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### **EMPIRICAL STUDY ON THE EFFECTS OF THE APPLICATION OF VIRTUAL REALITY TO EXPERIENTIAL EDUCATION ON STUDENTS' LEARNING ATTITUDE AND LEARNING EFFECTIVENESS**

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# Empirical Study on the Effects of the Application of Virtual Reality to Experiential Education on Students' Learning Attitude and Learning Effectiveness

Lingke KONG<sup>1</sup>

## Abstract

Along with the change in social environment, a lot of families ignore the parenting styles to result in weak empathy of students, who simply see others' faults but ignore personal responsibilities. In the experiential education process, the guides encourage students to seek for answers by themselves, allowing students presenting sense of participation and sense of accomplishment. Nevertheless, it requires more research to prove whether experiential education activity could enhance students' learning effectiveness. Apply experimental design model to the quasi-experimental study, total 198 students in Jiangsu, as the research objects, are precede the 16-week (3 hours per week for total 48 hours) experimental teaching. The research results are summarized as following. 1. Applying virtual reality to experiential education with teams, students reveal good interaction with peers and receive honor and affirmation in the group. The learning attitude and motivation are therefore positive. 2. Applying virtual reality to experiential education activity for team tasks and peers interaction, students present the ability to organize and execute action processes to achieve specific achievement belief and achieve the objectives with the application of virtual reality to experiential education. 3. Students favoring the application of virtual reality to experiential education would engage in the group and regard it as the model to change the behaviors. In this case, students participating in virtual reality applied experiential education appear significantly positive correlations between learning attitude and learning effectiveness. According to the results to propose suggestions, it is expected to more effectively integrate teachers or adjust the directions of teaching strategies to effectively provide the effort direction for students' learning needs.

*Keywords:* virtual reality, experiential education, learning attitude, learning effectiveness, social environment, family education.

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## **Introduction**

Current education is mainly spoon-feeding teaching and suffered from academic pressure. Besides, the convenience of technology results in people being unfamiliar with self-recognition or showing weak team awareness and inadequate communication skills. Parents' excessive interference in the education process deprives children from the opportunity for finding out answers on their own and hands-on. No wonder many students lack interests in learning. Parents should timely let go and think of the joy and touch about the infants' first step without others' support. Under security, children, with personal experience, attempts, and proper adventure, could present the possibility of infinite development. Curiosity is the nature of humans; comfortable and unchanged life would bore people. On the contrary, proper fun and adventure experiences could induce students' passion for learning and learning autonomy to further achieve the educational goal.

Along with the change in social environment, many families ignore the parenting styles to easily cause children's deviated value. Children with stronger self-concept results in the weak empathy to merely see others' faults, but ignore personal responsibilities. Experiential education allows mutual learning between individuals and teams in real situations. Such activities enhance the interaction among people. Based on teams, various activities are preceded in the practical guiding process to learn communication, problem solving, and interpersonal interaction. The experiences are internalized and applied to life to achieve better life. Most students show good interaction with people and teams, but lots of students worship idols, pursue fashion, and merely accept the preferred information to result in inadequate self-cognition and not understanding the pursued goals. Furthermore, different family education background and styles and increasing low birth rate or only child result in many students not knowing how to get along with others and plan the future direction. In the experiential education process, the guides encourage students to seek for answers on their own, allowing students presenting sense of participation and sense of accomplishment. However, it requires more research to prove whether experiential education activity could enhance students' learning effectiveness. As a result, the effect of virtual reality applied experiential education on students' learning attitude and learning effectiveness is studied in this study, expecting to effectively integrate teachers or adjust the directions of teaching strategies to effectively provide the effort direction for students' learning needs.

## **Literature review**

Warren (2019) mentioned that the structure of experiential learning cycle in experiential education was mainly transformed from Kolb's model, and the guiding process contained planning, doing, reviewing, and concluding. When a guide led the members to activity, planning and discussion with the members

would be preceded in the beginning, and then the members were led to the activity with discussions and execution simultaneously. After completing the activity, the members would recall the conditions in the process and discuss the pictures with better impression or stimulation, be guided to apply to the next activity or apply the experience to real life, and continue the next activity and learning. The activity process became a loop, and more learning and development were generated in each loop. Such a process was called experiential learning cycle. Aggarwal & Wu (2019) proposed in "Introduction to Curriculum" that experiential education aimed to have students go through practicing, experiencing, and reflecting the meaning of life through the courses. Experiential education was an integrative course based on student interests, in which activities were more than lecturing, teaching materials and process were flexible, individual differences were emphasized, and the teaching was problem-solving centered and aimed to cultivate students' problem-solving ability. Gil-Lacruz, Gracia-Pérez, & Gil-Lacruz (2019) explained the essence of experiential education as to re-comprehend education process and learning process, which were further combined, as well as a series of students' subjective activity programs and approaches with educational interaction as the medium designed for guiding students to acquire direct experience and real-time information.

He *et al.* (2019) regarded the close relations between attitude and learning, where learning was the process of individual change in persistent behavior through practice or experience and attitude was acquired through experiential learning. Stahlberg & Tuominen (2019) pointed out learning attitude as individual mental process with persistence, consistence, and action on learning affairs, under the interaction in environment, to further form individual attitude and behavior prepared for learning methods and habits. Quennerstedt (2019) pointed out the broad coverage of learning attitude, including learning and attitudes towards learning content and learning environment. Learning attitude was a mental process, which could merely be evaluated with explicit behavior, but could not be directly measured; and, learning attitude would change with the interaction between learners and environment. Breunig (2019) mentioned the remarkable effect of participation in experiential education activities on the enhancement of self-concept and self-fulfillment to delay the continuous effect of learning attitude. Pistorsa, Vihinenb, & Figueiredoc (2019) considered that experiential education activities could enhance general students' learning attitude and learning effectiveness. Zubair, Kamal., Artemeva (2018) stated that experiential education activity curriculum aimed to have students go through practicing, experiencing, and reflecting the meaning of life. Activity curriculum was an integrative course based on students' learning attitudes, where experiential education activities were more than lecturing, teaching materials and processes presented certain flexibility, individual differences were emphasized, the teaching was problem-

solving centered, and the cultivation of students' problem-solving ability was focused. Accordingly, the following hypothesis is proposed in this study.

*H1: Preceding experiential education with virtual reality would affect learning attitude.*

Chen & Hung (2018) pointed out direct learning effectiveness as the behavior change of learners before and after learning activity, i.e. the change of deducting "entry behavior" before participating in learning from "terminal behavior" after participating in learning activity, called "direct" learning effectiveness. In other words, "indirect" learning effectiveness was the effect appearing a period after learners participating in learning activity. In sum, learning effectiveness referred to the direct learning outcome or performance behavior after learners participating in learning activity. Voukelatou (2019) indicated that the evaluation of learning effectiveness, in terms of time, was divided into formative evaluation and summative evaluation; learning effectiveness could be evaluated with achievement test or academic performance and certain behavior change; in terms of evaluation tool, it contained formal or standardized achievement test and informal or subjective cognition evaluation. Jessani *et al.* (2019) indicated that the practice of experiential education activities notably influenced participants' learning effectiveness and remarkably enhance participants' learning effectiveness. Ricke (2018) mentioned that experiential education activities could enhance the academic learning effectiveness of elementary high-grade students with low self-esteem. Most students could apply personal experience to life and improve the psychological, physiological, and interpersonal self-cognition evaluation and affective sensitivity. Liberatore *et al.* (2018) regarded the significant effect of experiential learning based outdoor education activities on individual learning effectiveness. Among outdoor experiential education activities, activity curriculum, team interaction, experience sharing after activity, natural environment, and past activity experience would affect learning effectiveness. The following hypothesis is therefore proposed in this study.

**H2:** Preceding experiential education with virtual reality would affect learning effectiveness.

Hsu *et al.* (2018) indicated that students' positive learning attitude and learning attitude towards the cooperation with team members and guides would affect the willingness to participate in activities, and different learning attitudes would affect learning effectiveness. In the participation process, extended learning induced from activities would also affect the activity participation fun and attraction. Rogers & Rose (2019) pointed out great effects of learners' intrinsic learning motivation, learning attitude, self-efficacy, and achievement expectancy on personal learning effectiveness, where learners' peers also showed profound effects on the learning attitude and learning effectiveness. Aiming at such learning attitude, deep discussion

was required. Costescu *et al.* (2018) proposed major correlations among learning motivation, learning attitude, and learning effectiveness, based on several scholars research. Kuechler & Stedham (2018) pointed out the great positive correlation between learning motivation and learning strategies in learning cognition process, and the critical effects on learning attitude and learning effectiveness. Learners' direct behavior involving in learning and learning attitude presented significant effects on the learning effectiveness; personal mental traits, such as learning motivation, learning attitude, self-efficacy, and the direct behavior involving in learning, e.g. learning attitude, were key factors in learning effectiveness. Consequently, the following hypotheses are proposed in this study.

*H3: Learning attitude reveals significantly positive effects on learning effect in learning effectiveness.*

*H4: Learning attitude shows remarkably positive effects on learning gain in learning effectiveness.*

## **Methodology**

### *Measurement of research variable*

*Learning attitude:* Referring to Hsu *et al.* (2019), learning attitude contains three dimensions of (1) cognition, (2) affection, and (3) action tendency.

*Learning effectiveness:* Referring to Hong *et al.* (2019), (1) learning effect and (2) learning gain are discussed.

### *Research object and sampling data*

Applying experimental design model to the quasi-experimental study, total 198 students in Jiangsu are preceded the 16-week (3 hours per week for total 48 hours) experimental teaching. The retrieved data are analyzed with SPSS, and the hypotheses are tested.

### *Analysis method*

Analysis of variance is utilized for discussing the effect of applying virtual reality to experiential education on learning attitude and learning effectiveness, and regression analysis is further used for understanding the relations between learning attitudes and learning effectiveness.

## Results

### *Reliability and validity analysis*

With factor analysis, learning attitude is extracted factors of “cognition” (eigenvalue=2.783,  $\alpha=0.84$ ), “affection” (eigenvalue=2.196,  $\alpha=0.88$ ), and “action tendency” (eigenvalue=1.537,  $\alpha=0.86$ ). The cumulative covariance explained achieves 73.291%.

Learning effectiveness, through factor analysis, is extracted two factors of “learning effect” (eigenvalue=3.142,  $\alpha=0.90$ ) and “learning gain” (eigenvalue=2.855,  $\alpha=0.92$ ). The cumulative covariance explained reaches 83.472%.

### *Effects of applying virtual reality to experiential education on learning attitude and learning effectiveness*

*Variance analysis of virtual reality applied experiential education on learning attitude:* Analysis of variance is applied to discuss the difference of virtual reality applied experiential education in learning attitude, i.e. analyses and explanations of virtual reality applied experiential education and general teaching. Table 1 shows significantly differences of teaching approaches in learning attitude, where virtual reality applied experiential education (4.33) outperforms general teaching (3.84) on cognition, virtual reality applied experiential education (4.24) outperforms general teaching (3.63) on affection, and virtual reality applied experiential education (4.51) outperforms general teaching (3.52) on action tendency. H1 is therefore supported.

*Table 1.* Variance analysis of virtual reality applied experiential education on learning attitude

variable		F	P	Scheffe post hoc
Teaching approach	cognition	20.296	0.000**	experiential (4.33) >general (3.84)
	affection	24.531	0.000**	experiential (4.24) >general (3.63)
	action tendency	32.167	0.000**	experiential (4.51) >general (3.52)

*Note:* \* stands for  $p<0.05$ , \*\* for  $p<0.01$ .

*Variance analysis of applying virtual reality to experiential education on learning effectiveness:* Using analysis of variance for discussing the difference of virtual reality applied experiential education in learning effectiveness, the teaching approaches of virtual reality applied experiential education and general teaching are analyzed and explained. From *Table 1*, virtual reality applied experiential education (4.29) outperforms general teaching (3.47) on learning effect and virtual

reality applied experiential education (4.42) outperforms general teaching (3.92) on learning gain. Accordingly, H2 is supported.

Table 2. Variance analysis of virtual reality applied experiential education on learning effectiveness

variable		F	P	Scheffe post hoc
Teaching approach	learning effect	19.937	0.000**	experiential (4.29) > general (3.47)
	learning gain	26.534	0.000**	experiential (4.42) > general (3.92)

Note: \* stands for  $p < 0.05$ , \*\* for  $p < 0.01$ .

*Correlation analysis of learning attitude and learning effectiveness*

*Correlation analysis of learning attitude and learning effect:* To test H3, the analysis result, Table 3, reveals remarkable effects of cognition ( $\beta=2.122^{**}$ ), affection ( $\beta=2.241$ ), and action tendency ( $\beta=2.433^{**}$ ) on learning effect that H3 is supported.

*Correlation analysis of learning attitude and learning gain:* To test H4, the analysis result, Table 3, show notable effects of cognition ( $\beta=2.046^{**}$ ), affection ( $\beta=2.373^{**}$ ), and action tendency ( $\beta=2.566^{**}$ ) on learning gain. Consequently, H4 is supported.

Table 3. Analysis of learning attitude and learning effectiveness

Dependent variable→	learning effectiveness			
	learning effect		learning gain	
Independent variable↓	$\beta$	Beta	$\beta$	Beta
learning attitude				
cognition	2.122**	0.203	2.046**	0.198
affection	2.241**	0.215	2.373**	0.226
action tendency	2.433**	0.236	2.566**	0.247
F	18.435		33..531	
significance	0.000***		0.000***	
R2	0.227		0.292	

Adjusted R2	0.211	0.275
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Note: \* stands for  $p < 0.05$ , \*\* for  $p < 0.01$ .

Data source: self-organized in this study

## Discussion

It reveals that most students are induced the attention, appear interests, and are aroused desires by virtual reality applied experiential education activity to improve the learning attitude and learning effectiveness. Learning attitude is the driving force of learning behavior as well as the motive to seek and fulfill personal goals. An individual not correlating with the environment and others would not appear learning attitude and motivation in the behavior. Any motivation theories should function on individuals, environment, and culture. To induce individual learning attitude and motivation, it must be interesting, useful, charming, exciting, striking, challenging, and able to induce curiosity. Environment presents strong implications on human behaviors. Situation building could have the entire environment present emotional effect, effectively enhance learners' learning fun, excite the learning attitude to find out questions, enhance self-learning ability, promote participation and attention, and increase learning benefits. Apparently, students are interested in virtual reality applied experiential education and present more positive learning attitude. Static knowledge-based courses could easily bore students. For this reason, the idea of applying virtual reality to experiential education could be integrated into course design and teachers could attempt to include the idea of experiential learning (experiential learning, mobile learning, and reflective learning) in courses. For static knowledge-based courses, vivid virtual reality or gaming styles could be utilized. In addition to avoiding students from not being interested in courses, active course contents could impress students with better learning effectiveness. Besides, the dominance of course is not held by a teacher; allowing students participating in discussing course procedure and content would enhance students' participation and effectively promote the learning attitude to be glad to participate in course learning. What is more, students being able to teach others would present sense of accomplishment. In this case, increasing opportunities for students applying the learned to teach shared objects, either classmates or family members, would enhance students' learning attitude and learning effectiveness.

## Conclusion

The research results and findings show that, applying virtual reality to experiential education with teams, students appear good interaction with peers and acquire honor and affirmation in the groups. Apparently, learning attitude and motivation are positive. Applying virtual reality applied experiential education to team tasks and peer interaction allow students presenting the ability of organizing and executing actions to achieve specific achievement belief that the application of virtual reality to experiential education could be preceded smoothly to achieve the objectives. Learning attitude could be learned; students, being affected by virtual reality applied experiential education environment, would change or form the learning attitude; and, students, in favor of virtual reality applied experiential education, would engage in the group and regard it as the model to change the behavior. In this case, students participating in virtual reality applied experiential education reveal significantly positive correlations between learning attitude and learning effectiveness. In the interaction with students during the actual experience, it is discovered that students, through experience, reflecting themselves, life, and environment to acquire better learning effectiveness. Such a learning style could have students appear deep impression on the acquired knowledge, apply the learned to life, and even promote and share the learned with others. In comparison with those with low learning attitudes, ones with high learning attitudes are willing to face difficulties and positively seek for solutions, without escape. Applying virtual reality to experiential education allows students learning new success experiences and new knowledge through various experiential courses and applying such success experience to the later learning. When encountering difficulties, they would not easily give up, choose to positively face problems and solve problems, and apply the learned new knowledge to life.

### *Recommendations*

Aiming at above research results, the following suggestions are proposed in this study.

- 1) Obviously classifying students with/without actual participation experience for course design and operation could have more interaction and group differences in the process. In this case, the activities could be slightly adjusted aiming at students with participation. Under the idea, the course could be re-activated and accurately focus on course topic.
- 2) It is suggested to introduce virtual reality applied experiential education into different environment and education approaches to compare the learning effectiveness of different groups for adjusting virtual reality applied experiential education activity design.

- 3) Schools are suggested to refer to experiential education model and introduce “learning-by-doing” in various subjects as well as implement affection in learning attitude, rather than stressing on knowledge-based subject learning, to strengthen the perception of the overall learning awareness.

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