

A Study of the Effect of Implementing Intellectual Property Education with Digital Teaching on Learning Motivation and Achievements

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ABSTRACT

The emergence of e-learning created new education and diverse environment, conforming to the rapid change in modern society. The high acquisition characteristic breaks through the restrictions to time and space of traditional teaching, and the international emphasis on the problem and development of intellectual property is thoroughly presented on various international conferences and international conventions. The practice on education promotion could enhance the understanding of intellectual property and present the mission to practice intellectual property law, i.e. effectively transforming learners to further enhance the concept of intellectual property. Taking a university in Guangxi as the research object, total 198 students in four classes are proceeded the 16-week (3 hours per week for total 48 hours) experimental teaching study. The research results conclude the effects of 1.Digital Teaching on motivation to learn, 2.Digital Teaching on learning outcome, 3.motivation to learn on learning effect in learning outcome, and 4.motivation to learn on learning gain in learning outcome. According to the research results, suggestions are proposed, expecting to cultivate students understanding the full chain of intellectual property and realizing the property and legal norms behind intellectual property problems and the applicable approaches.

Keywords: digital teaching, intellectual property, motivation to learn, learning outcome

INTRODUCTION

Under e-generation, technology has made new changes of everything and explosively changed people's living habits. Information technology is closely related to people's daily life. Along with the rapid advance of information technology, the rapid popularity of global information network has changed the operation of global organizations, and even work, lifestyles, and education are developed new appearance. People increase the acquisition of distinct Internet information and the pursuit of e-life. Under the advance of technology and the high popularity of the Internet, the far-reaching characteristic of network forms the channel for rapid information flow that the knowledge access and communication are no longer restricted to time and space. Under such space-time environment, traditional education model is led to a new level, learning activity is transferred from classrooms to virtual network environment, and learning materials are transformed from paper-based textbooks to digital contents. The emergence of e-learning creates new education and diverse environment, conforming to the rapid change in modern societies. The high acquisition characteristic breaks through the restriction to time and space of traditional teaching and creates the autonomous and individual e-learning space for easily implementing the idea of lifelong learning.

Contribution of this paper to the literature

- When applying intellectual property Digital Teaching, teachers should make visualized Digital Teaching processes, rather than simply projecting texts.
- When proceeding intellectual property Digital Teaching, teachers could first make a mini teaching research team to discuss the methods, aiming at the class resources and student interests.
- Teachers with intellectual property profession should develop the function of seed teachers to lead teachers with other subject background applying Digital Teaching to the material edition and practice of intellectual property education.

International emphases on the problem and development of intellectual property have been thoroughly presented on various international conferences and international conventions. The correlation lies in the acquisition of development through human thoughts, and the development path and results could be promoted by the establishment of intellectual property rules. Making intellectual property law and regulations could confirm correct behaviors and correct wrong behaviors for immediate effects. At the time when intellectual property is emphasized, the analysis and discussion of intellectual property issues could enhance the acquaintance of intellectual property and the mission to practice intellectual property in education promotion, i.e. to effectively transform learners to further enhance the intellectual property concepts and facilitate the effective and peaceful development of human society. The development of intellectual property education in a country should face the world, adapt to the requirement for globalization, and constantly update. Education circle in China therefore has to cope with the global trend, consider how to popularize intellectual property education in the society, and teach students not in the department of intellectual property understanding intellectual property. To have students understand intellectual property related systems, interpretation of intellectual property, and the practicability, as well as judicial practice, intellectual property and the policy could be applied to achieve the goal when solving the problems emerged in the development. For this reason, students should be cultivated the application of intellectual property, especially through e-learning, to enhance the sensitivity to intellectual property when facing intellectual property problems and to understand the logic behind intellectual property problems and the applicable approaches in the intellectual property problem understanding process.

LITERATURE AND HYPOTHESIS

Intellectual Property Education

Huang and Chuang (2016) stated that, under the conditions of commodity economy or market economy, intellectual achievement in China presented commodity and property attributes as other tangible products, like labor creation, after the economic reform and should be rewarded when being used or transferred. Lee and Hao (2015) regarded the idea of intellectual property law in China as the intellectual property norms to adjust the social relationship generated by the acquisition, use, and protection of intellectual achievement of citizens, legal people, or other organizations. Cai, Wang, and Chiang (2014) indicated that Intellectual Property Law adjusted social relationship, i.e. intellectual property relationship. It specifically referred to the social relationship which was confirmed and adjusted by intellectual property law, was induced among citizens, legal people, and other organizations based on the creation, utilization, and transfer of intellectual achievement, and had rights and obligation as the contents. Jin, Zhao, Chow, and Pecht (2014) mentioned that intellectual property education did not simply aim to cultivate excellent judges and lawyers, but to cultivate intellectual property professions with mission and justice personalities and being able to contribute to the society (Maeng & Lee, 2015). However, it has been argued whether intellectual property education is mass education or elitist education, general education or vocational education. The currently formed trend is that intellectual property education is the combination of academic education of intellectual property and professional training of intellectual property (Woo, 2014). The core is the cultivation of intellectual property education, including school education of law, formative education of judges, and education of general law.

The intellectual property education module in this study instructs students with intellectual property, which is a non-fundamental jurisprudence subject in school education of law. However, general students do not have the background of intellectual property that professional intellectual property law knowledge might be difficult to absorb for students. In this case, professional law lessons for general school education of intellectual property are not taught in this study, but the fundamental introduction to intellectual property or general lessons of law, as for students not in the department of intellectual property, is established so that students present basic concepts of intellectual property and further understand domestic and international intellectual property systems.

Digital Teaching

Howard and Navarro (2016) pointed out distinct comprehension and interpretation of “Digital Teaching” at different development stages. It was earlier explained as “electronic teaching”, “electronic media teaching”, or “technology-oriented teaching”, as teaching various knowledge or skills through electronic media, like computers and network equipment. Later on, the so-called “online teaching”, “network teaching”, and “distance teaching” were also equivalent to Digital Teaching, but the key point was changed into teaching contents that teaching activity through the assistance of information communication technology did not simply exceed the restriction to time and space but could be continuously proceeded for diverse development, sharing, and innovation. Agarwal and Mittal (2014) regarded Digital Teaching as the process of instructors teaching with digital media, which contained Internet, Intranet, computers, satellites, broadcast, audio tapes, video tapes, interactive computers, and CDs. The application covered networking teaching, computerized teaching, virtual classrooms, and e-team teaching. Ibáñez, Serio, Villarán, and Kloos (2014) utilized the Internet as the teaching methods, including the elements of multi-format content delivery, management of teaching experience, network community for increasing learners’ exchange, and content developers or experts. Atenas and Havemann (2014) indicated that learners and instructors were no longer restricted to fixed time and location in traditional face-to-face instruction but could precede interactive teaching and learning through networks; learners could flexibly adjust the learning process according to personal learning environment and states, and instructors could adjust the teaching process, depending on learners’ situations, to develop the effect as one-to-one teaching. Jude, Kajura, and Birevu (2014) covered the research and development of e-learning tools, the establishment of network environment for e-learning and the development of digital material contents, and the design of e-learning activity in e-learning industry to reduce the barrier of time and space for instructors’ material contents, enhance knowledge and performance solutions, and provide diverse learning.

Motivation to Learn

Clark and Mayer (2016) regarded motivation to learn as the inner psychological process to induce students’ learning activity, maintain learning activity, and lead the learning activity to the goal set by teachers. Jude, Kajura, and Birevu (2014) revealed that motivation to learn was the inner psychological process to induce students’ learning activity, maintain learning activity, and have the learning activity approach the goal set by teachers to achieve teaching goals and effective teaching of teachers. Alickovic and Subasi (2016) considered that motivation to learn was the inner belief to lead individual learning goals, induce learning behaviors and continuous efforts, reinforce cognition process, and strengthen and improve learning results. Molaee and Dortaj (2015) proposed motivation to learn as the psychological factors in encouraging students proceeding learning activity; it was the internal motive directly promoting students’ learning as well as to start and arouse learning behaviors. According to value-expectation model proposed by Huang and Chuang (2016), ability belief, expected success, and work value are the critical variables of motivation to learn in students’ self-adjusted learning process. Ability belief referred to students’ perceived personal ability when engaging in learning.

According to the research of Huang and Chuang (2016), students’ motivation to learn in this study is divided into learners’ interior motivation to learn and exterior motivation to learn, which are explained as below.

- (1) Interior orientation: The contents contain favoring challenging lessons, regarding learning as the interest and hobby, considering that learning could expand the view, being actively to learn new lessons, and regarding learning as to develop self-potential, goal fulfillment, and life value.
- (2) Exterior orientation: The contents cover that learning is to receive others’ affirmation, acquire better performance, pass examinations or evaluation, show off to others, compete with classmates, be praised and noticed by seniors or the opposite sex, avoid punishment and scolding, avoid the shame of failure, and enter ideal schools and cross levels in the future.

Learning Outcome

Bartholomew (2015) indicated that, in a teacher’s teaching process, students’ self-affirmation to the learning ability and learning outcome were the indicators to measure the instructor’s results and teaching quality as well as the indicators of learners’ learning results. Subasi, Alickovic, and Kevric (2017) mentioned that the indicators to evaluate students’ learning results were the major items to evaluate teaching quality. Learning outcome would be affected by curriculum design, teaching methods, and learning behaviors. Students’ learning aimed to monitor self-learning, reflect the learned knowledge, and learn how to learn. Accordingly, learning outcome was the direct presentation of learning results. Students’ learning results were a major indicator to measure learning outcome as well as the major item to evaluate teaching quality (Atenas & Havemann, 2013). In this case, effectiveness aimed to test the achievement of learning or teaching goals for making timely correction or feedback as the reference or guidance to improve the next lesson. Valerie (2015) pointed out the indicators to evaluate students’ learning results

as the major items to evaluate teaching quality. Learning outcome would be affected by curriculum design, teaching methods, and learning behaviors, and students' learning aimed to monitor self-learning, reflect the learned knowledge, and learn how to learn. Learning outcome therefore was the direct presentation of learning results. Conejeros and Mansilla (2014) regarded the indicators to evaluation students' learning results as the major items to evaluate teaching quality. Learning outcome would be influenced by curriculum design, teaching methods, and learning behaviors, and students' learning was to monitor self-learning, reflect the learned knowledge, and learn how to learn so that learning results were directly presented by learning outcome.

According to Cai et al. (2014), learning outcome includes two dimensions in this study.

- (1) Learning effect - containing test performance, time for completing process, and term performance.
- (2) Learning gain - covering learning satisfaction, achievement, and preference.

Learning effect and learning gain are therefore regarded as the dimensions to measure teaching effect in this study.

Research Hypothesis

Khalid, Khalil, and Nasreen (2014) indicated that learners presented high autonomy on e-learning management platforms to precede learning tests through the interactive function of the system and according to individual learning step and select suitable learning paths and learning contents to largely enhance the motivation to learn. Huang and Chuang (2016) stated that e-learning, according to students' individual needs and learning processes, could proceed individualized learning without being restricted to space and time and could trace the learning results to enhance learners' motivation to learn. With experimental teaching, Rawson and McCool (2014) indicated that applying good and positive teaching strategies to e-learning lessons could induce students' motivation to learn and learning interests, establish students' confidence and expression, reinforce students' problem-solving abilities, and promote teaching efficacy and learning achievement to further achieve the best e-learning effect. The following hypothesis is therefore proposed in this study.

H1: Digital Teaching would affect motivation to learn.

Conejeros and Mansilla (2014) mentioned that the digitalization of learning contents and learning processes was expected to enhance learning outcome with the rapid, efficient, and far-reaching characteristics. Mortara et al. (2014) argued that e-learning was regarded as a more efficient learning method because of the good accessibility, excellent adaptability, high interactivity, and self-paced. Cai et al. (2014) considered that e-learning had become a broadly used learning model, but network technology applied e-learning enhanced teaching efficiency and made up "repeated learning" which was short in traditional education; and, e-learning could effectively promote motivation to learn or learning outcome. Saelao, Tubsree, and Markwardt (2016) concluded that applying and integrating technology to teaching and learning could actually promote motivation to learn or learning outcome. Accordingly, the following hypothesis is proposed in this study.

H2: Digital Teaching would influence learning outcome.

Uysal and Gunal (2014) proposed that meaningful and effective learning and skillfully grasping the concepts relied on students' intrinsic psychological motivation when students expected to acquire certain knowledge with e-learning. Clark and Mayer (2016) pointed out the value of e-learning, such as receiving good performance or praise, presenting intrinsic motivation, and students being able to contact broader professional competence to enhance the learning outcome. Niknejad and Rahbar (2015) found out the positive effect of students' motivation to learn on learning outcome. Surjono (2015) mentioned that students with high motivation to learn presented more definite goals and strong desire to learn learning contents, higher expectation of results, and better self-efficacy. Alickovic and Subasi (2016) also found out better effect caused by high motivation to learn. Sanjay (2016) discovered that students with high motivation to learn showed better performance and students with intrinsic motivation outperformed those with extrinsic motivation. In this case, the following hypotheses are proposed in this study.

H3: Motivation to learn presents significantly positive effects on learning effect in learning outcome.

H4: Motivation to learn shows remarkably positive effects on learning gain in learning outcome.

RESEARCH METHOD

Measurement of Research Variable

Motivation to learn

Referring to Huang and Chuang (2016), motivation to learn contains two dimensions of 1. interior orientation and 2. exterior orientation.

Table 1. Variance analysis of Digital Teaching on motivation to learn

| | Variable | F | P | Scheffe post-hoc |
|------------------|----------------------|--------|--------|---|
| Digital Teaching | interior orientation | 10.233 | 0.000* | Digital Teaching (3.96) > general teaching (3.62) |
| | exterior orientation | 12.451 | 0.000* | Digital Teaching (4.22) > general teaching (3.71) |

* stands for $p < 0.05$

Table 2. Variance analysis of Digital Teaching on learning outcome

| | Variable | F | P | Scheffe post-hoc |
|------------------|-----------------|--------|--------|---|
| Digital Teaching | learning effect | 14.583 | 0.000* | Digital Teaching (4.06) > general teaching (3.52) |
| | learning gain | 15.417 | 0.000* | Digital Teaching (4.37) > general teaching (3.87) |

* stands for $p < 0.05$

Learning outcome

Referring to Cai et al. (2014), it is divided into 1. learning effect and 2. learning gain.

Research Object and Sampling Data

Taking a university in Guangxi as the research object, 198 students in 4 classes are proceeded the 16-week (3 hours a week for total 48 hours) experimental teaching research. The retrieved questionnaire is analyzed the data with SPSS, and Factor Analysis and Reliability Analysis, Regression Analysis, as well as Analysis of Variance are utilized for testing hypotheses.

Analysis Method

Analysis of Variance is used in this study for discussing the difference of Digital Teaching in motivation to learn and learning outcome, and Regression Analysis is further applied to understand the relationship between motivation to learn and learning outcome.

ANALYSIS RESULT

Reliability and Validity Analysis

With Factor Analysis, motivation to learn is extracted two factors of "interior orientation" (eigenvalue=2.826, $\alpha=0.81$) and "exterior orientation" (eigenvalue=2.247, $\alpha=0.85$). The accumulative covariance explained achieves 76.283%.

Learning outcome, with Factor Analysis, is extracted two factors of "learning effect" (eigenvalue=2.182, $\alpha=0.87$) and "learning gain" (eigenvalue=1.844, $\alpha=0.88$). The accumulative covariance explained reaches 81.135%.

Effects of Teaching Methods on Motivation to Learn and Learning Outcome

Difference analysis of teaching methods in motivation to learn

Applying Analysis of Variance to discuss the difference of teaching methods in motivation to learn, various teaching methods appear significant differences on interior orientation in motivation to learn, **Table 1**, and Digital Teaching (3.96) shows higher interior orientation than general teaching (3.62). Distinct teaching methods present remarkable differences on exterior orientation in motivation to learn, and Digital Teaching (4.22) reveals higher exterior orientation than general teaching (3.71). H1 is therefore supported.

Difference analysis of teaching methods in learning outcome

Using Analysis of Variance for discussing the difference of teaching methods in learning outcome, **Table 2**, various teaching methods show notable differences on learning effect, and Digital Teaching (4.06) reveals higher general teaching (3.52) than learning effect. Distinct teaching methods present significant differences on learning gain, and Digital Teaching (4.37) appears higher learning gain than general teaching (3.87). In this case, H2 is supported.

Table 3. Analysis of motivation to learn to learning outcome

| Dependent variable→ | Learning outcome | | | |
|-----------------------|------------------|-------|---------------|-------|
| Independent variable↓ | Learning effect | | Learning gain | |
| motivation to learn | β | Beta | β | Beta |
| interior orientation | 2.046** | 0.192 | 2.463** | 0.238 |
| exterior orientation | 2.177** | 0.204 | 2.287** | 0.216 |
| F | 24.731 | | 29.285 | |
| Significance | 0.000*** | | 0.000*** | |
| R2 | 0.238 | | 0.267 | |
| Adjusted R2 | 0.213 | | 0.236 | |

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

Correlation Analysis of Motivation to Learn and Learning Outcome

Correlation analysis of motivation to learn and learning effect

To test H3, the analysis results, **Table 3**, reveal remarkable effects of interior orientation ($\beta = 2.046^{**}$) and exterior orientation ($\beta = 2.177^{**}$) on learning effect that H3 is supported.

Correlation analysis of motivation to learn and learning gain

To test H4, the analysis results, **Table 3**, reveal notable effects of interior orientation ($\beta = 2.463^{**}$) and exterior orientation ($\beta = 2.287^{**}$) on learning gain that H4 is supported.

CONCLUSION

The research findings prove that applying Digital Teaching to intellectual property education could enhance students' learning outcome and induce the motivation to learn as well as allow teachers teaching with interesting and diverse methods in classes. In addition to careful planning for the design of digital multimedia materials, intellectual property Digital Teaching materials integrating intellectual property practice and presenting teaching contents with large amount of cases and definite teaching goals would show the teaching meaning; otherwise, they might simply be funny, but ignore the learning goal and process. The design of intellectual property Digital Teaching materials should pay attention to visible factors, highlight viewing and hearing factors, reduce reading proportion, and highlight aesthetic characteristics, image, styles & preference, and art as well as graphing techniques in computers. Besides, too much stimulation of sound and light effect should be avoided, or it might result in visual fatigue and bad learning outcome to cause student attention being attracted by images and funny things but ignoring professional problems. Rich media combination could easily distract attention or be too late for dealing with information to cause cognitive burden; besides, students might pay attention to unrelated materials and pay less attention to materials which could establish the link with intellectual property concepts. For this reason, when applying Digital Teaching to intellectual property education, better and proper aesthetic images based on visualization and audibility could attract students' attention as well as focus the attention on professional contents.

RECOMMENDATIONS

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

1. When applying intellectual property Digital Teaching, teachers should make visualized Digital Teaching processes, rather than simply projecting texts. Digital Teaching processes are the basic tool for Digital Teaching of law, including two elements. One is visualization to perform abstract ideas of brief introduction, key points, and systems with visualized operation. The other is audibility to include audio functions, e.g. sound effect, background music, and interpretation in the Digital Teaching process to really implement e-multimedia and avoid visual fatigue caused by single visualization.
2. Teachers are lack of the abilities of programming and animation design in the teacher training process, and professional designers and sound-effect staff do not understand intellectual property education theories, student traits, and teaching strategies. In this case, the best material design should have the match of teachers, designers, sound-effect staff, and game designers. The authorities therefore have to provide cooperation opportunities between businesses and education for instructors learning the production and

application of Digital Teaching materials to intangibly enhance the professional growth and pursue the technology and excellence of intellectual property education quality.

3. When proceeding intellectual property Digital Teaching, teachers could first make a mini teaching research team to discuss the methods, aiming at the class resources and student interests. Teachers could mutually observe and discuss in the Digital Teaching activity, review the application of Digital Teaching to intellectual property education, share individual teaching experiences, propose the difficulties in the teaching, and share the self-made teaching materials. The cooperation could induce more ideas, and sharing materials could share the burden on making materials. It could be the reference for the future application of Digital Teaching to intellectual property education.
4. A teaching team should be made for intellectual property education. Teachers with intellectual property profession should develop the function of seed teachers to lead teachers with other subject background applying Digital Teaching to the material edition and practice of intellectual property education. The information literature, course integration, and related teaching knowledge of the teacher team could be enhanced with specialty division. Besides, digital software operation guidance could be offered for the development of teaching and learning to have the application of Digital Teaching to intellectual property education be more lively and effective as well as to complement each other.

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