TABLE III
STEPWISE REGRESSION ANALYSIS EXAMINING OVERALL SATISFACTION

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.080	.489		4.255	.000
	Contents	.448	.133	.484	3.361	.002

a. Dependent Variable: overall satisfaction

The results indicate that overall satisfaction of the experiment can partially be predicated by whether the contents were accessible enough for the participants. Nonetheless, other factors such as the accessibility of the login system, the access interface of the system or the accessibility of the exercise included in this experiment were not able to explain or predict the overall satisfaction for the users.

IV. CONCLUSION

Since there was a limitation of devices such as the keyboard and the mouse, previous e-learning contents were only able to utilize the one-way interaction between the learning contents and the learners. These kinds of one-way interactions and contents, however, were not able to take the real learning laboratory experience into the contents, let alone achieve the learner-center learning environment. Using only the mouse and keyboard not only create a passive learning environment, but it also decreases the level of concentration and interest, while real-life laboratory learning is all learner-centered and encourages learner participation.

Therefore, but we have also tried to make a new learning environment for engineering/natural science-majored learners. First, virtual interaction learning contents with digital textbook were proposed, and the interactive digital textbook using smartphone sensors and methodology of an interactive digital textbook for experimental subjects were developed. Developing digital textbook with interactions should fully take consideration of the relationship between the various interactions and learning efficiency. We will measure the relationship and efficiency of learning interactions and learning activities.

.

REFERENCES

[1] K. Chung, "Learning Reaction Analysis Engine for Interactive Digital Textbook Platform," Advanced Multimedia and Ubiquitous Engineering pp 459-465, 2017.

[2] K. Chung, et al., "Design and Development of Sensor-based Virtual Experiment Contents for Smart Phone," Chungbuk Journal of Education 2007. Vol 28 No. 1., pp. 39-69, 2007.

[3] B. Son,l et al., "A Study on the Case of Domestic and Foreign E-textbooks," Korea Education & Research Information Service. RR 2004-5, 2004.

[4] Y. Jung, et al., "A Study on the Standardization (Methods) of Digital textbooks," Korean Educational Development Institute. CR-2008, 2008.

[5] K. Son, A. Han, "Design and Development of e-Learning Contents Authoring System based on e-Learning Environment," The Journal of Educational Information and Media, Vol 12(4), pp.77-104, 2006.

[6] S. Ku, K. Youn, "A Study of Textbook System Models of KNOU," Korea National Open University, Institute of Distance Education. 06-06, pp.6-31, 2007.

[7] Kwang sik Chung, et al., "Studies Suspension Prevention System of the Distance Learning Using Cloud and Big Data," 2017 Parallel Conferences of AR4MET-ICOED-REEGETECH, 2017.

[8] Kwang Sik Chung, Sooyoul Kwon, Wen-Hao Huang, "Design and Development of Sensor-based Virtual Experiment Contents for Smart Phone," Journal of Digital Contents Society 2013, Volume 14, Issue 2, pp.161-169, 2013.

[9] Kwang Sik Chung, Joo Hee Kim, Joo Hee Choi, Hye Won Byun, Study on the Digital textbook Business Model of KNOU press, Proceeding of AAOU 2010, October 26 – 28, 2010.

[10] Shin-nosuke Suzuki, Yutaro Akimoto, Manabu Ishihara, Yukio Kobayashi, "Basic Development of the Active Textbook System consisted of a General book and a Portable Electronic Terminal," Procedia Computer Science, 2017, Volume 112, pp. 109-116, 2017.

[11] Christian Bokhove, "Using Technology for Digital Mathematics Textbooks: More than the Sum of the Parts," The International Journal for Technology in Mathematics Education, Vol. 24, Iss. 3, pp. 107-114, 2017.

[12] Jeong Yong Ahn, Kyung-Soo Han, Jae Gyu Jeon, Designing a digital textbook for the classroom in the Mobile age" Multidisciplinary Academic Conference 2017, pp. 402-406, 2017.

[13] Yasung Park, Yong Kim, "A Design and Development of micro-Learning Content in e-Learning System," International Journal on Advanced Science, Engineering and Information Technology, Vol. 8 No. 1, pp. 56-61, 2018.

[14] Danial Hooshyar, Moslem Yousefi, Heuiseok Lim, "A Procedural Content Generation-based Framework for Educational Games: Toward a tailored data-driven game for developing early English reading skills." Journal of Educational Computing Research,