

IMPLEMENTING PORTFOLIO EDUCATION USING OBJECTIVE DATA OF GENERIC SKILLS

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ABSTRACT

National Institute of Technology, Sendai College (Sendai KOSEN), Hirose Campus participated in the program of "implementation of portfolio education of 6 priority items for establishing quality assurance of education" of National Institute of Technology in the academic year of 2020 and we examined how portfolio education should be conducted and how we could implement it. In 2021, we started the first stage of portfolio education for younger (1st- to 3rd-year) students.

This paper reports the initial cases conducted at Hirose Campus in 2021 and introduces the future portfolio education plans. Among the initial concepts were "to reduce a load of students in the introduction of the portfolio," "to provide the appropriate guidance to deepen students' understanding of portfolio education," "to introduce objective generic skills assessment," and "to enrich the portfolio according to students' level of understanding." According to these concepts, guidance and portfolio creation workshops were held for younger students. In particular, we tried to include the results of objective evaluation of generic skills into the portfolio, which is a strength of Hirose Campus, and to practice effective portfolio education in cooperation with parents as mentors for life outside school.

KEYWORDS

Portfolio education, Collaboration between Parents and Teachers, Objective assessment of Generic Skills

Standards: 9, 11, 12

INTRODUCTION AND BACKGROUND

Zubizarreta (2004) proposed that students' self-reflective practice with learning portfolios is effective in improving learning. On the other hand, Peter Seldin et al. (1993) demonstrated the effectiveness of teaching improvement by teachers themselves using teaching portfolios. For more effective lesson improvement, it is important that the two portfolios, the teaching portfolio by the faculty and the learning portfolio by the students, be organically combined. Fig. 1(a) shows an overview of portfolio creation and utilization by students. By creating a learning portfolio and reflecting on their own learning history, students can accurately recognize their own strengths and weaknesses and learn effectively to achieve their goals. In addition, students can be encouraged to take initiative in their own learning by clarifying their goals through the "showcase portfolio," which is a collection of their achievements. The showcase portfolio can be a powerful tool to prove their learning and strengths when applying for jobs or higher education.

On the other hand, portfolios are also very important for faculty members. An overview of the use of portfolios by faculty members is shown in Fig. 1(b). Teachers will be able to improve their teaching skills by recording and reflecting on their own teaching history in their "teaching portfolios." Furthermore, by summarizing the achievements of research and school management in an "academic portfolio," teachers can objectively grasp their current status and set goals for the next step. They will develop their teaching and school management skills through the creation of their portfolios.

As a result, faculties and courses in universities and colleges can use portfolios to guarantee and improve the quality of their education, as well as to improve the curriculum and lesson contents. In addition, portfolios will allow easy and effective connections to other educational institutions, such as high schools and universities.

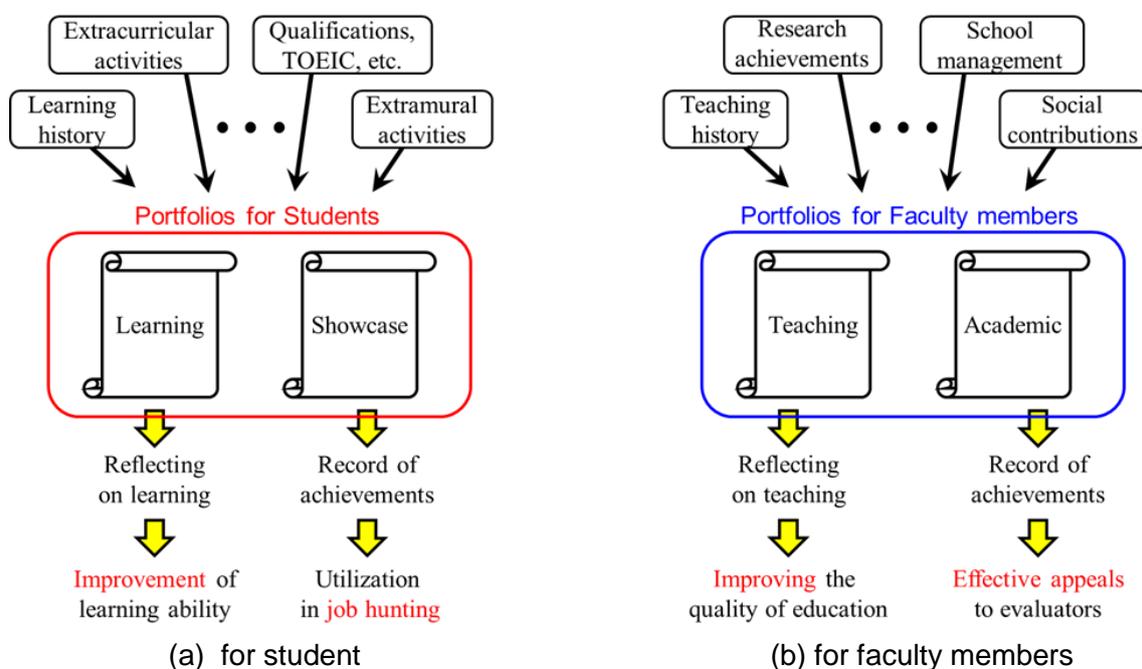


Figure 1. An overview of portfolio creation and utilization

In Japan, portfolio education is just beginning, and many educational institutions are now trying to implement portfolio education in terms of its effective use for individual students and the way it can be reflected in their education. In 2020, the National Institute of Technology set the following six priority items for the establishment of educational quality assurance: 1) Implementation of portfolio education, 2) Implementation of visualization of experimental skills, 3) Implementation of cross-disciplinary competence (generic skills) development, 4) Educational improvement practices supported by data (evidence), 5) Implementation of peer supporter training, and 6) Consolidation and sharing of student information. Portfolio education is positioned as the first item, indicating that it is very important.

At Sendai KOSEN, we had had a common understanding of the concept of portfolios, but no substantial portfolio education had been provided. In the academic year 2021, however, portfolio education finally started at Hirose Campus. Since both students and teaching staff were new to portfolio education, the priority was to establish our awareness of portfolio education. First, we held workshops on what we intend to do through portfolios and how to use them, rather than using sophisticated and complex portfolios from the beginning. We then decided to complete the portfolios in stages over several years with the establishment of students' awareness.

In this paper, we will introduce a case study of the initial education for students who are using the portfolio for the first time at our campus, with the concept of drawing out students' independent learning. Specifically, we will focus on a practical plan for portfolio education based on the characteristics of our school, including 1) the development of generic skills and their assessment we have worked on using objective, standardized tests since 2014, and 2) the involvement of parents as mentors, taking advantage of the fact that many of our students commute to school from their parents' homes. And finally, we will explain the future plans for the development of the portfolio and how we plan to utilize it.

CONTINUOUS SURVEY ON GENERIC SKILLS AT SENDAI KOSEN, HIROSE CAMPUS

On our campus, we have been conducting a continuous survey of students' generic skills (GSs) since 2014. Progress Report on Generic Skills (PROG), which is a standardized test in Japan (Kawaijuku Group, 2021), has been used to evaluate students' generic skills. The reason for adopting the PROG is that we considered that generic skills cannot be accurately assessed by self-evaluation. Assessment by teachers using rubrics is also a possibility, but when one teacher assesses many students, accurate assessment is difficult, and on the other hand, assessments for the same student may differ among teachers due to their subjectivity. As an objective method, PROG can assess students' generic skills more accurately without the subjectivity of students and teachers. Moreover, PROG has been adopted by many universities and allows students to accurately recognize their own strengths and weaknesses by being able to compare their scores with the average score of university students. As a result, students can accurately reflect on and improve their generic skills.

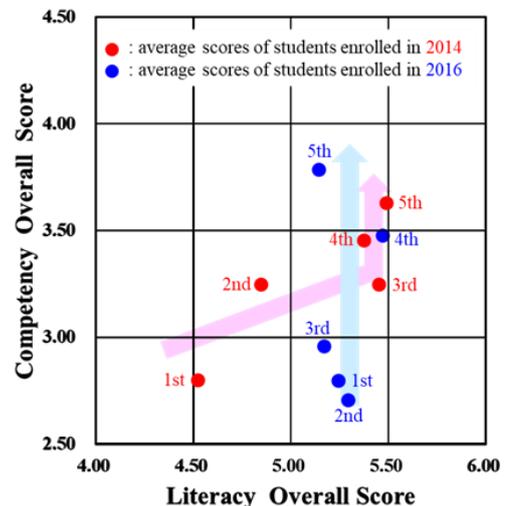
Fig. 2(a) and (b) respectively show the years when the students took the PROG test and the overview of their growth characteristics. In Figure (a), circles "○" mean that students of every course took the test, triangles "Δ" mean that students of only some courses took the test (specifically, only students in two of the three courses in all were tested), and cross "×" means that students DID NOT take the test. Fig. 2(b) shows yearly changes in overall scores of the same students from their 1st year to 5th year in Literacy and Competency parts who enrolled in 2014 (red circles) and 2016 (blue circles). From Fig (b), it is observed that the Competency skills of our students improved with their grade progress, although some variability could be

observed. As for Literacy skills, on the other hand, growth was observed as the grade progressed, but there was also a tendency to saturate when the score exceeded 5.0. Based on these questionnaires, we are currently working to improve the curriculum and lesson contents. Kawasaki et al. reported on the curriculum improvement at the IEEE Global Engineering Education Conference 2021(EDUCON2021), and Yajima et al. reported on specific improvements in lesson contents at the 17th CDIO International Conference (CDIO2021).

In this way, visualizing the growth of generic skills through annual PROG tests is effective for improving education. Furthermore, it is thought to be effective for individual students to improve their learning by incorporating it into their portfolios. In the PROG test, the assessment contents of the Literacy part are classified into six elements like “collecting information” and so on, and the Competency part consists of three categories of Personal, Interpersonal, and Problem-solving competencies, and they are classified into 9 contents and 33 elements. The detailed categorization of skills allows students to select the skills they need to achieve their individual goals, and taking the PROG exam and reflecting on it repeatedly promotes efficient growth of their generic skills.

Year	Academic Year						
	2014	2015	2016	2017	2018	2019	2020
1st	○	○	○	○	○	○	○
2nd	○	○	○	○	○	○	○
3rd	○	△	○	○	○	○	○
4th	○	○	○	○	○	○	○
5th	○	△	○	×	○	×	○

- : students of every course took the test.
- △ : ONLY students in two of the three courses in all were tested.
- × : students DID NOT take the test.



(a) year of students who took the PROG test (b) the overview of growth characteristics of our campus students

Figure 2. Continues survey of the generic skills at Hirose campus

CONCEPT OF PORTFOLIO TO BE DEVELOPED

In this attempt, we started with the development of a learning portfolio, since it was the first time for both the teachers and the students to conduct portfolio education. In developing the learning portfolio, the development concept is shown in Fig. 3.

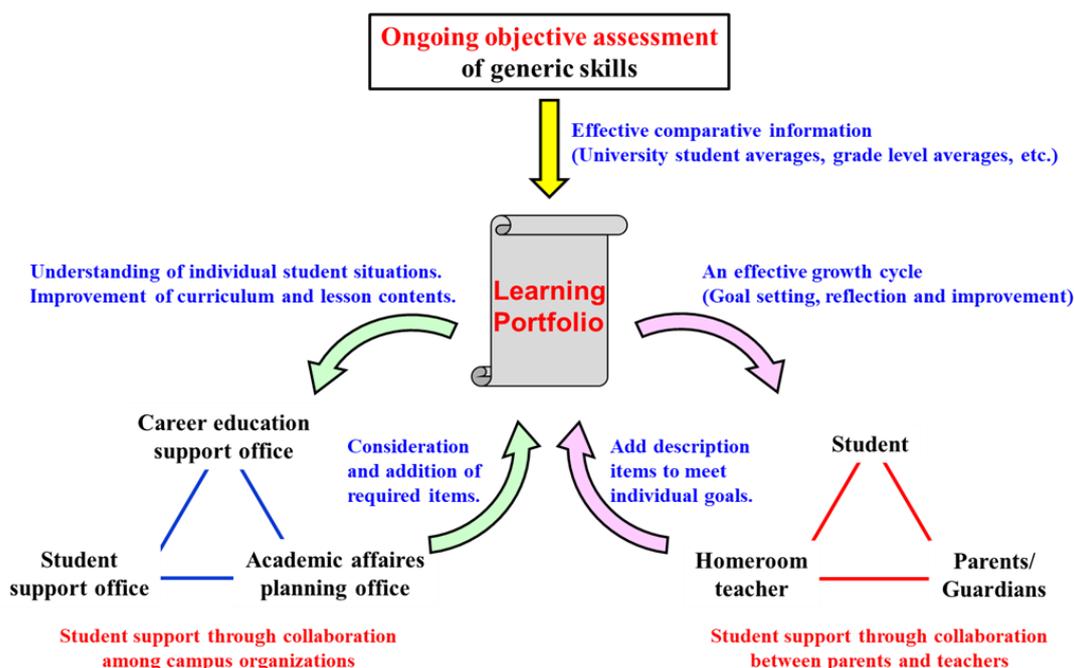


Figure 3. The development concept of the portfolio

Introduction of a voluntary improvement cycle for students through ongoing surveys of generic skills

Students will be able to reflect on generic skills, which are difficult to recognize accurately, based on objective assessment results. Furthermore, by comparing their score with the average score of university students and the average class score, students can identify their strengths and weaknesses. As a result, students can easily set short-term and future goals. By taking the PROG test regularly, students will repeat the improvement cycle and grow at their own initiative.

Introduction of support for students through collaboration between teachers and parents

The portfolio belongs to the student and is to be created by the student himself/herself for individual purposes. However, Sendai KOSEN has students between the ages of 15 and 20, including young students who have just graduated from junior high school. In addition, about 80% of the students commute to school from their homes. Considering these characteristics of our school, we thought that the involvement of their parents in portfolio education could make the education more effective. Therefore, we gave the parents a role as mentors outside school by including a section in the portfolio for parents to fill in as well. By sharing the portfolio with parents and homeroom teachers, we gave it the role of a tool to build a support system for students both on and off campus.

Introduction of education improvement through collaboration with existing organizations on campus

The portfolio allows teachers to understand each student's situation and to improve education as a whole school. By understanding the needs and challenges of individual students, we can

enhance our individual and career support. In order to realize these supports, the Student Support Office, the Career Education Support Office, and the Academic Affairs Planning Office, which are existing organizations in our college, will work together to develop the portfolio education.

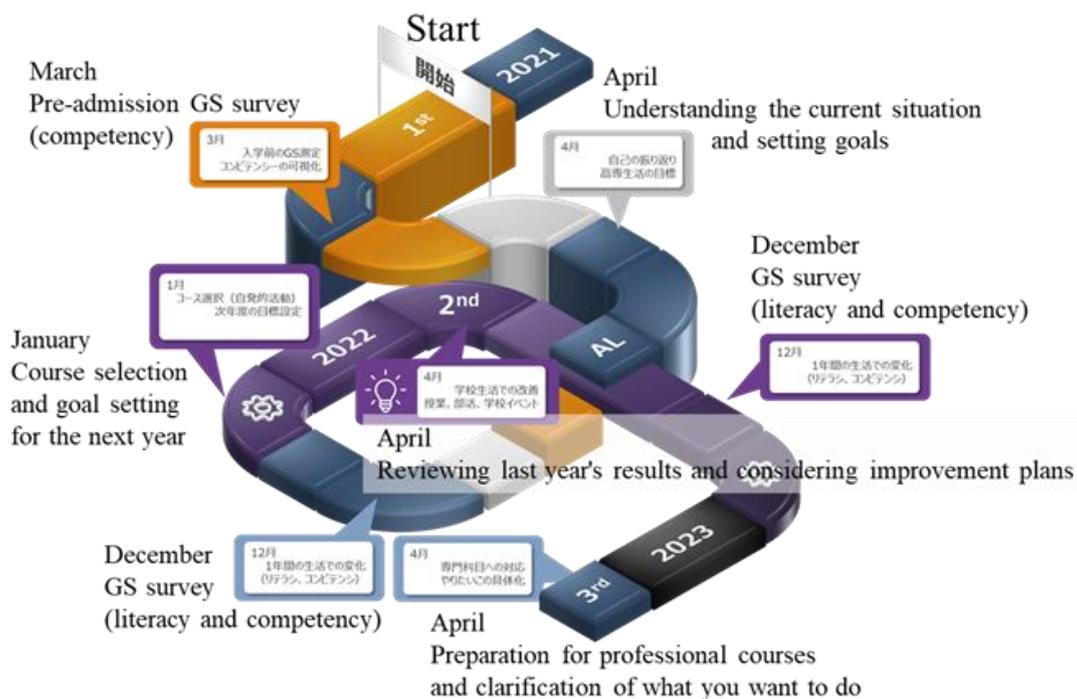
INITIAL APPROACHES TO PORTFOLIO EDUCATION

In implementing the portfolio, we emphasized the importance of students creating their own portfolios according to their own goals, rather than being led by teachers. In order to prevent the portfolio from becoming just a formality for students who are using it for the first time, we have made some efforts and attempts, which are described below.

First, we introduced a paper portfolio to reduce the students' load of starting the portfolio. The content of the portfolio was made easier to understand, and the range of content was not limited so that students could freely write anything they wanted. In order to make it even more fully individualized, it was decided that students could freely add items to the list according to their individual purposes.

Second, we provided regular guidance and portfolio filling workshop work to help students understand the meaning, intent, and use of portfolios. As an example, Fig. 4 shows some of the content of the first guidance and the workshop conducted for first-year students. In the guidance, the schedule from admission to graduation shown in (a) was explained, and students were made aware of the timing of important events leading up to graduation, such as course selection, laboratory assignment, and so on. And the preparations needed to achieve the purpose for each event were explained. In the second guidance session, the Career Support Office provided guidance on career activities, explaining the importance of preparation and the use of portfolios from the first year.

Third, as for generic skills which are difficult for students to recognize by themselves, we decided to use a portfolio to review, improve, and set goals based on objective evaluation results using the PROG results conducted once a year instead of relying on self-evaluation. In the workshop, we explained the characteristics of generic skill growth at our school and let them do individual work on self-analysis and goal setting using their own PROG scores. At the end of the academic year, we plan to hold a workshop using the scores from this year's PROG test. Fig. 4(b) and (c) show the scenes of the workshop.



(a) the content of the first guidance



(b) the scene of the guidance



(c) the scene of the workshop

Figure 4. Guidance and workshops

Fourth, we decided to use the simplified portfolio until the students' own understanding of portfolio education was established. In addition, it was designed so that students could evolve it by themselves, adding items according to their own goals. In the meantime, the school will continue portfolio education, and existing organizations on campus will work together to select and add what is needed at each grade level.

THE FIRST PORTFOLIO AND FUTURE PLANS

Fig. 5 shows a part of the portfolio (for second-year students) that we developed. The portfolio consists of two parts. Fig. 5(a) shows the first generic skills development part of the portfolio, in which students use their PROG results. Students can visualize their own growth by filling in graphs of their scores on all six Literacy assessment elements and nine middle-levelled

contents of Competency. As a result, students will be able to look back and consider ways to improve their skills and set goals based on the growth results.

Figure 5(b) shows the second part of the portfolio, which records their achievements, learning situation and sets short- and long-term goals. The teachers try not to specify the items to be recorded so that the students could freely describe their long-term goals. In addition, the parents were given a role as mentors for life outside school by providing a parent comment box. This will build a collaborative student support system between parents and teachers through the portfolio, and as a result, an effective growth cycle for students can be expected.

The portfolio developed is a minimal portfolio with a low implementation load for students and faculty alike, in line with the initial concepts. As portfolio education becomes more prevalent among students, we plan to develop a more detailed portfolio. The specific plan of progress is shown below. The first step will be to fully individualize the portfolio. A fully individualized portfolio is realized by selecting detailed items of competencies necessary to achieve the goals of individual students and adding them to the visualization items of the generic skills development part. For the second part, we are currently considering ways to allow students to evolve the items to be collected in their portfolios and the perspectives of their reflections, based on their own ideas.

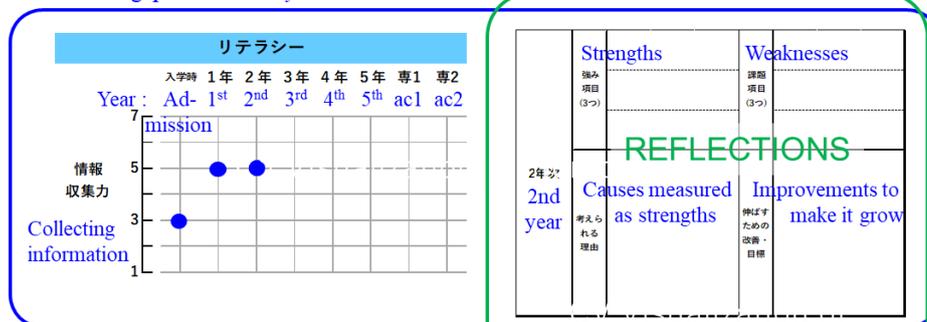
The second step is to digitize the portfolio in the next few years. For digitalization, an inexpensive and general platform that leads to lifelong learning must be established. Considering the development of a showcase portfolio, information dissemination to the outside world is also an important factor. Currently, we are considering using Microsoft Excel as a database and social networking services. For the showcase portfolio, we are also planning to build a creative environment (3D scanner, creating/editing videos, and so on) that will allow us to digitize the artifacts produced at our campus.

On the other hand, in order to allow teachers to understand the importance and use of portfolios, faculty development sessions and workshops on creating teaching and academic portfolios will be held. Through these experiences, teachers will be able to create and effectively use teaching/academic portfolios and reflect on their teaching skills and where they stand as teachers. In addition, by comparing the contents of their own teaching portfolios with those of their students' learning portfolios, teachers can improve their teaching more effectively by eliminating differences in perception between teachers and students. Portfolio practice for teachers must also be promoted in a way that is compatible with portfolio education for students, and we plan to start faculty development sessions and workshops in the next year. In addition, we will implement evidence-based lesson improvement by not only comparing and analyzing the learning and teaching portfolios but also by providing feedback on the generic skills test and growth analysis that are regularly conducted.

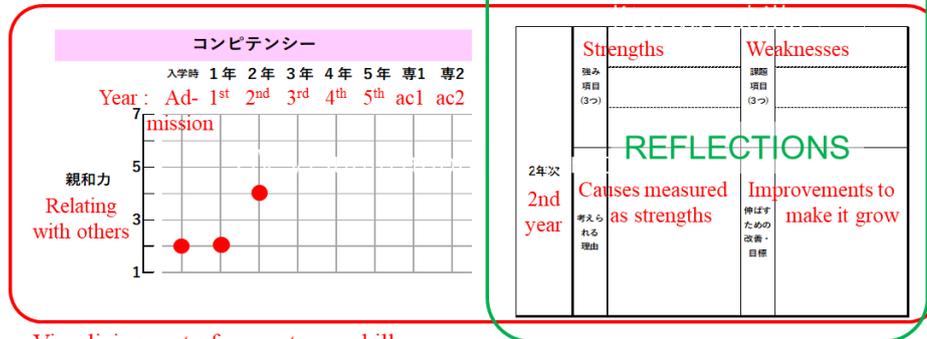
Using the completed portfolio, we will promote portfolio education with the final purpose of building close collaboration with universities, not only on the status of knowledge retention but also on generic skills. Yajima et al. will report on the concept and planes of collaboration with universities at the 18th International CDIO Conference.

Self-analysis part based on the evaluation results
(Picking up own strengths and weaknesses and considering causes and improvements)

Visualizing part of literacy skills



Visualizing part of competency skills



(a) The generic skills development part of the portfolio.

学生記入欄	
クラス委員 Student Council	高専での状況と目標 出席・課題提出状況等や目標 出席状況 Attendance Status. 課題の提出状況 Submission status of assignments 3年生に向けての目標 Objectives for this year. その他目標(学外・将来的) Other goals (off-campus, future, etc.)
部活動 (役職) Extracurricular activities	
取得資格 TOEIC等 Qualifications, TOEIC, etc.	
その他 学外での活動等 (ボランティア・ 地域スポーツ・ アルバイト等) Off-campus activities, etc.	

(b) Recording part of their achievements, learning situation and sets short- and long-term goals

Figure 5. A part of the portfolio that we developed.

CONCLUSION

Sendai KOSEN, Hirose Campus participated in the program of "implementation of portfolio education of 6 priority items for establishing quality assurance of educations" of National Institute of Technology in the academic year of 2020. We examined how portfolio education should be conducted and how we could implement it at Hirose Campus. In 2021, we started the initial implementation of portfolio education for younger (1st- to 3rd-year) students.

In order to prevent portfolio education from becoming a just formality, the initial concepts were defined as "reducing the burden of introduction for students," "providing guidance to deepen students' understanding of portfolio education," "introducing objective generic skill evaluation," and "enriching the portfolio according to students' level of understanding." We developed a portfolio, and provided guidance and portfolio writing workshops for first through third-year students. The portfolio we developed included reflections based on an objective evaluation of generic skills, a particular strength of Hirose Campus, and the role of parents as mentors for life outside school. Through these efforts, we will attempt to practice effective portfolio education. Future plans include digitalization of the portfolio and reflection of the results of the portfolio education in the curriculum and lesson contents. For the final goal of portfolio education, close collaboration with universities will hopefully be constructed using the completed portfolio.

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