

understand a task'. Activity Cluster 2, 'activities of note-taking and creating presentation slides for introducing a topic', is effective for enhancing Consciousness Cluster II, 'consciousness towards competence to set up and undertake a task on schedule'. Activity Cluster 3, 'an activity to listen to a lecture', is useful for raising Consciousness Cluster I, 'consciousness towards understanding computers and knowledge of AI'.

(2) Activities effective for students' consciousness-raising in both modules were identical except their significance levels.

(3) In 'AI Technology', students were categorized into four clusters according to their characteristics by means of principal component analysis and cluster analysis.

For further research, it is possible to attempt utilizing multiple media or applying a same medium in a different way and time in order to identify various learning effects. Such research outcomes surely contribute to create more effective pedagogical environment in the classrooms.

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7. References

- [1] Adachi, K. (2007) "Analysis of the classification of the learners' activities in blended learning", *Japan Journal of Educational Technology*, 3(1), pp.29-40. (in Japanese)
- [2] Bersin, J. (2004) *The Blended Learning Book: Best Practices, Proven Methodologies, and Lessons Learned*, Pfeiffer, USA, San Francisco.
- [3] Miyaji, I. (Ed.) (2009) *Toward Blended Learning from e-learning*, Kyoritu-Shuppan, Japan: Tokyo. (in Japanese)
- [4] Arakawa, M., Ueki, Y., and Fuyuki, M. (2004) "Spontaneous learning activation spiral education method utilizing web-based coordinated education activation system CEAS", *Japan Journal of Educational Technology*, 28(4), pp.311-321. (in Japanese)
- [5] Miyaji, I., and Yoshida, K. (2005) "Practice and learning effect of education by blending of lecture and e-learning", *Transactions of Japanese Society for Information and Systems in Education*, 22(4), pp.230-239.
- [6] Miyaji, I., Yoshida, K., and Naruse, Y. (2007) "Effects of blending e-learning and lectures utilizing a structured notebook", *Transactions of Japanese Society for Information and Systems in Education*, 24(2), pp.208-215.
- [7] Miyaji, I. (2009) "Effects on blended class which incorporates e-learning inside the classroom", In G. Richards (Ed.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2009*, Vancouver, Canada, pp.1818-1825.
- [8] Miyaji, I. (2009) "Comparison between the blended classes which incorporate e-learning inside and outside the classroom", *Proceedings of the 17th International Conference on Computers in Education ICCE2009*, KONG, S.C., et al. (Eds.), Hongkong, pp.306-310.
- [9] Miyaji, I. (2011) "Comparison between effects in two blended classes which e-learning is used inside and outside classroom", *US-China Education Review*, USA, 8(4), pp.468-481.
- [10] Miyaji, I. (2017) "Change of Technical Terms and Awareness of Blended Classes in 'AI Technology'", *Proceedings of the 16th International Conference on Information Technology Based Higher Education and Training, ITHET2017*, Ohrid, Macedonia, pp.4-5.
- [11] Touchi, J. (2010) *New Illustrated Introduction to Artificial Intelligence*, Nihonrikou-shuppankai, Japan: Tokyo. (in Japanese)