

Supporting information

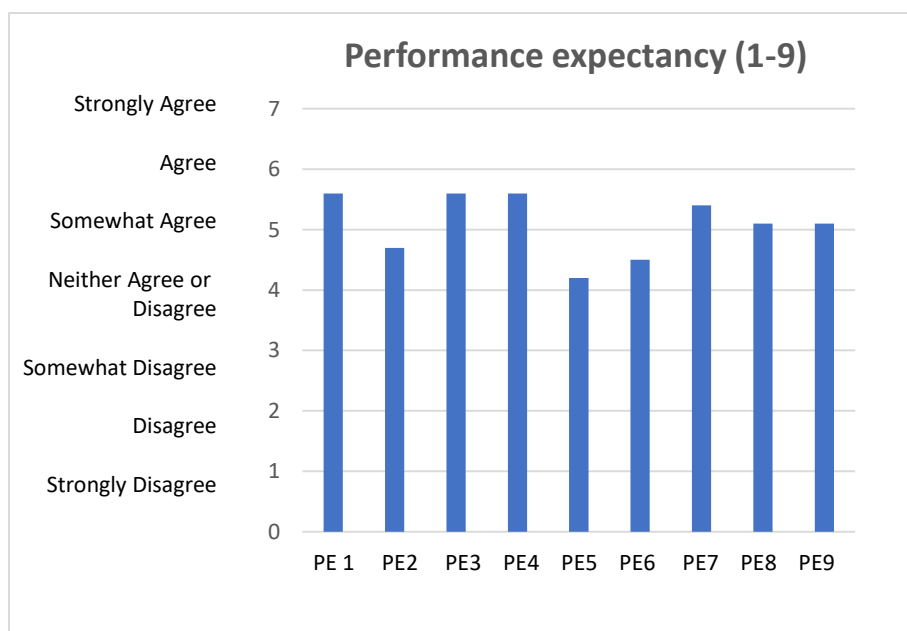
Below there are eight sets of questions about 3D-printing map Creator Application. Each set of questions is focused on one of important topics (e.g. performance expectancy). The scores were averaged after interviewing all the users and plotted as summary of the results.

Performance Expectancy Results

The Performance Expectancy data showed positive user feedback demonstrating that users of the application found that it would greatly improve their productivity and work efficiency (Supporting Figure S1).

Supporting Table S1. Questions about user's performance expectancy.

| Performance expectancy (PE: 9 items) |
|--|
| 1. Using a 3D printing map creator would enable me to accomplish given tasks more quickly. |
| 2. Using a 3D printing map creator in my job would improve my performance. |
| 3. I would spend less time in completing given tasks if using a 3D printing map creator in my job. |
| 4. Using a 3D printing map creator would make it easier to do my tasks. |
| 5. Using a 3D printing map creator would increase my chances of obtaining good evaluation in my works. |
| 6. Using a 3D printing map creator would make me treat other coworkers as collaborators. |
| 7. Using a 3D printing map creator in my job would increase my productivity. |
| 8. Using a 3D printing map creator in my work would improve my effectiveness in completing tasks. |
| 9. I would find use of a 3D printing map creator useful in my classes. |



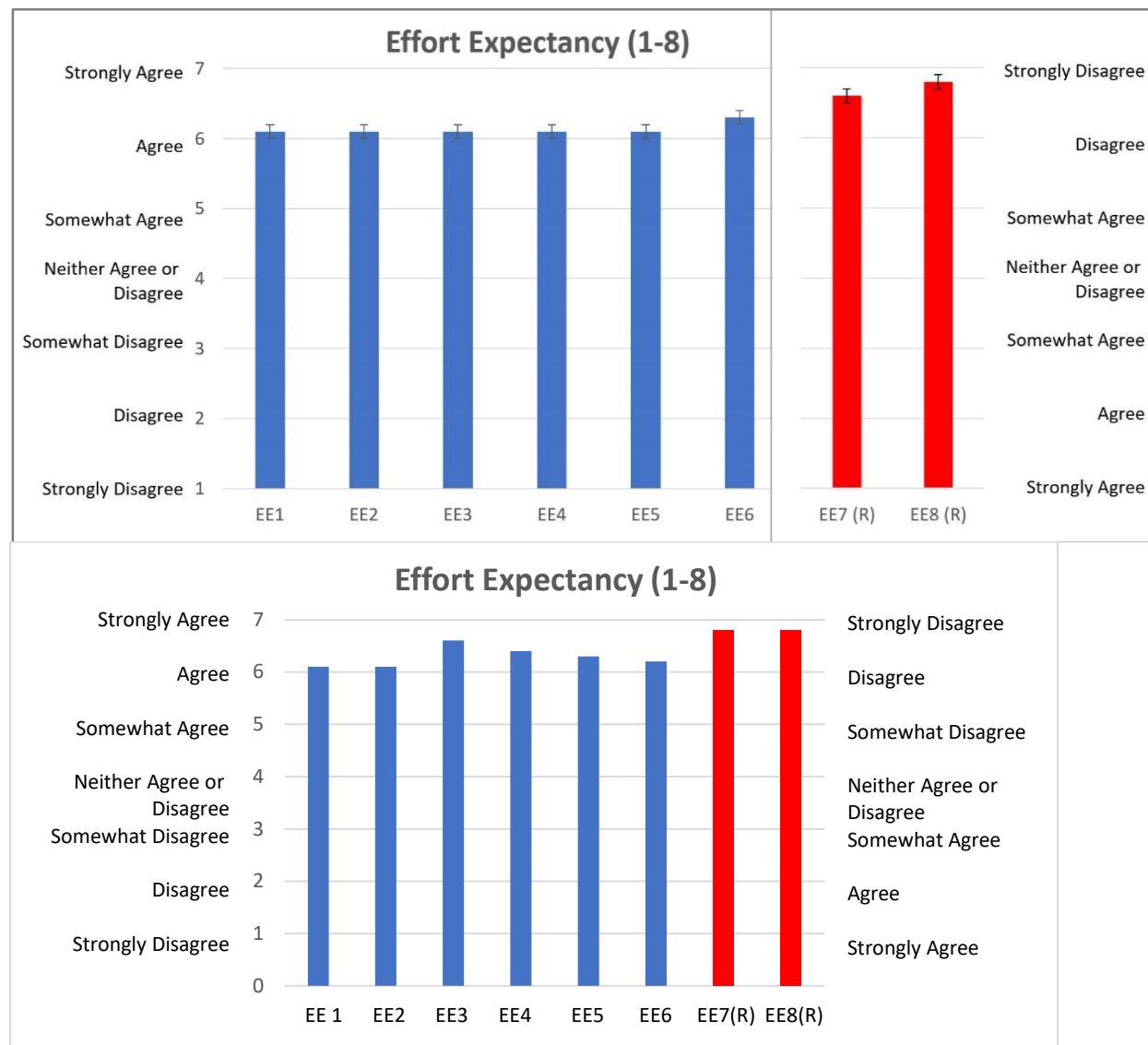
Supporting Figure S1. Averaged scores assigned by the users for the performance expectancy.

Effort Expectancy Results

The Effort of Expectancy results demonstrated strong positive feedback showing that the users found that the map creator application was both easy to learn and easy to use (Supporting Figure S2). Therefore, the map creator was not found to be complicated to use or hard to learn for the participants.

Supporting Table S2. Questions about user's Effort of Expectancy.

| Effort expectancy (EE: 8 items). |
|--|
| 1. Learning to use a 3D printing map creator is easy for me. |
| 2. I find it easy to get a 3D printing map creator to do what I want it to do. |
| 3. My interaction with a 3D printing map creator is clear and understandable. |
| 4. I find a 3D printing map creator to be flexible to interact with. |
| 5. It is easy for me to become skillful at using a 3D printing map creator in my works. |
| 6. I find a 3D printing map creator easy to use in my works. |
| 7. Working with a 3D printing map creator is complicated and it is difficult to understand what is going on. (R) |
| 8. It takes too long to learn how to use a 3D printing map creator to make it worth the effort. (R) |



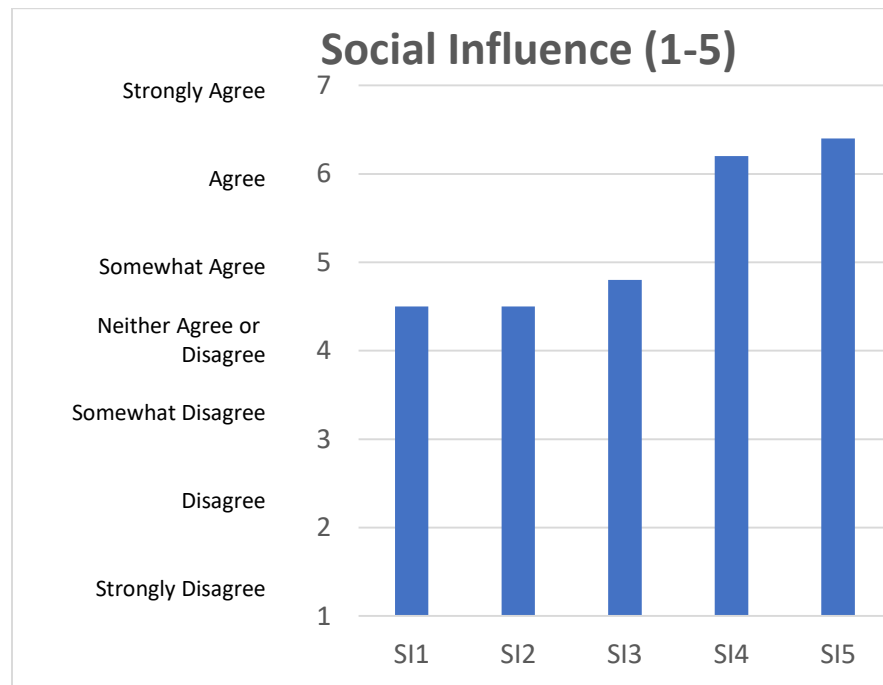
Supporting Figure S2. Bar graph of the Effort Expectancy Data, EE7 and EE8 (in red) are reversed survey questions.

Social Influence Results

User feedback from the Social Influence data showed positive results that participants agreed that co-workers would support the use of the Map Creator application in the workplace (Supporting Figure S3).

Supporting Table S3. Questions about user's opinion about Social influence.

| Social influence (SI: 5 items) |
|--|
| 1. People who influence my behavior think that I should use a 3D printing map creator. |
| 2. People who are important to me think that I should use a 3D printing map creator. |
| 3. My co-workers in my workplace would be helpful in the use of a 3D printing map creator. |
| 4. My co-workers would be very supportive of the use of a 3D printing map creator for my work. |
| 5. In general, my workplace would support the use of a 3D printing map creator. |



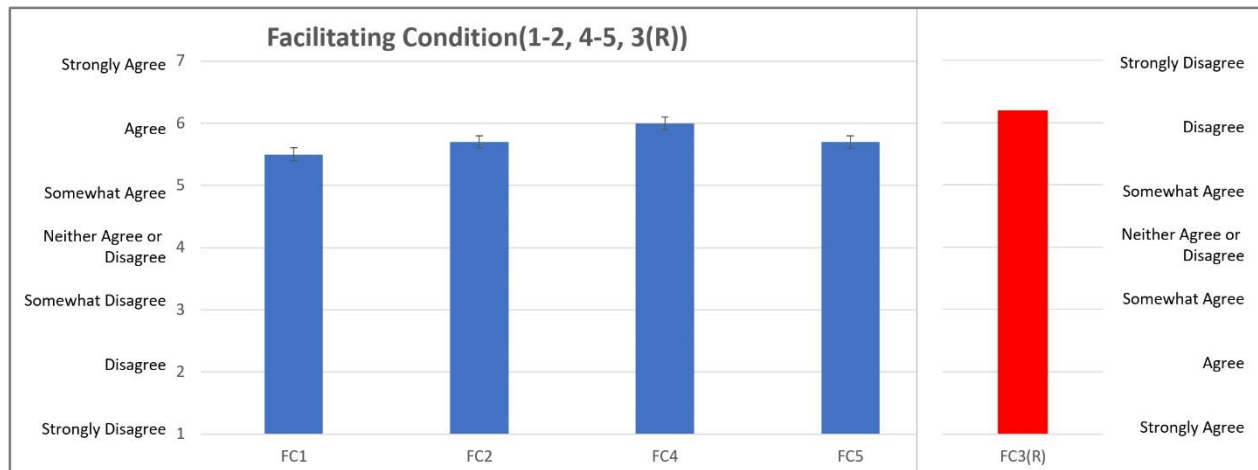
Supporting Figure S3. Bar graph of the Social Influence Data.

Facilitating Conditions Results

The results of the Facilitating Conditions portion of the survey displayed that all the participants have access to the resources, knowledge, and support that is necessary to use the map creator applications (Supporting Figure S4).

Supporting Table S4. Questions about user's opinion about Facilitating conditions.

| Facilitating conditions (FC: 5 items) |
|--|
| 1. I have the resources necessary to use a 3D printing map creator. |
| 2. I have the knowledge necessary to use a 3D printing map creator. |
| 3. The 3D printing map creator is not compatible with other computer programs I use. (R) |
| 4. The technology support personnel (help desk) is available for assistance with 3D printing map creator difficulties. |
| 5. Using a 3D printing map creator fits into my learning style. |



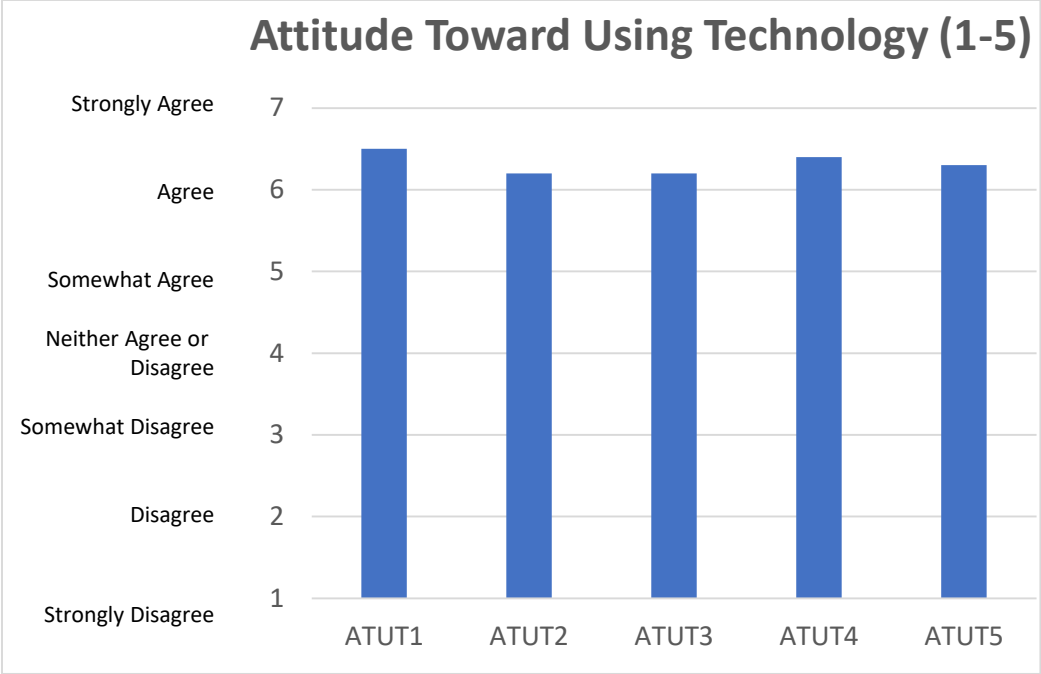
Supporting Figure S4. Bar graph of the Facilitating Conditions data. FC3 (red) is a reversed survey question.

Attitude Towards using Technology Results

The feedback from the survey revealed that all the participants showed positive support and agreed or strongly agreed that the map creator application is fun and pleasant to use for their work (Supporting Figure S5). Therefore, they would most likely adopt this technology as a tool for their work tasks.

Supporting Table S5. Questions about user's attitude toward using technology.

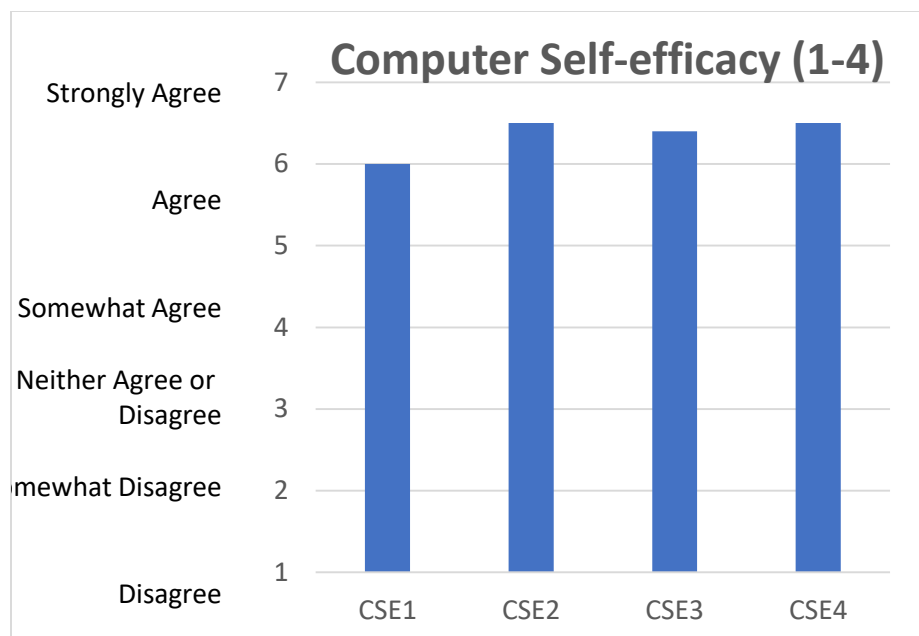
| Attitude toward using technology (ATUT: 5 items) |
|--|
| 1. Using a 3D printing map creator in my workplace is a good idea. |
| 2. I like working with a 3D printing map creator in my works. |
| 3. Using a 3D printing map creator in my works is pleasant. |
| 4. 3D printing map creator makes my works more interesting. |
| 5. Using a 3D printing map creator is fun. |



Supporting Figure S5. Bar graph displaying the results of the Attitude Towards Technology portion of the Scheme 6. This finding shows that users felt that they could use the application on their own, as well as with a built-in help feature, and enough time to complete the task.

Supporting Table S6. Questions about user’s computer self-efficacy.

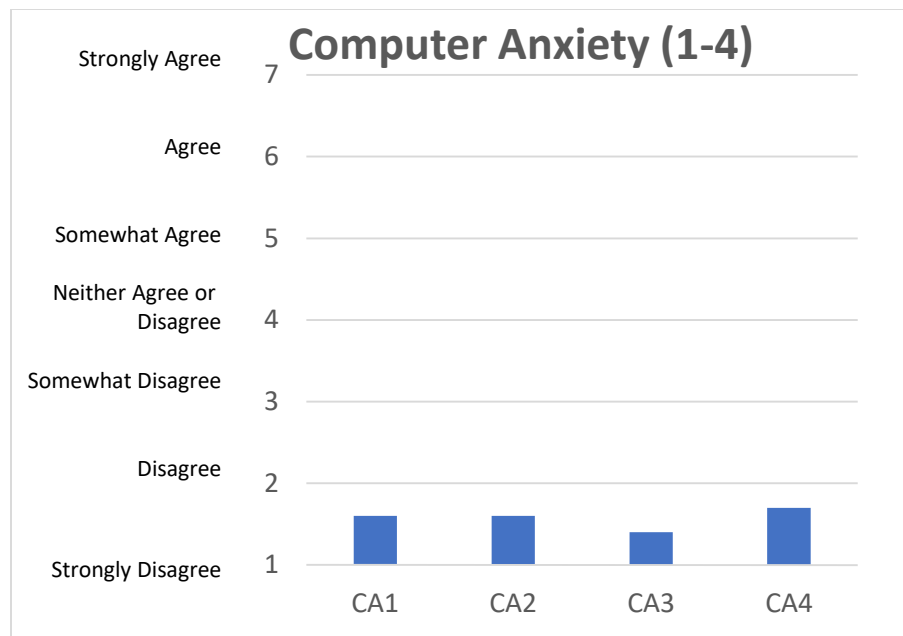
| Computer self-efficacy (SE: 4 items) |
|---|
| 1. I could complete a given task using a 3D printing map creator even if there was no one around to tell me what to do. |
| 2. I could complete a given task using a 3D printing map creator if I could call someone for help when I got stuck. |
| 3. I could complete a given task using a 3D printing map creator if I had a lot of time to complete the task for which necessary resources were provided. |
| 4. I could complete a given task using a 3D printing map creator if I just had built-in help facility for assistance. |



Supporting Figure S6. Bar graph showing the results of the Computer Self-efficacy portion of the usability Scheme 7.

Supporting Table S7. Questions about user's computer anxiety.

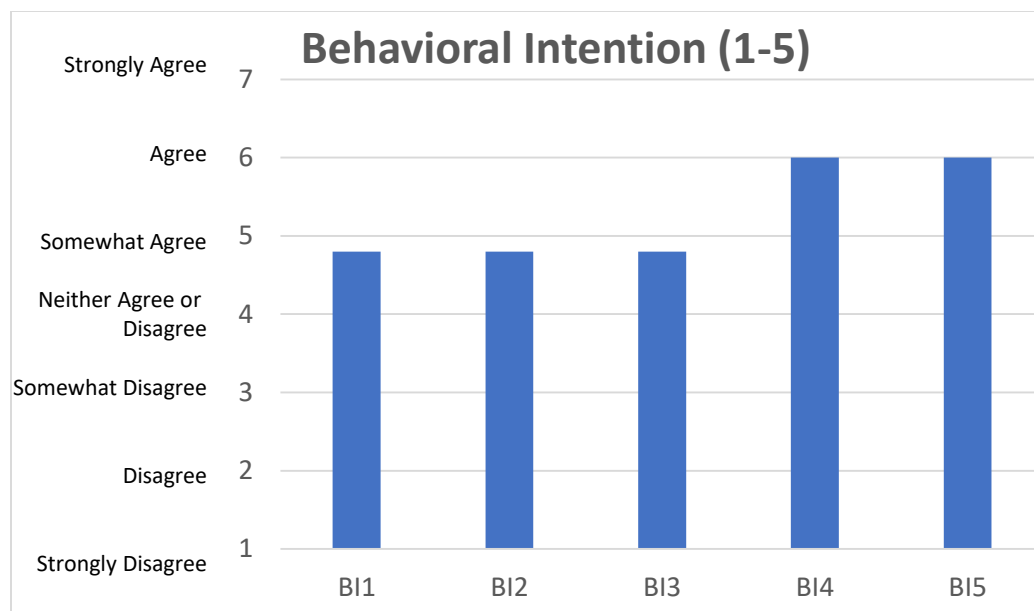
| Computer anxiety (ANX 4 items) |
|--|
| 1. I feel apprehensive about using a 3D printing map creator. |
| 2. It scares me to think that I could lose a lot of information using a 3D printing map creator by hitting the wrong button. |
| 3. I hesitate to use a 3D printing map creator for fear of making mistakes I cannot correct. |
| 4. A 3D printing map creator is somewhat intimidating to me. |



Supporting Figure S7. Bar graph showing the results of the Computer Anxiety portion of the usability Scheme 8.

Supporting Table S8. Questions about user's behavioral intention.

| Behavioral intention (BI: 5 items) |
|---|
| 1. I intend to use a 3D printing map creator in the next 6 months. |
| 2. predict I would use a 3D printing map creator in the next 6 months. |
| 3. I plan to use a 3D printing map creator in the next 6 months. |
| 4. I will use the 3D printing map creator on a regular basis in the future. |
| 5. I will use the 3D printing map creator frequently in the future. |



Supporting Figure S8. Bar graph showing the results of the Behavioral Intention portion of the usability survey.

Comparison of the maps created by the users of Map Creator Application and by professionals using CAD software conducted by eight individuals with blindness

Eight individuals with blindness evaluated both types of maps. Previously they liked the maps created by the professionals using CAD, and the goal was to make sure that by using our Map Creator Application even people without technical background can create maps as well accepted by the end users. Questions asked to the participants during comparison test were:

- 1) Can you distinguish and discern the symbols and features on both types of maps?
- 2) Do each of the maps provide adequate tactile features?
- 3) Can you locate and recognize each symbol on both types of maps?
- 4) Are the maps easy or hard to use?
- 5) Which map(s) do you prefer?

Summary of the participants' feedback:

All eight participants liked both types of maps. Seven of the participants said that they could not tell the difference them and preferred both types. This suggests that the 2D drawing followed by 3D conversion in the Application produced tactile features similar to ones in manually designed 3D CAD maps. There was no difference in the answers to the questions when comparing both map types. All of the participants said they could understand and use both types of maps. This was a very encouraging outcome, since this means that our application can now enable custom map development by many caregivers who previously was unable to do it because of the lack of technical expertise. We hope it will help to make 3D-printed tactile maps much more available to the population of people with blindness.