceived by the students. The results showed that drawing a three-view diagram increased the evaluation of "feasibility of 3D data shape," which is a "modeling technical skill," but "expressiveness of 3D data shape," which is a "technical skill to express accurate shapes," tended to fall short of the expected value. Conversely, in the case of free drawing, the "expressiveness of 3D data shape" tends to be relatively high, despite the fact that accurate drawings are not drawn. In addition, we also found some cases in which "expressiveness of 3D data shape" was improved in individual drawing styles. These results provide useful guidelines for creativity in hand-drawn drawings and 3D CAD, which is the key to the development of digital human resources in the future.

Keywords3DCAD, Education, digital fabrication, Creativity