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EFFECTS OF BLOCKCHAIN LAW COURSE INTEGRATED MULTIMEDIA DYNAMIC TEACHING ON STUDENTS' LEARNING MOTIVATION AND LEARNING EFFECTIVENESS

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Effects of Blockchain Law Course Integrated Multimedia Dynamic Teaching on Students' Learning Motivation and Learning Effectiveness

Xiuyu TONG[1]

Abstract

The cultivation of intellectual property right talents who bear the mission of blockchain era becomes the key in the new breakthrough of integrating blockchain and intellectual property rights to form new sources of economic growth in the new/old kinetic energy conversion. Higher education is the major way to cultivate talents. Nevertheless, blockchain law courses currently offered by international colleges and universities are developed from technology fields of technology finance, distributed systems, and cryptocurrency, but not the instruction from legal perspectives. The experimental design model is applied in this study to the experimental research of students majoring in intellectual property rights in the same grade from same-level schools in Guangxi. Total 170 students are preceded the 16-week blockchain law knowledge on-campus experimental teaching. The research results show significant correlations between blockchain law course integrated multimedia dynamic teaching and learning motivation, remarkable correlations between blockchain law course integrated multimedia dynamic teaching and learning effectiveness, notably positive effects of learning motivation on learning effect in learning effectiveness, and significantly positive effects of learning motivation on learning gain in learning effectiveness. According to the results, suggestions are proposed, expecting to cultivate domestic students majoring in intellectual property rights, from legal vision, establishing the systematic way of thinking and knowledge system from know-why, to practical application, and then to legal regulations to enhance the learning effect of blockchain law knowledge and core skills to solve blockchain law issues of students majoring in intellectual property rights.

Keywords: blockchain law course, multimedia dynamic teaching, learning motivation, learning effectiveness

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Introduction

The new technological revolution and industrial transformation sweep across the globe that data have become the basic strategic resources and new factors of production in the society, and digital economy is deeply changing humans' production and lifestyles to become the new engine of economic growth. Being the disruptive technology, the special decentralized, detrustful, and unalterable technology characteristics of blockchain overcome the difficulty in trust, data diddling, unequal subject status, and privacy leakage, which has to hinder the digitalization process for long, guarantee the authenticity and transmission security of data, deliver trust and release data productivity, fulfill the leap from information Internet to value Internet, and release huge industrial momentum through the integration with physical industry to eventually lead the globally new technology revolution and realize industrial transformation and times leap. Intellectual property right talents are high compound professional talents; especially, blockchain knowledge becomes primary to measure the compound level of intellectual property right talents, under the background of blockchain patent being the key in fighting for the development of blockchain industry internationally. The practice method and ability of intellectual property right talents, including intellectual property right judges, lawyers, patent attorneys, trademark agents, and patent examiners, would need redefinition (Fenwick, Kaal & Vermeulen, 2017).

The approach of information age highlights the importance of information integrated instruction. Past research revealed that proper application of information technology could indeed help students' learning. However, information integrated instruction was a big burden for most teachers, including the selections of information materials and information tools, design of learning activity, and selection of integration method, integration timing, and suitable objects. Under the background, the cultivation of intellectual property right talents who bear the mission of blockchain era becomes the key in the new breakthrough of integrating blockchain and intellectual property rights to form new sources of economic growth in the new/old kinetic energy conversion. Higher education is the major way to cultivate talents. Nevertheless, blockchain law courses offered by international colleges and universities are mostly developed from technology fields of technology finance, distributed systems, and cryptocurrency, but not taught from legal perspective. For compound intellectual property right talents integrating technology, knowledge, management, and knowledge in law, instructional resources aiming at legal knowledge, blockchain technology, and the application are rare. Under the real demands for frequent blockchain law issues and the regulation of blockchain activity with legal norms, compound intellectual property right talents in blockchain, intellectual property rights, and legal knowledge are short. For this reason, this study, taking blockchain-led technological revolution and industrial transformation as the goal, aims to cultivate intellectual property right compound talents matching the demand in blockchain era. Blockchain law

courses and the correspondent evaluation test are designed to cultivate students majoring in intellectual property rights, from the perspective of "law", establishing a systematic way of thinking and knowledge system from know-why to practical application, and to legal regulations to enhance the learning effect of blockchain law knowledge and core skills for solving blockchain law issues.

Literature review

This study is developed based on the relationship between blockchain and law. Essentially, blockchain is a decentralized distributed storage system. Lessig (2009) regarded code as law that code in cyberspace could be independent from law in real society to realize technological autonomy without the intervention of legal evaluation will. Millard (2018) considered that blockchain would change the operation rules of law. Blockchain courses are newly established and gradually popular educational course to cater to blockchain knowledge. Blockchain courses stress on both content design and subject field confirmation. Wu and Jo (2019) divided blockchain subject field into business and technology, which appeared concentric circles cross on blockchain component, smart contract, and finance, and emphasized that business knowledge, including accounting, finance, marketing, and management, should be learned in blockchain courses to understand how blockchain worked and created value through cost reduction and efficiency enhancement. Themistocleous *et al.* (2020) indicated that the content of blockchain courses for Master of Science should stress on the combination of technology, business, and law. Blockchain courses covered various education and training methods, including college and university courses, community courses, and social training courses. Opinions about general establishment from elementary schools to doctorate or focus on undergraduate or postgraduate were distinct. Along with the emergence and expansion of blockchain law issues, the training of blockchain law knowledge is gradually increasing the weight.

Referring to relevant research, Tang *et al.* (2017) defined multimedia as words and pictures. Words referred to verbal form, containing printed words and spoken words; pictures referred to pictorial form, covering static pictures (illustration, coordinate chart, diagram, photo, map) and dynamic pictures (animation, film). From the viewpoint of multimedia used by Neumann (2018), the media combination of words (words on screens or spoken narrative) and pictures (animation, illustration, or film) in Encarta or the media combination of words (printed words) and pictures (static pictures) in books were the combination of multimedia. Wei & Venayagamoorthy (2017) mentioned that blackboard writing, spoken language, pictures, images, animation, physical teaching aids, and virtual manipulative which were used by teachers in classes were the media in teaching. Muñoz-Cristóbal *et al.* (2017) defined multimedia learning as the learning using co-presented materials of words (including printed words, spoken words) and images (containing illustration,

pictures, photos, maps, animation, images). Liang & Mehigan (2017) considered that computer multimedia dynamic teaching could attract students' attention through vivid images, bright colors, words, and sound to further promote students' concentration and interests in learning. In terms of multimedia dynamic teaching, it is an important issue to well apply network resources in the network era. In order to help teachers instruct students using network resources, many multimedia dynamic teaching systems are developed. After the experimental teaching, Ojennus & Watts (2017) indicated that applying good and positive teaching strategies to computer multimedia dynamic teaching courses could induce students' learning motivation and learning interests, build students' confidence and expression, reinforce students' problem-solving capability, and promote teaching efficiency and learning achievement to further achieve the optimal computer multimedia dynamic teaching effect. Haavi, Tvenge, & Martinsen (2018) mentioned that the participation in computer multimedia dynamic teaching could significantly enhance self-concept and self-fulfillment. The promotion of self-concept and self-fulfillment presented the lasting effect of delaying learning motivation. Soemer & Schiefele (2018) stated that the kinetic energy of computer multimedia dynamic teaching could enhance the learning motivation and learning effectiveness of general students. Hu, Chen, & Chou (2017) indicated that computer multimedia dynamic teaching aimed to have students experience practice, experience, and reflect the meaning of life through courses. Activity curriculum, the integrated curriculum based on students' learning motivation and attitudes, showed flexible materials and processes. The following hypothesis is therefore proposed in this study.

H1: Blockchain law course integrated multimedia dynamic teaching presents significant correlations with learning motivation.

Liu *et al.* (2017) mentioned that teachers could understand the effect of teaching activity from students' evaluation results to review the teaching quality as the reference for evaluating teaching. Teachers could understand students' responses to different teaching styles by observing students' responses in the learning and understanding students' performance in classes or learning processes. Learning effectiveness was an indicator to evaluate students' absorption of course content and to judge the effectiveness of teachers' instruction according to students' performance on tests. Kelly *et al.* (2018) stated that students' learning effectiveness was inspected through examinations to check whether students achieved the knowledge acquisition and skills scheduled in instructional objectives and teaching activities or materials were effectively learned. Higher scores on test items showed better learning effectiveness of students; on the contrary, it revealed worse learning effectiveness. Rysavy, Michalak, & Wessel (2017) indicated that multimedia dynamic teaching presented higher teaching ability and higher student satisfaction than traditional teaching and would remarkably enhance learning effectiveness.

Mars & Gouider (2017) discovered that multimedia dynamic teaching could benefit the combination of theory and practice, enhance problem-solving capability of the class in authentic living situations, and effectively promote learning effectiveness. Chien (2017) mentioned that the use of multimedia dynamic teaching was superior to problem-solving teaching for students with low prior knowledge. Teles *et al.* (2017) stated that reducing intrinsic cognitive load could enhance students' problem solving and efficiently promote learning effectiveness. Since media materials of video, sound, pictures, and animation were largely applied to multimedia dynamic teaching, which, after the multiplexing, would strongly stimulate and shock information receivers' sensory and auditory nerve (Ghosh, Ghosh, & Mohanta, 2017). In this case, complete problem-solving steps in example teaching could reduce learners' extrinsic cognitive load and further reduce learners using cognitive resources in working memory to effectively promote learning effectiveness (Pandove, Ranib, & Goelc, 2017). Accordingly, the following hypothesis is proposed in this study.

H2: Blockchain law course integrated multimedia dynamic teaching shows remarkable correlations with learning effectiveness.

Shi *et al.* (2017) proposed that learning motivation was not innate, but was affected by acquired factors of environment or reinforcers; factors in students' learning motivation contained schools, teachers, peers, course materials, and various off-campus factors. Wauters & Dirks (2017) indicated that, with learning motivation, a person was willing to and positively learn, could well arrange the resource management strategies, precede learning time planning, overcome learning obstacles and seek for support, and continuously learn in specific situations to construct the knowledge through the learned cognitive strategies to eventually achieve the learning goal. Ramey & Stevens (2018) regarded learning motivation as the inner belief in being able to guide individual learning goal, induce learning behavior and continuous effort, reinforce cognitive process, and strengthen and improve learning outcome. Condori & Pardo (2017) regarded learning motivation as the psychological process to induce students' learning interests and continuous learning activity to approach learning goal. Ford & Minshall (2017) discussed senior high school students' English learning motivation and discovered that students' English learning motivation was not the inner like of English, but mainly for certain practical goals, such as entering good universities. The research also indicated that students with positive learning motivation could have better performance on English learning, be more glad to learn, and would continuously learn English in the future. Apparently, learning motivation could promote learning effectiveness. Kalloniatis *et al.* (2017) found out the positive effect of students' learning motivation on learning effectiveness. Stein *et al.* (2017) mentioned that students with high learning motivation had more definite goals and strong desire to learn the learning content, higher expectation of outcomes, and

better self-efficacy; as a result, students with high learning motivation presented better learning effectiveness. Bandhakavi *et al.* (2017) discovered that domestic college students' English learning motivation was mostly affected by course content and instructors, i.e. students' extrinsic motivation higher than intrinsic motivation; and, students with strong intrinsic motivation showed higher learning will and learning effectiveness. Khahou, Rodriguez, & Jmaiel (2017) discovered that situated learning presented good teaching effect and was suitable for different gender; teaching with situated learning appeared large effects on "attribution of effort" in learning motivation and could affect learning motivation to further influence learning effectiveness. It revealed that the strategy with situated learning was superior to non-situated learning. Consequently, the following hypotheses are proposed in this study.

H3: Learning motivation reveals notably positive effects on learning effect in learning effectiveness

H4: Learning motivation appears significantly positive effects on learning gain in learning effectiveness.

Methodology

Measurement of research variable

Learning motivation. Referring to the research of Chen, He, & Gao (2018), students' learning motivation is divided into two dimensions in this study.

1) Intrinsic orientation: containing in favor of challenging courses, regarding learning as interest and hobby, regarding learning being able to expand the vision, actively learning new courses, learning for developing self-potential and fulfilling ideal.

2) Extrinsic orientation: covering learning for being affirmed by others, receiving better performance, passing examinations or evaluation, showing off to others, competing with classmates, being appreciated and noticed by seniors or the opposite gender, preventing from being punished and scolded, preventing from the shame of failure, getting into ideal schools in the future.

Learning effectiveness. Referring to the research of Chien & Chu (2018), learning effectiveness contains two dimensions in this study.

1) Learning effect, including academic performance, time for completing schedule, and term performance.

2) Learning gain, containing learning satisfaction, achievement, and preference.

Curriculum mapping

The plate theory planning of blockchain law knowledge is distinct. The Chinese Institute of Electronics regards blockchain talents as blockchain technology talents and excludes the cultivation of knowledge in law. Some points of view conclude blockchain law issues as the law effectiveness and smart contract of virtual currency legal regulations, ICO legal regulations, and blockchain technology (Blemus, 2018). However, the overall trend stresses on the challenge to blockchain technology and application to the theory and practice of existing legal systems and focuses on basic blockchain knowledge, digital currency legal issues, smart contract legal knowledge, and blockchain legal supervision knowledge. Accordingly, the curriculum design framework of *Blockchain Law* is shown as below (*Table 1*).

Table 1. Blockchain law curriculum design framework

Course Plate	Main Content	Plate Design Value And Goal	Hour
Basic knowledge of blockchain	Basic concept of blockchain Know-why of blockchain Development process of blockchain Application scene of blockchain Current situation of blockchain industry	Correctly defining blockchain from the perspectives of concept scope, historical category, business application, technology realization is the theoretical basis to know science, treat the emerging affair, and develop successive legal knowledge learning.	12
Legal knowledge of digital currency	Origin and development of digital currency Concept of digital currency Legal property of digital currency Legal risk of digital currency Fiat digital currency and Libra Concept and development process of ICO Business application of ICO Legal risk of ICO	Digital currency is the practice paradigm for the successful application of blockchain technology and is currently mature. Meanwhile, legal issues of digital currency are the concentrated legal dispute in current application of blockchain to clarify the legal risk and coping path of digital currency. It, with profound meaning, could largely benefit blockchain talents legally developing the business of digital currency in the future.	8

Legal knowledge of smart contract	Origin of smart contract Application scene of smart contract Legal definition of smart contract Legal attribute of smart contract Legal risk of smart contract Supervision path of smart contract	The highlight of digital asset protection issues resulted from contract attribute determination of smart contract and smart contract defect has become blockchain law issues. Definite legal attribute and legal application path of smart contract could clarify legal risk control at work or contain or eliminate possible hack for blockchain talents, especially code developers.	6
Supervision of blockchain law	Existing domestic and international supervision policies Supervision program Supervision path selection	The intervention of governmental supervision is the appropriate measure under current incomplete blockchain law system to balance the development potential of blockchain and legal risks. It could fully develop the empowerment of blockchain technology and control legal risks in legal and reasonable range. Besides, it allows acquiring the latest situation of various governments in the world about blockchain to assist in blockchain talents' career choice, industry development trend, and future potential.	6

Research object and sampling data

Applying experimental design model to this experimental research, 170 students majoring in intellectual property rights, including 85 students in the academic years of 2018 and 2019 (i.e. students in the experimental group), in the same grade from same-level schools in Guangxi are preceded the 16-week (1.5 hours/session for two sessions per week, total 32 sessions/24 hours) blockchain law knowledge on-campus experimental teaching with blockchain law course integrated multimedia dynamic teaching during September-December, 2019, and September-December, 2020; and, the rest 85 students (i.e. the control group) are taught blockchain law course with general traditional teaching, without multimedia dynamic teaching. The retrieved questionnaire data are analyzed with SPSS, and factor analysis, reliability analysis, regression analysis, and analysis of variance are used for testing various hypotheses.

Analysis method

Analysis of variance is applied to discuss the difference of blockchain law course integrated multimedia dynamic teaching in learning motivation and learning effectiveness, and regression analysis is further utilized for understanding the relations between learning motivation and learning effectiveness in this study.

Results

Reliability and validity analysis

With factor analysis, learning motivation is extracted two factors and learning effectiveness is extracted two factors.

Table 2. Factor analysis

variable	factor	eigenvalue	α	cumulative variance explained
learning motivation	intrinsic orientation	3.427	0.88	78.255
	extrinsic orientation	2.538	0.87	
learning effectiveness	learning effect	2.675	0.90	81.697
	learning gain	2.243	0.92	

Effects of learning method on learning motivation and learning effectiveness

Variance analysis of learning method in learning motivation. Analysis of variance is used for discussing the difference of learning method in learning motivation in this study, i.e. analysis and explanation of blockchain law course integrated multimedia dynamic teaching and general traditional teaching. *Table 3* shows that blockchain law course integrated multimedia dynamic teaching (4.157) outperforms general traditional teaching (3.886) on intrinsic orientation and blockchain law course integrated multimedia dynamic teaching (4.052) outperforms general traditional teaching (3.563) on extrinsic orientation that H1 is supported.

*Table 3. V*ariance analysis of blockchain law course integrated multimedia dynamic teaching in learning motivation

variable		F	P	Scheffe post hoc
blockchain law course integrated multimedia dynamic teaching	intrinsic orientation	24.315	0.000**	multimedia dynamic>general traditional teaching
	extrinsic orientation	27.628	0.000**	multimedia dynamic>general traditional teaching

*Note: * stands for p<0.05 and ** for p<0.01.*

Variance analysis of learning method in learning effectiveness. Analysis of variance is applied to discuss the difference of learning method in learning effectiveness in this study, i.e. analysis and explanation of blockchain law course integrated multimedia dynamic teaching and general traditional teaching. *Table 4* reveals that blockchain law course integrated multimedia dynamic teaching (4.233) outperforms general traditional teaching (3.914) on learning effect and blockchain law course integrated multimedia dynamic teaching (4.127) outperforms general traditional teaching (3.758) on learning gain that H2 is supported.

Table 4. Variance analysis of blockchain law course integrated multimedia dynamic teaching in learning effectiveness

variable		F	P	Scheffe post hoc
blockchain law course integrated multimedia dynamic teaching	learning effect	33.521	0.000**	multimedia dynamic>general traditional teaching
	learning gain	36.186	0.000**	multimedia dynamic>general traditional teaching

*Note: * stands for p<0.05 and ** for p<0.01.*

Correlation analysis of learning motivation and learning effectiveness

Correlation analysis of learning motivation and learning effect. To test H3, the analysis result, *Table 5*, reveals notable effects of intrinsic orientation (β=2.486**) and extrinsic orientation (β=2.175**) on learning effect that H3 is supported.

Correlation analysis of learning motivation and learning gain. To test H4, the analysis result, *Table 5*, shows significant effects of intrinsic orientation (β=2.583**) and extrinsic orientation (β=2.342**) on learning gain that H4 is supported.

Table 5. Analysis of learning motivation towards learning effectiveness

dependent variable→	learning effectiveness			
independent variable↓	learning effect		learning gain	
learning motivation	β	P	β	P
intrinsic orientation	2.486**	0.000	2.583**	0.000
extrinsic orientation	2.175**	0.000	2.342**	0.000
F	37.384		44.516	
significance	0.000***		0.000***	
R2	0.324		0.387	
adjusted R2	0.309		0.369	

*Note: * stands for p<0.05 and ** for p<0.01. Data source: self-organized in this study*

Discussion

The research results reveal that covering blockchain basic knowledge, digital currency legal knowledge, smart contract legal knowledge, and blockchain law supervision knowledge in the *Blockchain Law* curriculum could enrich the knowledge structure of students majoring in intellectual property rights, enhance the basic knowledge of blockchain law issues, and reinforce the control of blockchain legal risk and legal problem solving capability. In addition to elaborately designing the blockchain course framework, planning the development of blockchain practice teaching is another important content in *Blockchain Law*. The combination of theory and practice allows students majoring in intellectual property rights really integrating into the *Blockchain Law* course and adapt, in advance, to the career needs for intellectual property rights in the blockchain era. Otherwise, it would stay in the cultivation of theoretical knowledge, but not really learning into practice. Moreover, the requirements of technology basis and law literacy for intellectual property right talents are higher. Reinforcing students majoring in intellectual property rights developing the practice of digital currency transaction and the writing of smart contract code in course teaching could uncover the secret of blockchain for students integrating into true blockchain situations and comprehensively understanding the learned basic knowledge.

Conclusion

The research findings reveal the effectiveness of blockchain law course integrated multimedia dynamic teaching. Students in both groups do not have the experience in blockchain law related knowledge before the course, with equal specialty, grade, and school level. After the course, students in the experimental group remarkably outperform those in the control group. Blockchain law course integrated multimedia dynamic teaching enhances the blockchain law knowledge standard of students majoring in intellectual property rights. Besides, the offer of blockchain law course integrated multimedia dynamic teaching could encourage the learning motivation of students majoring in intellectual property rights to autonomously learn blockchain law knowledge and promote the learning effect of blockchain law knowledge. Blockchain law course integrated multimedia dynamic teaching has students make larger advance in knowledge. Students make great advance and present higher satisfaction with the course, explaining the significant meaning of the course on the promotion of students' blockchain law knowledge as well as the stronger promotion value. Apparently, students reflect to the needs for blockchain practice knowledge. The development of practice teaching contents, such as practice teaching, field practice, and discussion sharing would be the new content considered in the Blockchain Law courses.

Recommendations

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

1) When a teacher applies blockchain law course integrated multimedia dynamic teaching to the design, a large amount of information would flood in to increase students' cognitive load. Besides, it is necessary to constantly repeat the search and selection of data in the multimedia process for deep learning. For this reason, the information being accessible, easy to build correlations, and coherent, with priority, should be considered in the material design so that students have micro and integral information in the learning process.
2) The presentation of multimedia dynamic teaching is a teaching tool, allowing teachers flexibly grasping information in classes. In order to reduce the complexity among elements, the information steps are displayed in the performance process, and irrelevant information is hidden. Through the communication with spoken language, teachers could operate at proper time to transform information, in the teaching process, for interaction. Information presentation and spoken language to guide students in the blockchain course would present certain functions.
3) Blockchain law course integrated multimedia dynamic teaching and the presentation of images and words would receive more information than single infor-

mation display. In this case, a teacher should guide in the process, rather than repeatedly lecture. Time control is extremely important. It is essential to leave time for students establishing correlations, including the connection between spoken language and word information. A teacher's spoken language is used for guiding, not intervening, that a teacher has to pay attention to the statement of spoken language and avoid improper spoken language interfering students' learning.

4) The blockchain law course integrated multimedia dynamic teaching could establish the relationship with images and word information. The guide of suitability index or the generation of hint could more directly result in students' thinking and exploration than the explanation with spoken language.

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