Examination of Use of AI in Managing Digital Communities: By Using Avatars for Experiential Learning for Beginners in Programming and Support by Generative AI

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Abstract

With the development of ICT technology, especially avatar technology, and the spread of game commentary and Vtuber activities, the use of avatars in digital content and online communities has increased. The purpose of this study is to enable the promotion of experiential learning for novice programmers through the use of AI in the operation of digital communities. Policies will be developed through regular meetings and events, with feedback and reaction functions to facilitate communication and operational support—lecture support conducted to programming learners for technical learning. In order to verify this objective, we established regular learning opportunities in communities that practice multiple technology learning. We attempted to create operational examples utilizing avatars and generated AI. The standard features of the widely used online conferencing tools Zoom and Teams, FaceRig, were used as a supplemental method of personal identification for part of the management side and test the iPhone's TrueDepth camera and ARkit available for avatars. We also used typical software such as 3tene, a simple avatar-tracking software using an ordinary webcam, and delivery software to customize and adjust screen delivery. Furthermore, this time, we will discuss how easily anonymous and auxiliary elements can be utilized in interactive hands-on and community operations and what elements are necessary for building and operating a place to improve ICT utilization skills, primarily focusing on young first-time learners. Specifically, hands-on training was held on creating LINE applications that use generated AI, and a sample application created from a model was made into a familiar consultation application from the learner's perspective. We also considered whether or not this would lead to a future reduction in support costs for the management side. In the above, we have conducted a practical application to support experiential learning and examined future issues and possibilities.

1 Introduction and Background

In Japan, programming education for beginners is rapidly being promoted to foster logical thinking. In addition, promoting informatization beyond regional boundaries is needed to solve the problems of population decline and labor shortage. The need for more human resources responsible for the future of local communities has become a severe problem (Ministry of Economy, Trade and Industry 2021).

In order to improve and solve this situation, the government has proposed the "GIGA (Global and Innovation Gateway for All) School Concept." It aims to realize an educational ICT environment that fosters individualized and optimized creativity by entirely using personal computers and tablet terminals (MEXT 2021).

As a new educational system concept, STEAM is an acronym for Science, Technology, Engineering, Arts, and Mathematics that comprehensively covers critical thinking, communication skills, and teamwork. In addition, "STEAM utilization of learning" is also a current agenda (Ministry of Economy, Trade and Industry 2022).

Therefore, in the digital community, it is necessary to develop learning into "more interdisciplinary, creative, and social learning" to cultivate the ability to create value in the fourth industrial revolution by promoting the use of AI in learning and hands-on management.

In a related case, there is an example of a development analysis focusing on the effect of learning through asynchronous e-learning lectures in VR space[1] (Tokunaga et al. 2020). However, since the place for learning is not necessarily VR, it is necessary to consider easy-to-use learning support structures in the operation of digital communities.

From the viewpoint of operation and learner support, the authors considered that there is room to consider how ICT technology utilization leading to experiential learning for beginners (in this case, avatar technology and an application using generative AI) can be applied to the community.

2 Use and Support of ICT Technology for Beginners

The proliferation of online learning content has increased voluntary ICT technology learning opportunities and a growing demand for such learning from beginning students. This change is more flexible than traditional educational methods and allows users to learn at their own pace, so demand from beginners is rapidly increasing. With the adoption of new technology, learners can now utilize online platforms to access a variety of specializations and skills. Technologies provide a wide range of learning content, from the basics to applications of ICT technology, and allow beginners to advance their learning according to their interests and goals.

However, there are various opinions regarding how these changes will affect the role of educators. These technologies can potentially transform education and even replace educators. However, related research shows that this is simply due to expectations and enthusiasm for the evolution of technology, and there is a strong opinion that the presence and role of educators will continue to be significant (Bozkurt 2020). In this context, online learning content is increasing, and educators and educational institutions must respond appropriately. There is an urgent need to advance educational technology and ethics research by approaching it from both technological and ethical perspectives. This will likely consider potential challenges and ethical perspectives associated with introducing and using technology, creating a more sustainable and inclusive educational environment.

Therefore, the authors have managed an online-based technology learning community since around 2018 and have provided learning support for beginners about once a month. In addition, we examined the possibility of using avatar technology in learning opportunities, mainly for young people who are just beginning to learn about technology. The authors have continued to provide practical learning opportunities such as events and educational materials in communities specialized in information security since around 2016. Still, the rapid increase in demand, the rise in operating costs, and the shortage of ICT human resources capable of conducting the operations are remarkable. Therefore, we considered that there is a possibility to utilize community management not only in terms of the effect on learners but also in terms of the use of avatars when participating in the direction of the community and the duration of the auxiliary elements of teaching materials by the generated AI.

2.1 Avatar Technology for Communication

Avatar technology was utilized to make it difficult to identify individuals and avoid screen-off and voice-only venues at initial meetings and other occasions to keep management and study members who typically live far away from each other connected across regions and organizations. This validation confirmed from actual feedback that reducing barriers to communication is effective in keeping core members, who typically live far apart, connected across regions and organizations. Avatar

[1] Compared with conventional video lessons, e-learning using the system eliminates the sense of isolation. It improves the motivation for learning, suggesting that e-learning has a particular effect in preventing the loss of concentration.

Future issues include producing classes where students can concentrate more fully and feel more immersed than video classes. For this purpose, it is necessary to develop experiential content that takes advantage of VR, to create avatars that behave more human-like, and to produce classes that are adaptive to the learners.

technology could facilitate communication in two communities: one where face-to-face meetings are held only a few times a year and a digital community where meetings and events are essentially online. A precise validation, including emotions, has also been done in related studies (Hattori and Nagao 2022).

Figure 1. Try monthly activities meeting with avatar

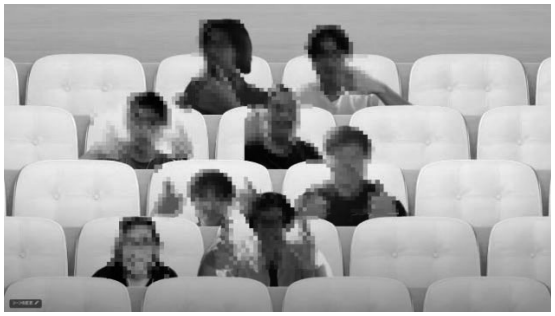

Figure 2. Group photo-like function of people in teams

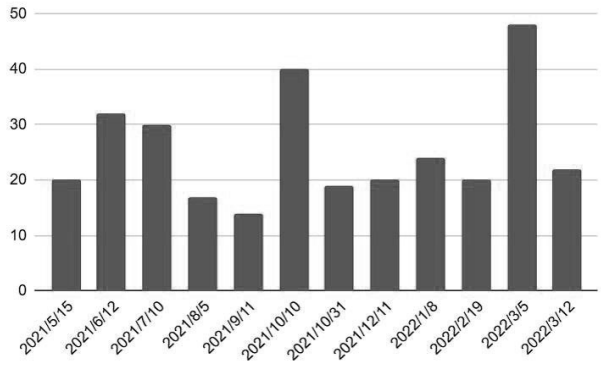

Figure 3. Number of participants in the community who meet offline regularly several times a year

Figure 4. A simple avatar movement

In addition to the Live2D model, which has long been a significant technology for utilizing avatars, there is also the VRM model, which has many practical examples. Using existing models[2] makes it easy for anyone to use avatars without specialized knowledge.

Even more advanced avatar-based communication facilitation can be facilitated easily by using the easy-to-use open-source avatar tracking software "3tene" [3] by a Japanese developer, as shown in Figure 5. Of course, even without avatars, it was easy to realize digital gatherings with standard meeting functions. From these practices, we constructed a place for experiential learning in an online space using synchronous avatars. It is important to note that digital gatherings with standard meeting functions were effortlessly realized even in the absence of avatars.

By making the application and deployment of such communication technologies more accessible, there is a potential avenue for discovering and addressing latent challenges in both the technological and ethical realms through practical use. This could pave the way for sustained advancements in educational technology and the exploration of new possibilities within digital communities.

Figure 5. Setting example using existing avatar

[2] https://vroid.pixiv.help/hc/ja/articles/4402394424089

[3] https://3tene.com/free/

2.2 Generative AI to Support Operations and Participants

We conducted a hands-on training session to create an app that uses generation AI and surveyed to see if the sample app created from the template could be used as an aid from a learner's perspective. We found that it is an adequate support. It was somewhat effective in reducing the costs and burden on the operating side of the authors. In this initiative, the participants themselves, who are beginners, conducted hands-on AI utilization in the form of a LINE app so that the generative AI could be easily used.

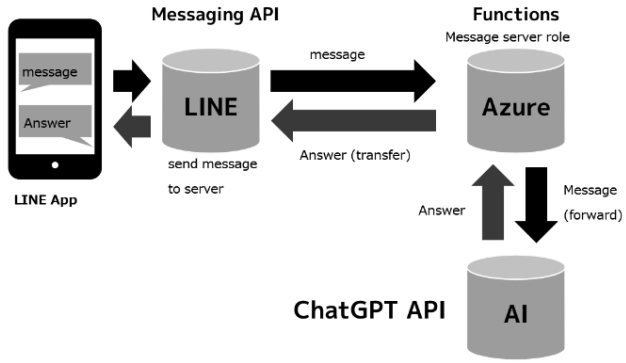

Figure 6. Hands-on application conceptual diagram (Miyagawa et al. 2023)

In the case of traditional Chatbot mechanisms based on conventional logic, it was not easy to reduce support costs for participants. However, in this verification, we were able to propose flexible solutions and provide experiential learning opportunities to many beginners with only about 60 minutes of hands-on teaching materials[4].

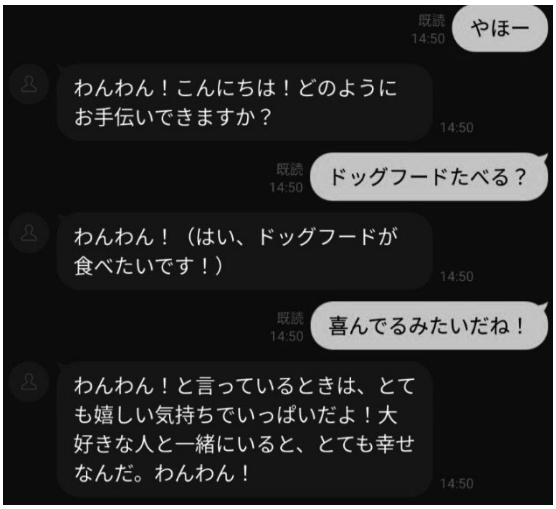

Figure 7. Supporting learners by adding characters to created LINE app

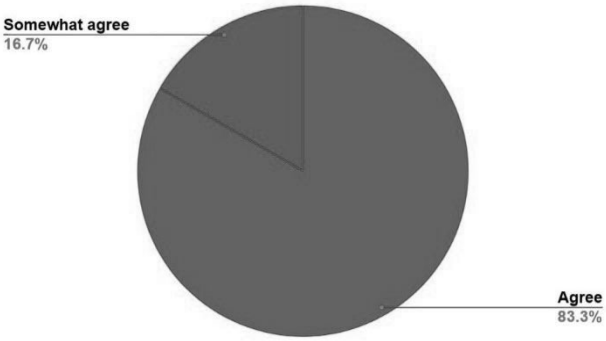

Figure 8. Survey on the need for hands-on supporters

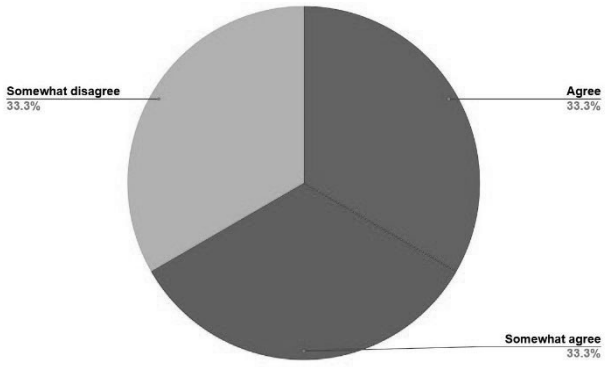

Figure 9. Do you think it is possible to provide hands-on support using ChatGPT?

[4] https://1ft-seabass.github.io/msbuild-japan-mlsa-ai-handson-20230628/

3 Conclusions

In this study, we have practiced and discussed the possibilities of promoting communication and experiential learning in synchronous digital community management with avatar technology and generative AI, which is becoming increasingly popular and assisted support. The current avatar technology is easy enough to utilize tracking technology, such as facial recognition, and we saw it as likely to be effective in reducing communication hurdles with first-time learners and in understanding the status of participants in community management. Furthermore, a few organizers could run hands-on events.

On the other hand, since it is clear that we are in technological advancement, it would be meaningful for the community to take advantage of this to learn through hands-on learning and hands-on activities with a game element. Furthermore, it was found that the conventional Chatbot and the generative AI are capable enough to be utilized by learners and administrators to create teaching materials and check operational flow as a sufficient auxiliary support AI without any need for comparison. The survey in Figure 8, 9, which was collected from young first-time learners at the hands-on event, also showed that most hands-on participants found assistance using ChatGPT, a generative AI, to be valid.

4 Summary and Outlook

Through this hands-on learning experience, we provided first-timers with a hands-on learning experience using avatar technology and generative AI. On the other hand, in terms of contents not directly related to the hands-on activities and participant support, we felt that the creation of a place for chatting and consulting with the generative AI through the LINE application we created this time may lead to a solution to the shortage of human resources in community learning in the future.

In addition, in promoting an interactive learning environment in the STEAM library, we felt the possibility of creating a community that includes a game element with a sense of humor and a reduction of anxiety by using natural and comfortable support methods such as avatar technology and a generative AI.

With the spread of avatar technology, we would like to focus on the difference between the promotion of communication in digital communities using existing software and the latest small motion sensors and the promotion of communication using gesture, body, and facial expression tracking in a simple online space, such as the one used mainly in this verification. We want to focus on communication's effects, differences, and characteristics. We would also like to examine which types of novice learners are more likely to engage in experiential learning using auxiliary aids while continuing to hold workshops and other activities.

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