June 30, 2026

3Dconnexion CAD Mouse Evaluation & Validation Report

Aso Architecture & Design College
Product Design Major, Year 2 ASO Innovation Lab
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Assistant Lead: Ryuto Fuchigami

1. Introduction

This report compiles the results of an on-site validation conducted in an educational setting, made possible through the generous loan of valuable evaluation equipment from 3Dconnexion. In our Product Design program, we deliver hands-on 3D CAD education using 3DEXPERIENCE and CATIA, with the goal of building the design and problem-solving skills required for product development. However, in the classroom, many students need substantial time not only to learn modeling techniques but also to become comfortable with viewpoint navigation, making improved usability and workflow efficiency an ongoing challenge. Against this backdrop, we conducted a comparative evaluation of three products provided by 3Dconnexion—SpaceMouse® Enterprise Kit 2, SpaceMouse® Pro, and SpaceMouse® Wireless Kit 2—against a standard mouse. In addition to objective measures such as modeling time, number of clicks, and mouse travel distance, we also assessed overall performance from an education-specific perspective, including ease of operation, physical strain, and instructional impact. We hope this report will contribute to the continued advancement of 3Dconnexion products and serve as one practical example of how 3D CAD tools can be applied in educational institutions, supporting future product development and broader adoption efforts.

2. Background

In the Product Design program, we provide practical 3D CAD education using 3DEXPERIENCE, enabling students to learn end-to-end workflows—from product design and modeling to drawing creation and simulation. Through classes and PBL (Project Based Learning), students aim to develop not only the technical skills required of designers, but also problem-solving ability and creativity. At the same time, 3D CAD modeling requires extremely frequent viewpoint operations in addition to shape creation—rotating, panning, and zooming the model repeatedly. With a standard mouse, users rely heavily on combinations of middle, right, and left clicks, which increases operational load during long sessions and can lead to lower productivity and physical fatigue—an ongoing issue in educational environments.
Moreover, the primary goal of CAD education is not simply to master CAD operations, but to develop the ability to translate design intent into tangible form. However, many CAD beginners spend a considerable amount of time manipulating the viewpoint, which can prevent them from fully concentrating on learning design and modeling. An input device that enables intuitive viewpoint control may therefore help improve learning efficiency.

Against this background, our school received the SpaceMouse® Enterprise Kit 2, SpaceMouse® Pro, and SpaceMouse® Wireless Kit 2 from 3Dconnexion and conducted a comparative evaluation against a conventional mouse. In addition to quantitative measurements such as modeling time, number of clicks, and mouse travel distance, the evaluation examined usability, physical strain, and educational effectiveness from multiple perspectives to assess the products' value in an educational environment.

3. Evaluation Overview

In this validation, we compared usability and work efficiency on the same CAD modeling task using a standard mouse and a 3Dconnexion 3D mouse. To reflect real-world use in an educational setting, testing was conducted in the same environment used for everyday classes.

Evaluation Period

May 7, 2026 – June 26, 2026

Evaluation Location

Aso Architecture & Design College, Building 2, Room 1222

Evaluation Participants

3 second-year students, Product Design major

Software Used

3DEXPERIENCE

Evaluation Equipment

SpaceMouse® Enterprise Kit 2
SpaceMouse® Pro
SpaceMouse® Wireless Kit 2

Evaluation Objective

Compare a standard mouse with a 3Dconnexion 3D mouse to assess modeling time, mouse interaction volume, ease of operation, physical strain, and educational impact.

4. Validation Environment

In this validation, we conducted testing using the PCs and 3DEXPERIENCE setup that students use every day, in order to replicate the actual classroom environment. The same evaluation task was performed under identical conditions with both a standard mouse and a 3D mouse; by holding all other factors constant, we compared the impact of differences in the input devices.

Equipment Used and Person in Charge

* SpaceMouse® Enterprise Kit 2 Lead: Takita
* SpaceMouse® Pro Lead: Fuchigami
* SpaceMouse® Wireless Kit 2 Lead: Nomiyama

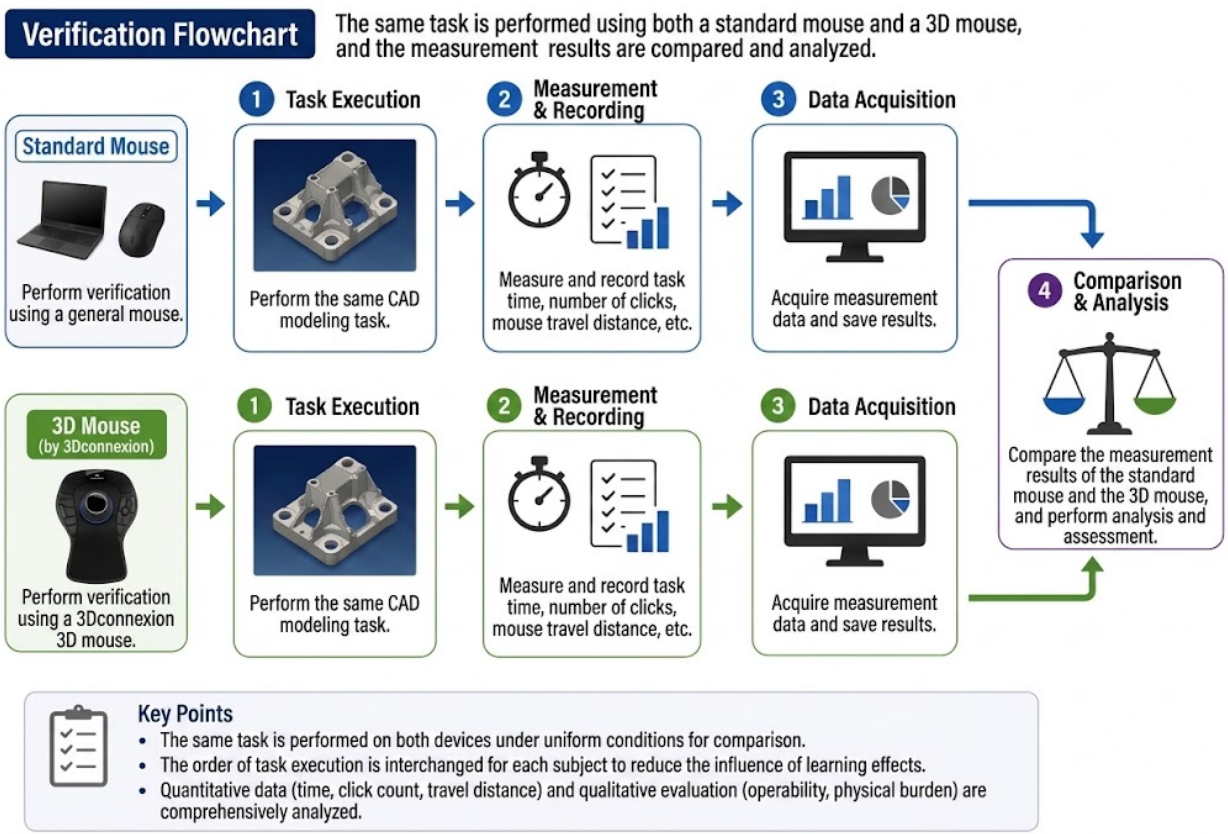
5. Validation Method

In this validation, we had participants complete the same CAD modeling task using both a standard mouse and a 3Dconnexion 3D mouse, then compared work efficiency and usability. For the evaluation, each participant performed the identical task with both the standard mouse and the 3D mouse; we quantitatively measured modeling time and the amount of mouse operation, and also collected subjective ratings on usability and physical strain.

In addition, we varied the order of the input devices used for each task to minimize learning effects as much as possible and ensure a fair comparison.

Evaluation Metrics

- Modeling Task Time
- Left-Click Count
- Middle-Click Count
- Right-Click Count
- Mouse Travel Distance
- Subjective rating of viewpoint-change operations
- Subjective rating of ease of operation
- Subjective rating of physical strain



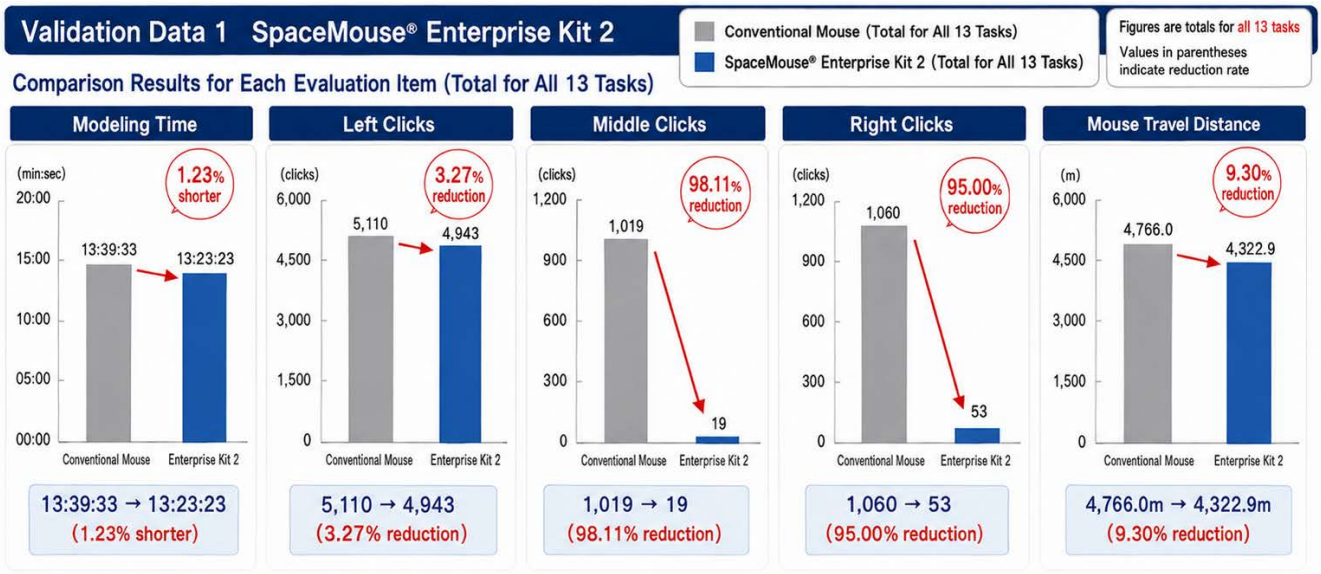
6. Validation Results

Validation Data 1 Space Mouse® Enterprise Kit 2 Lead: Hikari Takita

6-1 SpaceMouse® Enterprise Kit 2

Validation Results Summary

With the SpaceMouse® Enterprise Kit 2, modeling time was reduced by 1.23%. Meanwhile, the middle- and right-click actions used for viewpoint control were reduced by 98.11% and 95.00%, respectively, confirming a major decrease in the operating burden of a standard mouse. In addition, overall mouse travel distance decreased by 9.30%, indicating it can also help reduce physical strain during extended work sessions.



Evaluation Item	Conventional Mouse (Total for All 13 Tasks)	SpaceMouse® Enterprise Kit 2 (Total for All 13 Tasks)	Reduction Rate	Key Findings
Modeling Time	13:39:33	13:23:23	1.23% shorter	Modeling time was reduced by 1.23%. Although the difference is not large, a trend toward improved efficiency was confirmed.
Left Clicks	5,110	4,943	3.27% reduction	The number of left-clicks used for command input also decreased slightly.
Middle Clicks	1,019	19	98.11% reduction	By assigning viewpoint control to the SpaceMouse, middle-clicks were greatly reduced.
Right Clicks	1,060	53	95.00% reduction	Right-clicks were also greatly reduced, significantly lowering the operation load.
Mouse Travel Distance	4,766.0m	4,322.9m	9.30% reduction	Cursor travel decreased, suggesting reduced physical strain.

*Reduction rate calculated as (Conventional Mouse - SpaceMouse® Enterprise Kit 2) ÷ Conventional Mouse × 100 (Modeling time calculated in seconds).

Detailed Analysis

Based on a comparison across 13 tasks, the average modeling time decreased from 13 min 33 sec to 13 min 23 sec, a reduction of 1.23%. Meanwhile, the most noticeable gains—beyond modeling time—were seen in view/navigation operations.

With a standard mouse, users relied heavily on the middle and right buttons whenever rotating, panning, or zooming the model. By using the SpaceMouse® Enterprise Kit 2, many of these actions could be performed intuitively with the left hand. As a result, middle-clicks dropped by 98.11% and right-clicks by 95.00%, showing a major improvement. Left-clicks, however, are used to enter modeling commands, so the reduction was limited to 3.27%. Mouse travel distance was also reduced by 9.30%, confirming an overall decrease in cursor workload.

Discussion

In this evaluation, the most noticeable gains were seen not in shorter modeling time, but in fewer clicks and less mouse travel. In particular, the sharp drop in middle- and right-clicks was driven by having the SpaceMouse® Enterprise Kit 2 handle viewpoint controls such as rotating, panning, and zooming the model.

With a standard mouse, both viewpoint control and modeling operations must be done on the same device. By using a SpaceMouse alongside it, viewpoint control can be assigned to the left hand while the right hand focuses on modeling. As a result, there is less switching between actions, enabling smoother modeling.

That said, this test was conducted after an approximately one-month familiarization period, so the level of experience was not yet comparable to that of a standard mouse. Even so, the reduction in operational workload was still confirmed, suggesting that continued use could lead to further efficiency gains.

Usability Evaluation

SpaceMouse® Enterprise Kit 2uses a control scheme that' s different from a standard mouse, so at first there were moments of uncertainty when navigating the view. However, by using the training application provided by 3Dconnexion, it was possible to learn the basic operations in a short time and become comfortable enough for practical use after about one month. In real CAD modeling, being able to navigate the view with the left hand while modeling with the right at the same time helped keep work moving without breaking momentum, greatly reducing the need to pause just to change viewpoints. In particular, the ability to continue modeling while checking the entire model made it easier to stay aligned with the design intent, which felt like a major advantage. The verification results also showed large reductions in middle and right clicks, confirming that having SpaceMouse® Enterprise Kit 2 handle most view navigation reduces the operating burden on a standard mouse. Even during long modeling sessions, it put less strain on the wrist and fingers, and it was noticeable that fatigue was reduced.

From an educational standpoint, for students learning 3D CAD for the first time, an environment where view navigation feels intuitive can help them focus not on the CAD controls themselves, but on learning design and modeling. With continued use, it is expected to improve learning efficiency and support a shift toward more practical, hands-on design education.

Validation Data 1

	Modeling Time	Clicks (Left)	Clicks (Middle)	Clicks (Right)	Mouse Travel Distance
Q1 - Standard Mouse	16:21				
Q1 - 3D Mouse	13:13				
Q2 - Standard Mouse	07:07				
Q2 - 3D Mouse	07:37				
Q3 - Standard Mouse	10:41				
Q3 - 3D Mouse	08:50				
Q4 - Standard Mouse	12:23	275 times	57 times	62 times	45m
Q4 - 3D Mouse	14:39	272 times	4 times	6 times	44m
Q5 - Standard Mouse	15:48	328 times	56 times	75 times	44m
Q5 - 3D Mouse	13:13	302 times	0 times	0 times	38m
Q6 - Standard Mouse	12:55	265 times	56 times	70 times	41m
Q6 - 3D Mouse	14:06	270 times	2 times	4 times	46m
Q7 - Standard Mouse	15:00	348 times	54 times	67 times	43 m
Q7 - 3D Mouse	14:25	310 times	1 time	14 times	38m
Q8 - Standard Mouse	16:38	357 times	62 times	66 times	50 m
Q8 - 3D Mouse	18:15	344 times	0 times	4 times	48 m
Q9 - Standard Mouse	13:20	273 times	53 times	48 times	40 m
Q9 - 3D Mouse	13:10	261 times	0 times	0 times	39 m
Q10 - Standard Mouse	13:42	285 times	43 times	43 times	41m
Q10 - 3D Mouse	15:01	300 times	2 times	2 times	40 m
Q11 - Standard Mouse	15:33	325 times	61 times	73 times	50 m
Q11 - 3D Mouse	14:51	321 times	0 times	3 times	35 m
Q12 - Standard Mouse	14:05	293 times	39 times	42 times	38m
Q12 - 3D Mouse	13:57	294 times	0 times	1 time	36 m
Q13 - Standard Mouse	12:42	291 times	52 times	58 times	40 m
Q13 - 3D Mouse	12:42	277 times	0 times	0 times	31 m
Average Standard Mouse	13:33	305 times	53 times	60 times	43 m
Average - 3D Mouse	13:23	295 times	1 time	3 times	39 m
Reduction Rate	1.23%	3.27%	98.11%	95.00%	9.30%

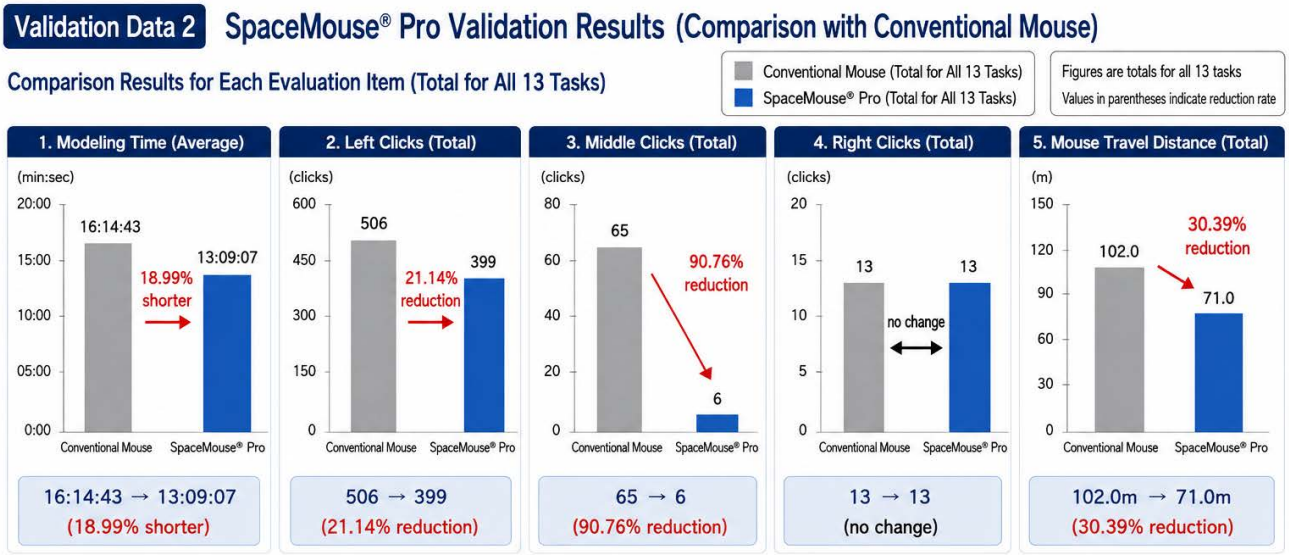
	Standard Mouse	3D Mouse	Reduction Rate
Average Modeling Time	13:33	13:23	1.23%
Average Clicks (Left)	305 times	295 times	3.27%
Average Clicks (Middle)	53 times	1 time	98.11%
Average Clicks (Right)	60 times	3 times	95.00%
Average Travel Distance	43 m	39 m	9.30%

Validation Data 2 SpaceMouse® Pro　　Owner: Ryuto Fuchigami

6-2 SpaceMouse® Pro

Verification Results Summary

In tests using SpaceMouse® Pro, it delivered the biggest boost in productivity among the three products. In particular, modeling time was reduced by 18.99%, left-clicks by 21.14%, and middle-clicks by 90.76%. In addition, mouse travel distance was cut by 30.39%, confirming a substantial reduction in the workload of standard mouse operations. These results show that SpaceMouse® Pro not only streamlines viewpoint control, but also significantly improves overall CAD modeling efficiency as an input device.



Evaluation Item	Conventional Mouse (Total for All 13 Tasks)	SpaceMouse® Pro (Total for All 13 Tasks)	Reduction Rate	Key Findings
Modeling Time (Average)	16:14:43	13:09:07	18.99% shorter	Modeling time was reduced by 18.99%, confirming a clear improvement in work efficiency.
Left Clicks (Total)	506	399	21.14% reduction	The number of command-input clicks was also reduced.
Middle Clicks (Total)	65	6	90.76% reduction	By assigning viewpoint control to the SpaceMouse® Pro, middle-clicks were greatly reduced.
Right Clicks (Total)	13	13	no change	Because of CAD software specifications, no significant change was observed in right-clicks.
Mouse Travel Distance (Total)	102.0m	71.0m	30.39% reduction	Mouse travel distance was reduced by 30.39%, suggesting less physical strain.
Total Clicks (Total)	584	418	28.42% reduction	Total clicks were reduced by 28.42%, indicating an overall reduction in operation load.

*Reduction rate calculated as (Conventional Mouse − SpaceMouse® Pro) ÷ Conventional Mouse × 100 (Modeling time calculated in seconds)

Detailed Analysis

After conducting a comparative evaluation of 13 tasks, the average modeling time dropped from 16 min 14 sec to 13 min 09 sec, confirming an 18.99% reduction in work time. In addition, left-clicks decreased from 506 to 399 (a 21.14% reduction), confirming that even the modeling operations themselves required less use of a standard mouse.

Furthermore, middle-clicks fell from 65 to 6 (a 90.76% reduction). By having the SpaceMouse® Pro handle most viewpoint actions—such as rotating, panning, and zooming the model—reliance on a standard mouse was greatly reduced.

Meanwhile, right-clicks showed no major change, averaging 13 clicks. This is because, due to the software' s design, a certain number of right-click actions are still required—for example, to end CAD commands or open context menus. In addition, mouse travel distance decreased from 102m to 71m (a 30.39% reduction). With far less cursor movement overall, the results also suggest reduced physical strain during extended work sessions.

Discussion

In this evaluation, improvements were confirmed across every metric—modeling time, number of clicks, and total mouse travel distance. In particular, the roughly 19% reduction in modeling time indicates not only more efficient viewpoint control, but also a smoother overall workflow for CAD modeling as a whole. One likely reason is that viewpoint control can be handled with the left hand using the SpaceMouse® Pro while the right hand continues modeling, reducing interruptions caused by changing views and creating an environment that makes it easier to stay focused on design work. In addition, the fact that middle-clicks dropped by more than 90% confirms that the SpaceMouse® Pro is handling most viewpoint operations. On the other hand, the lack of change in right-click counts likely reflects the interaction requirements built into the CAD software itself.

Because these gains were observed even with only about one month of familiarization, continued use is expected to deliver even greater efficiency and further reduce physical strain.

Usage Evaluation

The SpaceMouse® Pro lets you intuitively rotate, pan, zoom in, and zoom out on a model, making it possible to verify geometry while moving smoothly through the modeling process.By handling viewpoint control with the left hand and modeling actions with the right, the workflow is less likely to be interrupted, creating an environment where it' s easier to stay focused on design work. In addition, the test results confirmed a substantial reduction in both click counts and mouse travel distance, and I could clearly feel less physical strain on my wrists and fingers during extended CAD modeling sessions.

In educational settings, leveraging the SpaceMouse® Pro can help students spend less time on CAD operations and create a learning environment where they can focus more on design and modeling itself.With continued use, students can build proficiency more quickly, which is expected to improve learning efficiency as well as overall design capability.

Validation Data 2

	Modeling Time	Clicks (Left)	Clicks (Middle)	Clicks (Right)	Mouse Travel Distance
Q1 - Standard Mouse	23:00				
Q1 - 3D Mouse	15:00				
Q2 - Standard Mouse	25:00				
Q2 - 3D Mouse	16:00				
Q3 - Standard Mouse	20:00				
Q3 - 3D Mouse	11:00				
Q4 - Standard Mouse	11:00				
Q4 - 3D Mouse	07:00				
Q5 - Standard Mouse	10:00	390 times	33 times	9 times	49 m
Q5 - 3D Mouse	11:00	380 times	0 times	11 times	49 m
Q6 - Standard Mouse	17:00	470 times	53 times	11 times	100 m
Q6 - 3D Mouse	18:00	462 times	12 times	19 times	87 m
Q7 - Standard Mouse	13:00	410 times	57 times	12 times	90 m
Q7 - 3D Mouse	10:00	313 times	2 times	11 times	48 m
Q8 - Standard Mouse	12:00	448 times	71 times	9 times	90 m
Q8 - 3D Mouse	10:00	346 times	2 times	7 times	52 m
Q9 - Standard Mouse	12:00	415 times	48 times	14 times	67 m
Q9 - 3D Mouse	09:00	298 times	3 times	7 times	32 m
Q10 - Standard Mouse	23:00	768 times	100 times	18 times	188 m
Q10 - 3D Mouse	25:00	650 times	15 times	22 times	145 m
Q11 - Standard Mouse	10:00	384 times	34 times	17 times	53 m
Q11 - 3D Mouse	09:00	292 times	1 time	5 times	44 m
Q12 - Standard Mouse	17:00	635 times	75 times	17 times	135 m
Q12 - 3D Mouse	12:00	362 times	3 times	19 times	62 m
Q13 - Standard Mouse	18:00	637 clicks	114 clicks	10 clicks	142 m
Q13 - 3D Mouse	18:00	489 clicks	19 clicks	19 times	116 m
Average Standard Mouse	16:14	506 clicks	65 clicks	13 clicks	102 m
Average - 3D Mouse	13:09	399 clicks	6 clicks	13 clicks	71 m
Reduction Rate	18.99%	21.14%	90.76%	0.00%	30.39%

	Standard Mouse	3D Mouse	Reduction Rate
Average Modeling Time	16:14	13:09	18.99%
Average Clicks (Left)	506 clicks	399 clicks	21.14%
Average Clicks (Middle)	65 clicks	6 clicks	90.76%
Average Clicks (Right)	13 clicks	13 clicks	0.00%
Average Travel Distance	102 m	71 m	30.39%

Validation Data 3 Space Mouse Wireless Kit 2

Owner: Taketo Nomiyama

6-3 SpaceMouse® Wireless Kit 2

Validation Results Summary

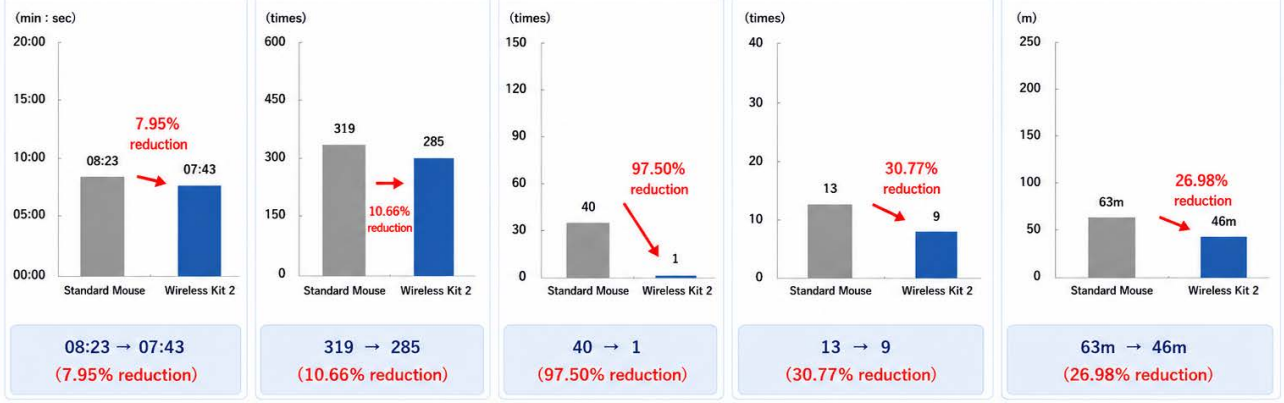
SpaceMouse® Wireless Kit 2 testing showed that,in addition to reducing modeling time, improvements were confirmed across every metric—click count and total mouse travel distance. In particular, middle-clicks were reduced by 97.50%, confirming that by having the SpaceMouse® Wireless Kit 2 handle most view navigation, the operational load on a standard mouse can be significantly reduced. In addition, modeling time was shortened by 7.95%, left-clicks decreased by 10.66%, right-clicks by 30.77%, and mouse travel distance by 26.98%. These results indicate it is effective for improving overall 3D CAD modeling efficiency while also reducing physical strain.

Test Data 3 SpaceMouse® Wireless Kit 2 Test Results (Comparison with Standard Mouse)

Comparison results for each evaluation item (Total of 13 tasks)

Standard Mouse (Total of 13 tasks)
SpaceMouse® Wireless Kit 2 (Total of 13 tasks)

Values are the total for all 13 tasks ( ) indicates the reduction rate



Evaluation Item	Standard Mouse (Total of 13 tasks)	SpaceMouse® Wireless Kit 2 (Total of 13 tasks)	Reduction Rate	Key Findings
Modeling Time (Average)	08:23	07:43	7.95% reduction	Modeling time was reduced by 7.95%, confirming improved work efficiency.
Left Clicks (Total)	319 times	285 times	10.66% reduction	The number of left clicks used for command input was reduced.
Middle Clicks (Total)	40 times	1 time	97.50% reduction	The large number of middle clicks in view operations was dramatically reduced with the SpaceMouse® Wireless Kit 2.
Right Clicks (Total)	13 times	9 times	30.77% reduction	The number of right clicks was reduced, confirming a decrease in operational load.
Mouse Movement Distance (Total)	63 m	46 m	26.98% reduction	Cursor movement distance was reduced, indicating lower physical effort.

*Reduction rate is calculated as (Standard Mouse − SpaceMouse® Wireless Kit 2) ÷ Standard Mouse × 100
(Modeling time is calculated in seconds).

Detailed Analysis

Based on a comparative validation across 13 tasks, the average modeling time dropped from 8 min 23 sec to 7 min 43 sec, confirming a 7.95% reduction in work time. In addition, left-clicks decreased from 319 to 285 (a 10.66% reduction), indicating less frequent use of a standard mouse during modeling operations.

In particular, middle-clicks fell from 40 to 1 (a 97.50% reduction), confirming that most viewpoint controls—such as rotating, panning, zooming in, and zooming out the model—could be shifted to the SpaceMouse® Wireless Kit 2.

In addition, right-clicks dropped from 13 to 9 (30.77% reduction), and mouse travel distance decreased from 63m to 46m (26.98% reduction), confirming improvements in both cursor movement and clicking operations.
These results indicate that SpaceMouse® Wireless Kit 2 is effective not only for improving productivity,
but also for reducing physical strain during extended 3DCAD modeling work.

Discussion

In this evaluation, improvements were confirmed across every metric: modeling time, number of clicks, and mouse travel distance. In particular, the number of middle-clicks was reduced by 97.50%, showing that SpaceMouse® Wireless Kit 2 made it possible to offload viewpoint control efficiently. While the improvement rate varied by task, a trend was observed in which the reduction in work time and clicks increased as tasks were repeated. This suggests that as users become more proficient, they can realize even more of the benefits of SpaceMouse® Wireless Kit 2.

In addition, being able to control the viewpoint with the left hand while performing modeling operations with the right hand at the same time helped keep work from being interrupted compared with using only a standard mouse, leading to better overall efficiency in CAD operations.Moreover, the flexibility enabled by a wireless setup is also well suited to educational settings, making it an input device that fits a wide range of learning environments, including classrooms and PBL activities.

Usability Evaluation

The SpaceMouse® Wireless Kit 2 is an input device that combines the convenience of wireless portability with intuitive viewpoint control. At first, it took some time to get used to the controls, but by using the training application provided by 3Dconnexion, it was possible to reach a practical level of proficiency in about one month. In actual 3D CAD modeling, being able to handle viewpoint control with the left hand and modeling operations with the right made it easier to maintain a smooth workflow, allowing modeling to move forward efficiently while checking the entire model. The reduction in both click counts and mouse travel distance also made it clear that the operating burden of using a standard mouse was reduced. In educational settings, in addition to the wireless convenience of flexible placement, it supports both ease of operation and reduced physical strain, making it an input device that can be readily used across a wide range of learning situations such as classes, exercises, and PBL activities. With continued use, improvements in learning efficiency and expansion into more practice-oriented design education can be expected.

Validation Data 3

	Modeling Time	Clicks (Left)	Clicks (Middle)	Clicks (Right)	Mouse Travel Distance
Q1 - Standard Mouse	10:40				
Q1 - 3D Mouse	08:58				
Q2 - Standard Mouse	07:21				
Q2 - 3D Mouse	07:05				
Q3 - Standard Mouse	06:27				
Q3 - 3D Mouse	06:09				
Q4 - Standard Mouse	09:23				
Q4 - 3D Mouse	08:16				
Q5 - Standard Mouse	08:19				
Q5 - 3D Mouse	07:40				
Q6 - Standard Mouse	09:01				
Q6 - 3D Mouse	08:56				
Q7 - Standard Mouse	07:04				
Q7 - 3D Mouse	06:43				
Q8 - Standard Mouse	09:54	406 times	64 times	18 times	83 m
Q8 - 3D Mouse	09:16	345 times	0 times	15 times	64 m]
Q9 - Standard Mouse	09:16	352 clicks	58 clicks	12 clicks	66 m
Q9 - 3D Mouse	08:16	306 clicks	0 times	11 clicks	45 m
Q10 - Standard Mouse	08:17	277 clicks	42 clicks	10 clicks	60 m
Q10 - 3D Mouse	07:48	273 clicks	1 click	5 clicks	40 m
Q11 - Standard Mouse	08:24	344 clicks	9 clicks	22 clicks	62 m
Q11 - 3D Mouse	08:16	326 clicks	4 clicks	8 clicks	52 m
Q12 - Standard Mouse	08:53	293 clicks	41 clicks	7 clicks	55 m
Q12 - 3D Mouse	08:24	282 clicks	0 times	6 clicks	41 m
Q13 - Standard Mouse	06:05	242 clicks	28 clicks	7 clicks	52 m
Q13-3D Mouse	04:37	180 clicks	0 times	6 clicks	32 m
Average Standard Mouse	08:23	319 clicks	40 clicks	13 clicks	63 m
Average – 3D Mouse	07:43	285 clicks	1 click	9 clicks	46 m
Reduction Rate	7.95%	10.66%	97.50%	30.77%	26.98%

	Standard Mouse	3D Mouse	Reduction Rate
Average Modeling Time	08:23	07:43	7.95%
Average Clicks (Left)	319 clicks	285 clicks	10.66%
Average Clicks (Middle)	40 clicks	1 click	97.50%
Average Clicks (Right)	13 clicks	9 clicks	30.77%
Average Travel Distance	63 m	46 m	26.98%

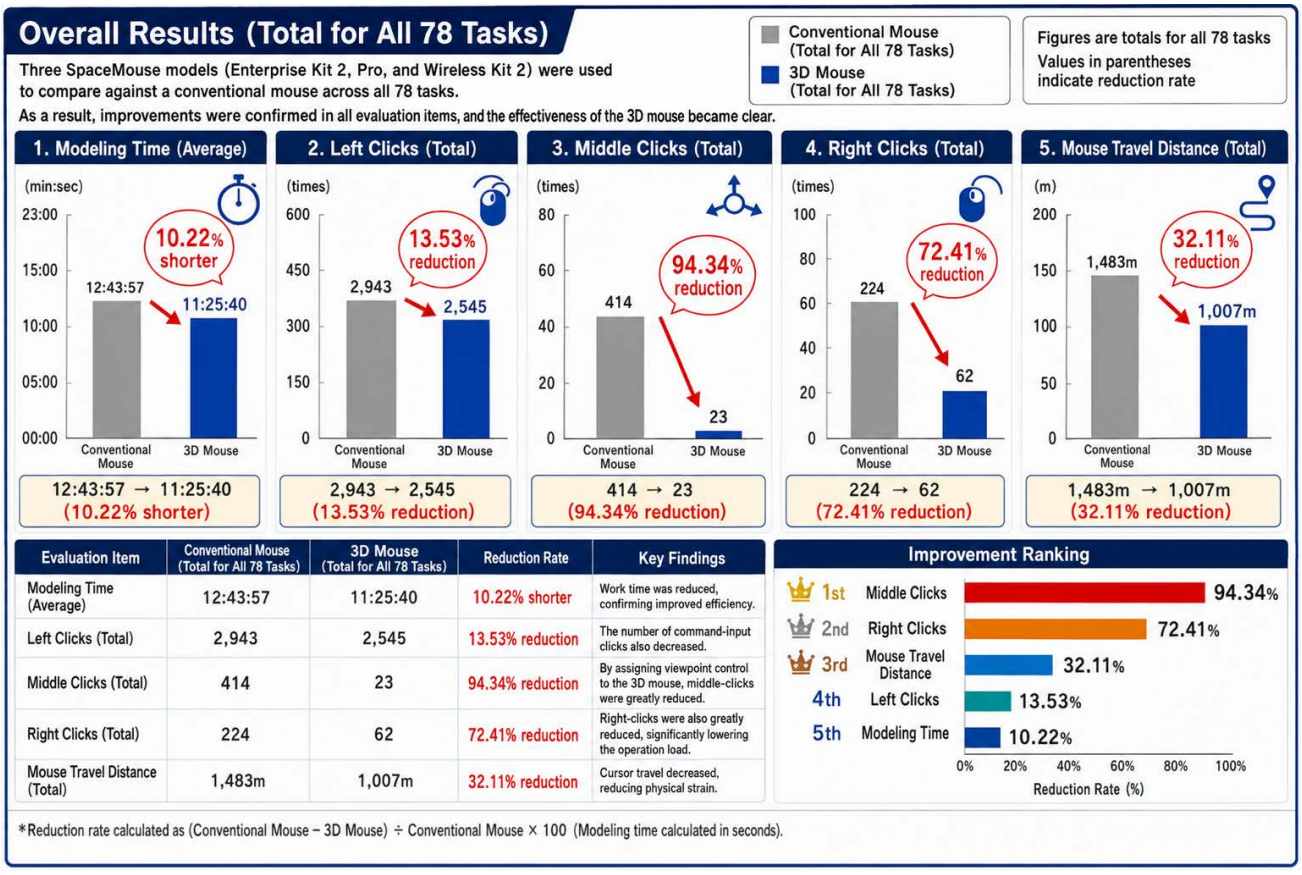
7. Overall Results

In this validation, we used three SpaceMouse models (SpaceMouse® Enterprise Kit 2, SpaceMouse® Pro, and SpaceMouse® Wireless Kit 2) to run a comparative evaluation against a standard mouse across a total of 78 tasks.

As a result, improvements were confirmed across every evaluation metric, clearly demonstrating the effectiveness of the 3D mouse.

Overall Results Summary

Based on a comparative evaluation across all 78 tasks, using a 3D mouse reduced average modeling time by 10.22%, confirming an overall boost in CAD workflow efficiency. In particular, viewpoint-related inputs dropped sharply: middle-clicks decreased by 94.34%, and right-clicks by 72.41%. With the SpaceMouse handling most viewpoint control, the operational load on a standard mouse was significantly reduced. In addition, left-clicks fell by 13.53%, indicating improved efficiency in the modeling actions themselves. These findings show that the SpaceMouse is more than just an input device: it can deliver both improved operational efficiency across 3DCAD modeling and reduced physical strain at the same time.



8. Overall Discussion

In this evaluation, we compared three types of SpaceMouse (SpaceMouse® Enterprise Kit 2, SpaceMouse® Pro, SpaceMouse® Wireless Kit 2) against a standard mouse. The results showed improvements across every evaluation metric, allowing us to quantitatively demonstrate the effectiveness of a 3D mouse.

In particular, the number of middle-clicks related to viewpoint control dropped by 94.34%, and right-clicks decreased by 72.41%. This confirmed that by handling most viewpoint actions—such as rotating, panning, zooming in, and zooming out—the 3D mouse can significantly reduce the operational burden placed on a standard mouse. In addition, modeling time was shortened by an average of 10.22%, and improvements were also observed in left-click counts and total mouse travel distance. These results indicate that a 3D mouse is not merely an input device that assists with viewpoint control, but an input device that contributes to improving overall efficiency in CAD modeling.

Additionally, identifying distinct strengths for each of the three models was another key outcome of this evaluation.

SpaceMouse® Enterprise Kit 2

It delivered an especially strong reduction in click actions tied to viewpoint control, making it highly effective at easing operational workload.

SpaceMouse® Pro

It showed the largest improvements in both modeling time and mouse travel distance, with a clear impact on boosting overall work efficiency.

SpaceMouse® Wireless Kit 2

It was confirmed to offer an excellent balance of ease of use, portability, and work efficiency, making it a model that' s easy to adopt in educational settings.

In addition, despite the relatively short familiarization period of about one month in this evaluation, improvements were observed across all products. With continued use, users are expected to become even more proficient, further boosting work efficiency and reducing physical strain.

Based on these findings,the SpaceMouse series not only improves operational efficiency in CAD modeling, but is also effective in reducing physical strain during long work sessions, leading to the conclusion that it is a highly useful input device for both educational environments and design work.

9. Educational Reflections (Instructor' s Perspective)

In educational settings, the goal of 3D CAD instruction is not simply to learn how to operate 3D CAD software, but to develop the design capability to accurately translate design intent into form and solve problems.
However, beginner CAD users tend to spend a lot of time navigating the viewpoint, and in many cases their attention shifts to the controls themselves rather than to the design thinking and modeling skills they should be focusing on. In this evaluation, introducing the SpaceMouse series significantly reduced the number of clicks related to viewpoint control, confirming that students can move through modeling in a more natural flow while still checking the entire model. As a result, it became clear that this could help create a learning environment where students can focus less on 3DCAD operation and more on design and shape review. In addition, during long modeling sessions, the physical strain from repetitive mouse actions can often affect learning efficiency. In this evaluation, reductions in click counts and mouse travel distance were confirmed, so educational benefits can also be expected from the standpoint of reducing physical burden. Furthermore, seeing measurable improvement in a short period of about one month suggests it is practical for adoption in educational settings. With continued use in classes, PBL, graduation research, and other activities, students can become more proficient, and even greater educational impact can be expected.

In the manufacturing industry of the future, designers will be expected to possess not only basic 3D CAD skills, but also strong capabilities in design quality, problem-solving, and creativity. To help create this kind of educational environment, the SpaceMouse series is considered an effective input device that enables students to remain focused on the design work itself.

This validation is a case study that quantitatively measured the real-world impact of implementing this approach in educational settings, and it is expected to contribute to advancing 3D CAD education as well as to the growth of learning environments developed through collaboration between schools and industry.



10. Future Outlook

In this evaluation, we confirmed that introducing a 3Dconnexion 3D mouse into educational settings can be effective in improving productivity and reducing physical strain—such as by shortening modeling time, cutting down the number of clicks, and decreasing overall mouse travel distance. That said, this evaluation covered a relatively short period of about one month, so we will need to continue further verification to better understand proficiency gains and educational impact from ongoing use.

Going forward, we plan to conduct continued evaluations from perspectives like the following, to further clarify the potential of using a 3D mouse in educational environments.

Proposed Future Evaluation Topics (Draft)

- Evaluate operational proficiency and learning outcomes during long-term use (six months to one year).
- 3DCAD Comparative evaluation of educational outcomes for beginner vs. advanced DCAD users
- PBL (Project-Based Learning) impact assessment on design quality
- 3DEXPERIENCE Optimizing the design education environment through integration with
- Developing and sharing best practices in educational settings

In addition, our school—centered around the ASO Innovation Lab—actively promotes collaboration with companies, educational institutions, and overseas partners. We will continue working with 3Dconnexion, sharing insights and real-world examples gained from the classroom to help drive better product development and an improved learning environment. We hope this study serves as one example of how 3D mice can be used in education, contributing to the growth of both educational institutions and industry, and we aim to keep creating new value through ongoing collaboration between education and the industrial sector.

11. Conclusion

—From the Student Representative—

For this project, we used a SpaceMouse provided by 3Dconnexion for about one month and conducted a comparative evaluation against a standard mouse. At first, the controls felt very different from the typical mouse we were used to, and there were times when it didn’ t work the way we expected. However, by continuing to use it while taking advantage of the training application provided by 3Dconnexion, we gradually got comfortable with the 操作 and became able to control the viewpoint more intuitively. As a result, it became easier to stay focused on modeling tasks, and we were able to feel both improved efficiency and reduced physical strain. In addition, this evaluation wasn’ t limited to simply trying the product—we also collected and analyzed data such as modeling time, number of clicks, and mouse travel distance, then objectively assessed and discussed the results, which was a valuable experience. Through this process, we also learned how to look at products from an evaluation perspective and why data-driven analysis matters, making it an extremely meaningful learning experience for us.

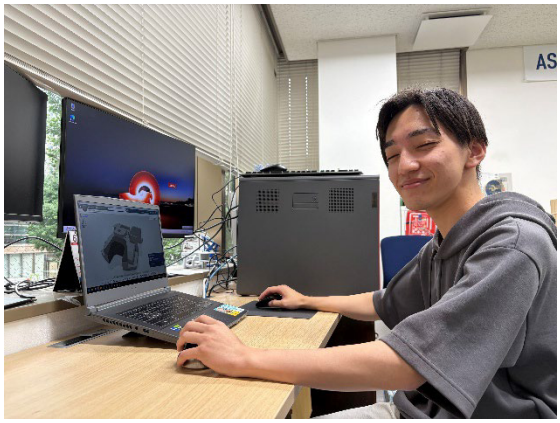
Through this evaluation, we truly realized how important it is to have an environment that lets us focus not on “operating CAD,” but on “thinking through better designs.” We hope to apply what we learned here to our future studies and design work, and to our growth as engineers who will be involved in manufacturing in the years ahead. Finally, we would like to express our sincere gratitude to everyone at 3Dconnexion for providing us with this valuable opportunity. We also extend our deepest thanks to the faculty who guided us, and to all those who supported and cooperated with this evaluation.

We would be delighted if these findings could contribute, even in a small way, to the continued advancement of 3Dconnexion products and to further strengthening 3D CAD education in academic settings.

Thank you very much for your time and support.

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ASO Innovation Lab

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Thank You

"Innovating Engineering Education Through Collaboration"

ASO Innovation Lab

ASO Architecture & Design College

Product Design Department

Special Thanks to 3Dconnexion for providing us with the opportunity to conduct this educational evaluation.

We sincerely appreciate your support and collaboration.

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Student Research Team

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