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Contents

The Application of Psycholinguistic Principles in University English Teaching

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Abstract: With the new curriculum reform put into effect, new requirements and plans for college English teaching have been put forward. More and more attention has been paid to Chinese college English teaching from all aspects, among which, psycholinguistics is a new frontier subject. The application of psycholinguistic principles in education is more extensive. The research on the osmotic application of psycholinguistic principles in Chinese college English teaching is becoming the focus of education. This paper briefly introduces the characteristics and basic situation of English teaching in Chinese colleges, and the application of psycholinguistic principles in Chinese college English teaching is expounded. The purpose of this study is to understand the principles of psycholinguistics in English teaching in Chinese universities. It is hoped to play a positive role in promoting college English teaching innovation in China.

Keywords: Psycholinguistic principles; College English teaching; Application

1. Introduction

Psycholinguistics, as a study of the psychological process of human language activities, mainly focuses on the explanation of language phenomenon by observing human psychological changes in the process of language communication and by examining what kind of reserved skill and ability human beings need to carry out language activities in the process of actual communication. In college language teaching, the practical application of language skills has been emphasized, and therefore, characteristic language teaching pattern will be studied and carried out to a certain degree on the basis of theoretical teaching, to guarantee the practicality of language teaching. At present, in college English teaching, besides the basic instruction of listening, speaking, reading and writing courses, the introduction of psycholinguistic principles to English language teaching has become an inevitable trend in order to cultivate students' practical abilities in applying basic knowledge in social practice. And in this field, many universities in China have launched pilot programs, which has very positive significance in improving the English teaching level and promoting the development of college English teaching in China.

2. The Present Situation of College English Teaching in China

With the implementation of new curriculum reform, the reform of English teaching in Chinese colleges and universities is getting on the right track. Because China's universities have been in a state of enrollment expansion, the quality of the students enrolled has been relatively declined, and the low cultural quality of the students has, to some extent, limited the teaching quality in Chinese universities.[1] In general, in this case, most college students' expectation for English teaching during the four-year study is confined to passing college English proficiency tests, such as TEM4, TEM8, CET4 and CET6. And this has led to the emphasis on exam-oriented education, that is, English teaching in colleges and universities paid more attention to examination and neglected cultivating students' practical abilities. Although the students' ability in coping with tests in written papers is guaranteed, it does not mean that the students' practical English proficiency has been improved. Coupled with the rapid development of global integration and economic globalization, the social demand for inter-disciplinary talents has continuously increased, and higher-level requirements have been put forward for the higher quality of foreign languages teaching in colleges and universities. In today's social environment, students who only master the theoretical knowledge of English language without practical abilities in social communication are unable to meet the development demand of the society.[2]

However, despite the increase of social demand for inter-disciplinary talents with high English proficiency in expanding globalization, most college students do not

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value English study, and they are psychologically afraid of difficulties in English learning. And many non-English majors in particular have even wanted to escape from college English tests-their mere goal in their English study in universities. Chinese college students has been in a state of passive acceptance of English knowledge for a long time for there is no upward pressure from entrance exams and the students lack of adequate understanding of the employment environment in the society. And the non-native language environment with English as a foreign language in China further deepens the difficulties in English teaching.[3] In colleges and universities in China, there are some problems existing in English teaching, such as insufficiency in professional research and backward teaching concept. And for non-English major students, English is just a course of study, and they are thought to finish their learning task if they pass the final exam even in English. And this would lead to the teachers' neglect of English teaching without considering improving their English teaching skills and strategies. In English classes, teachers and students are just paying lip service without real interaction and practical communication, which presents the characteristics of mechanical teaching in English course. Most teachers even don't bother to create English teaching situations, and it hard for them to motivate students' learning interest, thus producing a lot of students who just master English as a kind of "dumb English" and "mechanical English".[4]

3. The Design Concept of Permeating Psycholinguistics in College English Teaching

As is analyzed above, in the process of college English teaching in China, students are lack of English learning motivation, which makes the teachers' classroom teaching very passive and has largely restricted the promotion of teaching quality. Most colleges and universities in China are especially lack of effective English curriculum and the development of the design of actual teaching situations to cultivate students' oral English ability and English communicative competence. In a complete set of effective English teaching system, teaching should keep a whole ecological chain, making the students more actively involved in English learning and better interact with teachers' teaching process, which would cultivate both teachers' and students' initiative in English teaching and learning. Compared with the course instructions in compulsory education stages in primary and middle schools which emphasize knowledge instillation, college English teaching should be prepared to pay equal attention to both theory teaching and practice teaching design, taking into account the importance of both the instillation of knowledge and

research on scientific teaching mode and improving students practical ability in real world communication. Theory is the basis of practice teaching and practice teaching is the purpose of theory teaching, and therefore, it is necessary to increase the proportion of practice teaching in the curriculum design, strengthening the teaching methods of cultivating students' practical ability, such as abilities of oral communication and listening skills, meeting the target to open teaching content design.[5] Thus, the permeation of practical psycholinguistic principles in English teaching in Chinese colleges and universities is very urgent and necessary, which would direct the healthy development of English teaching in China theoretically and practically.

4. Reasonable Path of Applying Psycholinguistic Principles to College English Teaching

4.1 Principle and Application of Interaction Theory

As a basic and important principle in psychological linguistics, interaction theory is a completely new view point about the relationship between heredity and environment on the basis of the general recognition of the existing genetics and environmental factors. The idea of interaction theory consists of two parts: (1)heredity and environment are interdependent, and there is a relationship of correlation and mutual-dependence between them; and (2) heredity and environment interact with each other, and there is the possibility of mutual transformation between them, which can be changed by external stimuli.

When the concept of interaction theory is applied to English language learning and teaching, it will be found that the environment plays an irreplaceable role in learning and is one of the material bases to guarantee the quality of English teaching. English learning can be achieved through imitation and stimulation, but it cannot be limited to simple stimulation and imitation, and the creation of real situations is very necessary. English learning in real situation is just like the teaching and learning of mother tongue, which is not limited to the teaching of sentences or grammar but repeated practice in complex logical infiltration and sentence transformation in the real language environment.[6] In mother language environment, there is a real situational reinforcement learning, rather than a deliberate imitation. If real situations can be set up in English teaching in Chinese colleges and universities, students would acquire practical English communicative competence and better teaching results would be achieved. Language learning ability is a kind of innate ability of human beings, and human beings have the genetic factors of learning various languages, and the acquired environment is necessary to guarantee the learning effect.

According to the interaction theory, language teaching and learning is a dynamic process, which requires the creation of a good learning environment for students and good teaching atmosphere for teachers. In the process of college English teaching, the basic principles of practical teaching should be observed, creating a real situational teaching environment for students. For example, in teaching the unit related to the topic "Asking the Way", teachers can divide the students into groups to simulate the situation of asking the way and directing the way, practicing dialogues or conversations in a real situation. The students just "play" into the teaching situation and make their roles alive. And at the same time, classroom atmosphere is made active and students' initiative is exerted, which arouses students' interest in English study.[7] For another example, in a lecture to English majors on an article about how to write English poems, the teacher can let students follow the author's guidance and ideas to write the author's desired poem step by step. In this way, students not only have completed the study of English words, phrases and grammar, but also finished the task of discourse reading, and more importantly, under the guidance of the author and the teacher, the students use the target language they are learning (English) to produce their own English poem, and understand the beauty and charm of the English language in poetry. In applying this teaching method, teachers could enable students not only to be interested in English learning, but also to have a sense of achievement in using English and mastering English.

4.2 Principle and Application of Metacognitive Ability Theory

In psycholinguistic field, metacognitive ability is regarded as one of the important research subjects. Metacognitive ability theory deals with human beings' cognition and feedback on their self-learning situation in the process and activities of language learning. Metacognitive ability is in fact a kind of learning mechanism of human being. And this learning mechanism is reflected in English learning: students with metacognitive ability will be able to be clear about the meaning and value of English learning, know exactly the correct way of learning and improving themselves, analyze their own situation of grasping the language, actively adjust their methods and strategies in learning English, and this kind of ability is in fact what we call "power of understanding". As teachers, we should actively guide students and motivate them to generate the "power of understanding" and metacognitive ability in English learning, and apply them to their study process. In the process of English teaching, College English teachers should strategically help students build self-cognitive framework and encourage students to work hard and learn to analyze their own learning situation to find their short-comings and errors, developing the students' ability of autonomous learning.[8] After each test or quiz, for example, teachers can provide chances and organize students to discuss with each other about their learning methods and their achievements in the form of group discussion. In this way, the students can recognize and understand the connotation of English learning through mutual evaluation and self-assessment and build their knowledge framework. The application of metacognitive ability theory in college English teaching can help students better understand their own advantages and deficiencies, find out the problems existing in their learning process, and integrate their learning into the real situation of English learning.[9]

4.3 Principle and Application of Input Hypothesis Theory

Input hypothesis theory, as a common language learning theory in psycholinguistics, was put forward by Stephen Krashen, an expert in foreign language learning. This theory was originally called the monitoring model and later referred to as the input construction model. According to Stephen's point of view, language learning is an autonomous and independent activity. When the students are in the process of learning a foreign language without the influence of psychological barriers, it is easy for them to enter a state of self-awareness or autognosis, in which, the students' output of language learning will be much better than the effect of input. This means the less psychological burden students bear, the smaller language barrier they will have, and they will yield twice the result with half the effort. Based on the theory of input hypothesis, the biggest barrier in students' learning a foreign language is the psychological block, which includes the loss of the sense of direction due to the lack of language environment and the fear of difficulty caused by language learning disabilities. In order to break through the students' cognitive barrier, teachers should carry out their teaching in two directions: psychological guidance and classroom guidance. In the aspect of psychological guidance, teachers should provide psychological counseling for the students, encourage students to actively participate in teachers' teaching process, and try to use encouragement instead of criticism on the students to reduce their psychological burden and enhance the students' confidence. In the aspect of teaching guidance, teachers should actively guide the students and keep the balance between language input and output. After finishing the project of a unit, for example, the students can be encouraged to have their extracurricular investigation on the knowledge they have acquired in classroom and later on share the information they collect by demonstrating the outcome of their practical field work. The students can break through themselves by fieldwork practice and classroom presentation in the form of trying teaching. And

in this way, the students can improve their ability, hence the improvement of the quality of teaching and learning.

4.4 Principle and Application of Error Analysis Theory

According to the research results of psycholinguistics, it is a long-term process for learners to achieve good effect in learning a foreign language, and many cognitive approaches are imperfect in foreign language teaching in compulsory education period before learners enter university. In compulsory education stage, the language knowledge infused to the students is not systematically precise in organization, and the learners cannot grasp the language framework due to lack of learning strategies and methods. Some insignificant errors cannot be timely corrected in sentence pattern drilling and conversation simulation, which leads to the potential syntactic errors kept as legacy, causing the wide spread of "Chinglish" expressions. If teachers have loose requirements for their own teaching methods and are just satisfied with the students' language outcome with superficial meanings instead of grammatically accurate and correct expressions, the students will gradually generate a "mistaken" recognition in language habits and the long-term formed syntactic errors can even affect the formation of students' language sense. And this kind of mistakes can't get corrected through written tests, which further amplifies the potential harmfulness, leading to the students' habitual errors in later study. In the process of English teaching, teachers should restrain the students with strict requirements and timely point out the errors they make in both oral expressions and written forms, so as to avoid the influence of such mistakes on the formation of way thinking in foreign languages. And meanwhile, teachers should reasonably keep the proper proportion in the usage of Chinese native language and English second language in the process of English teaching, maximizing accurate and correct English and minimizing Chinese native language in class. Chinese native language is only used as classroom instruction in some activities if necessary or switching language in translation. The way of maximizing English second language and minimizing Chinese native language to avoid mother tongue interference in English learning helps to promote the formation of English way of thinking.

5. Conclusion

By introducing the characteristics and basic situation of English teaching in Chinese colleges, this paper expounds the design concept of applying psycholinguistic principles in Chinese college English teaching, hoping to help promote college English teaching innovation in China. Psycholinguistics, as a borderline subject in rapid development, has been widely applied in language teaching. In the process of applying principles of psychological linguistics to the practice of college English teaching, teachers should accurately perceive relevant theories in psycholinguistics, such as interaction theory, metacognitive ability theory, input hypothesis theory and error analysis theory. The application of such theories has positive significance in improving the English teaching level and promoting the development of college English teaching in China.

The permeation of psycholinguistic principles in English teaching in Chinese colleges and universities would direct the healthy development of English teaching in China theoretically and practically. The benign interaction between psycholinguistic theories and the improvement of English teaching level requires English teachers and professional experts to have further theoretical research and carry out more teaching practice innovation in this field.

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Exploration on the Practice System of Computer Software Course under the New Engineering

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Abstract: The rapid development of information technology and the new economy is a challenge to the training of computer technology and engineering professionals. The cultivation of engineering talents in Computer Engineering under the new engineering is an important part of the construction and exploration of new engineering in universities. According to the teaching reform of computer specialty in the new engineering construction, starting from the practice of curriculum system of software, mainly discusses the basic ideas of practice teaching reform of the course of computer software, software engineering practice curriculum system and practice curriculum system implementation method. The basic ideas of teaching reform practice in the course of the software include: expanding computer professional students' knowledge, strengthening students' computer science and software engineering knowledge and engineering practice ability, strengthening the frontiers of computer science and technology guide. Software practice course system is divided into three levels, including basic language course, engineering basic professional practice course and the professional practice course of engineering application direction. The implementation method of engineering application practice curriculum system is discussed in detail, such as strengthening university-enterprise cooperation, introducing teachers of social training institutions and guiding students to participate in subject competition and innovation projects.

Keywords: New engineering; Software practice; Curriculum system

1. Introduction

On February 20, 2017, the Ministry of Education issued the "Notice of the Department of Higher Education of the Ministry of Education Concerning the Launch of New Engineering Studies and Practices" (Letter from the Higher Education Department of the Ministry of Education [2017] No. 6) for the needs of new economic development, facing the future, and facing the world. We will carry out research and exploration of new engineering majors, and work on new ideas, new structures, new models, new quality, and new systems for the reform of engineering education. On April 8, 2017, the "Seminar on the Construction of New Engineering Courses in Colleges with Engineering Advantages" was held at Tianjin University. The meeting put forward: Grasping the new situation and new tasks of personnel training in colleges and universities, comprehensively deepening the reform of higher engineering education, accelerating the construction of new engineering disciplines, taking the initiative to face the future, and adapting to and leading the new economy.

With the rapid development of information technology, talent shortages have emerged in the fields of big data, Internet of things, artificial intelligence, and new technologies in the Internet, showing that China's computer science technology and engineering education are out of touch with emerging industries and new economic development[1]. At present, many colleges and universities have set up computer-related majors such as computer science and technology and software engineering. There is a close relationship between software-related practice teaching and curriculum setting for related majors. As far as the current practical curriculum system is concerned, it

is somewhat out of date or backward compared to the development of information technology[2]. Combining with the practical teaching and exploration of computer professional software in our school, we discuss the direction and implementation of practical teaching reform in the new engineering subject.

2. Basic Ideas of Teaching Reform of Software Practice Course under the New Engineering

2.1 Broaden students' Computer Professional Knowledge and Multi-professional Cross-Integration Teaching

The computer major is increasingly intertwined with other majors and forms many new majors and research directions. At present, the more popular information technology majors are directly related to computer science. For example: software engineering, network engineering, internet of things engineering, data science and big data systems, etc.; new engineering majors developed by computer professionals include: cyberspace security, service science and engineering, robotics, etc.; integration of computer science and industry applications. Professionals formed by the integration of computer professionals and industry applications, such as: Internet finance, digital health, e-commerce, geographic information systems, etc. The curriculum system related to the computer major is adjusted according to the orientation of the school and the needs of the employees, taking into account the scientific nature, advanced nature, and rationality.[3][4]

The training of computer professional software engineering talents under the new engineering discipline depends to a large extent on other cross-integration professions. In the conventional software practice teaching, the basic knowledge of algorithm and program design, software engineering technology, database and information system, Internet technology and its application are mainly emphasized. For the training of software quality in new engineering disciplines, the professional basic knowledge and core technical knowledge of relevant interdisciplinary subjects are strengthened, and professional crossover and innovation practice, industry application domain knowledge, etc. are strengthened[5]. Students are trained to use software technology to achieve cross-convergence professional related technologies and solve related professional problems.

2.2 Strengthen Students' Computer Science and Software Engineering Basic Knowledge and Engineering Practice Capability

The solid theoretical foundation of computer science technology and software engineering is an important goal of cultivating students in the construction of new engineering disciplines, and is a basic literacy for students to adapt to complex projects in the future. The core of computer software development and design is algorithm design and optimization, mode and architecture, database technology and performance optimization. International STEAM education represents science, technology, engineering, art, and mathematics. STEAM education is a comprehensive education integrating science, technology, engineering, art, and mathematics. Among them, mathematics, foreign languages, computer science, software engineering, quality assurance and testing techniques need to be further strengthened, so that students have the quality of acquiring new knowledge and skills in their future jobs[6]. Cultivating students not only has the ability to use computer technology to solve existing problems, but also has the ability to learn new knowledge and new technologies to solve the problems that arise in the future, and to play a leading role in future technologies and industries.

2.3 Strengthen the Leading Area of Computer Science and Technology

The advancement of curriculum structure with the times is an important part of the construction of new engineering disciplines. The emergence of some new majors in information technology, on the one hand, has adapted to the rapid changes in technology and economy, and on the other has challenged the construction of knowledge systems. The practical courses in computer professional software are constantly adjusted with the development of information technology. In recent years, the hardware development of information technology has continuously promoted the development of software. Technologies such as multimedia technology, big data, image technology, artificial intelligence, human-computer interaction, sensor technology, supercomputing, virtual reality, augmented reality, and cloud computing are all inseparable. To open computer software, how to set up a practical curriculum system based on specific research directions is an important task for the construction of new engineering disciplines. Based on personnel training objectives with both computer professionalism and integrated professional knowledge, we should scientifically and reasonably formulate training programs for new engineering computer majors in order to support the achievement of knowledge, ability, and quality of personnel training elements[7].

3. The System of Computer Software Course

There are many computer related software courses and a

wide range of content. In recent years, the development of computer technology has been more and more rapid, and the direction of computer science and technology extension has also been increasing. Almost all information technology developments are inseparable from computers. In general, the computer software courses are divided into three categories: basic language, engineering basic professional practice courses and engineering application professional practice courses. There are many kinds of computer-based programming languages, and students of computer-related majors are proficient in a programming language. Other languages can learn very quickly[8]. The languages listed in Figure 1 below have cross-platform and wide application features. Professional Practice Courses Current computer professional practice courses, combined with programming languages, implementation principles or engineering projects, which strengthen the practice of Linux teaching, because it can be applied in a variety of hardware platforms, embedded systems, notebooks and desktops, servers and so on. With the development of information technology, the professional practice courses in the direction of engineering applications are dynamically changing, combined with the development of new information technologies in recent years.

4. Implementation Method of Engineering Application Practice Course System

4.1 Strengthen University-Enterprise Cooperation and Cultivate Talents that Meet the Needs of Society
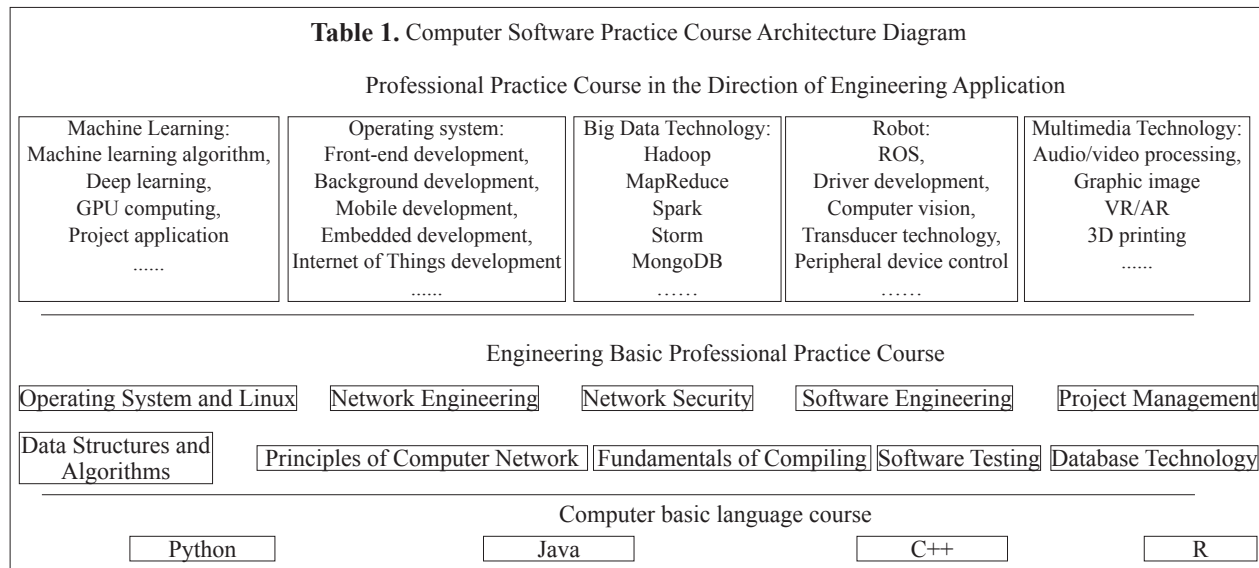
The important criteria for cultivating qualified personnel meet the needs of society and enterprises. Some of the company's senior technical talents have the actual engineering and technical capabilities that are lacking in col-lege teachers, effectively use these resources, and combine with the strong theoretical characteristics of universities to cultivate innovative technical talents.[9] The universities should employ outstanding talents such as technical backbones, senior engineers, and large-scale project architects of well-known companies to serve as creative classes or instructors and to formulate part-time teacher management standards. Improving the awareness and ability of college teachers in innovation and entrepreneurship education is an important part of pre-service training, curriculum training, and key training. Computer software-related professional teachers are employed by well-known companies in the industry to participate in the research and development and training of engineering projects.

On May 13, 2015, the General Office of the State Council issued the "Opinions of the General Office of the State Council on Deepening the Implementation of Innovation and Entrepreneurship Education Reform in Higher Education Institutions" (General Office of the State Council [2015] No. 36), and proposed an innovative cooperative mechanism for production and learning. In the past two years, the Higher Education Department of the Ministry of Education has organized relevant enterprises to support universities and colleges to jointly carry out cooperation projects on cooperation between companies and universities, and encouraged our school teachers to actively participate in project application.

Establish a new mechanism to jointly cultivate talents in colleges and industry. Enterprises from simple employers to co-cultivating units, strengthen engineering capabilities and innovation capabilities as the focus of reform of personnel training model, colleges and universities to establish an outside practice education base, colleges and

Table 1. Computer Software Practice Course Architecture Diagram

Professional Practice Course in the Direction of Engineering Application

| Machine Learning: Machine learning algorithm, Deep learning, GPU computing, Project application ...... | Operating system: Front-end development, Background development, Mobile development, Embedded development, Internet of Things development ...... | Big Data Technology: Hadoop MapReduce Spark Storm MongoDB …… | Robot: ROS, Driver development, Computer vision, Transducer technology, Peripheral device control …… | Multimedia Technology: Audio/video processing, Graphic image VR/AR 3D printing ...... |

Engineering Basic Professional Practice Course

| Operating System and Linux | Network Engineering | Network Security | Software Engineering | Project Management |

| Data Structures and Algorithms | Principles of Computer Network | Fundamentals of Compiling | Software Testing | Database Technology |

Computer basic language course

| Python | Java | C++ | R |

enterprises to jointly design training objectives, develop training programs, and jointly implement the training process[10]. Students participate in a certain period of engineering project training in enterprises, creating opportunities for students to participate in innovation and entrepreneurship practice and internships for famous enterprises.

4.2 Introduce Teachers from Social Training Institutions and Strengthen Cooperation Between Universities and Training Institutions

At present, there are many training institutions for computer-related majors in the society. Their teachers are strong in technology and most of the training teachers participate in actual information technology projects or engineering research and development. The introduction of talents in colleges and universities tends to be highly educated, emphasizes theoretical knowledge and scientific research dissertations, light engineering technology and management capabilities[11]. The advantage of colleges and universities lies in having a large number of high-level talents with high levels of research, and how to cultivate innovative engineering and technical personnel required by new engineering disciplines, and there is a certain disconnection between them[12]. There are many IT education and training institutions in Beijing, such as: Danai Education, APTECH Beijing, Qianfeng Education, Shangguan Training, and ChinaSoft International Education Group. The training courses set up by these training institutions are characterized by strong engineering, practicality and advanced technology.

Teachers of training institutions regularly go to campus to give lectures and combine practical teaching with engineering projects. Our school implements the "three semester" system. The third semester is arranged before the summer vacation. During this semester, our university and Dane use the joint training method for students in the second grade or the third year of university for computer science and technology and software. In the engineering major, the teachers in Dhanai are assigned to the school to give lectures. The contents mainly include Android development, Java project development, front-end development, etc. Their training content is combined with actual engineering projects and is deeply loved by students.

4.3 Participate Appropriately in Academic Competitions and Innovative Projects to Stimulate Students' Engineering Capabilities Through Competitions

At present, there are many kinds of computer-related competitions in the society. A considerable part is computer-related competitions organized by enterprises and associations or enterprises and universities. Selecting some key competition projects and participating in subject competitions purposefully will help cultivate students' awareness of competition and innovation. The relevant competitions organized by our university include: ACM/ICPC International College Student Program Competition, National Software Professional Talent Design and Skill Contest, North China Five Provinces (City) Computer Application Contest, and Sharing Cup University Student Science and Technology Resource Sharing Service Innovation Contest. The school has organized laboratory open-fund projects and innovative experimental projects for undergraduate students. Students are encouraged to apply software development projects with divergent thinking and continuously improve their engineering practice. Guide college students to actively participate in scientific research activities and cultivate and improve scientific and technological innovation capabilities[13].

5. Conclusion

The engineering of computer specialized software direction requires highly qualified personnel with strong practical ability and strong innovation ability. Through the practical teaching reform of new engineering computer software courses, colleges and universities cultivate students to have sustainable competency of high computer software engineering literacy, have sustainable and innovative talents, and have a sense of responsibility and mission for global future affairs and national development, and have international competition. In the area of information science and technology, we will foster a large number of high-quality engineering and technical talents with strong innovation capabilities and adapted to the needs of economic and social development, and serve the country's strategy of building an innovative country and a powerful country with talents.

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Research on Ideological and Political Education of Higher Vocational College Students' Network Groups in the New Era

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Abstract: With the rapid development of modern information technology, Internet technology has become a major driver of social and economic development. It also has a great influence on higher vocational school education, especially the ideological and political education of young students. The network has brought new changes to the students' cognition, thoughts and conduct, learning methods, and physical and mental development. At the same time, it has a negative effect on students' own development and student group development. In order to better serve the ideological and political education of higher vocational students and improve the pragmaticality and effectiveness of the ideological and political work, we have actively enriched the network carriers, took the initiative to fight for Internet public opinion, actively built a network response mechanism, and focus on the training of network leaders and other measures to strengthen the online community ideological and political education.

Keywords: Vocational students; Network Groups; Ideological and political education; Strategy research

1. Introduction

Higher vocational students' ideological and political education is an important part of higher vocational education management. The effectiveness of student ideological and political education is related to the direction of socialist education. It is the fundamental task of higher vocational colleges to "learn German." Students' ideological and political education must conform to the laws and characteristics of young students' physical and mental development. In combination with changes in the times and development, it is necessary to strengthen and improve ideological and political work with the times in order to adapt to the ever-changing social development.

In October 2017, General Secretary Xi Jinping proposed in the report of the 19th Congress "Strengthen cultural self-confidence, promoting cultural prosperity; strengthen Internet content development, and establish a comprehensive network management system, creating a clear cyberspace."[1] The report clearly points out the role of the Internet in ideological ideology and cultural construction, which has provided active guidance to ideological and political workers and education administrators in the context of the Internet era to correctly establish students' values and views on life and has a positive guidance and promotion role in guiding and leading students' social conduct and ethics.

2. Classification of the Internet Influences on Youth Groups

2.1 The Influences of Internet Learning Mode on Students' Cognition

The rise of the cyber society is a period in which human society enters the "digital survival" stage. The living space of human beings has been extended, and the way of production and life style, including students' perceptions, has also changed.[2] Self-awareness of higher vocational students is mainly self-awareness. The development of self-awareness of young students is often influenced by social environment and social comparison. As a form of social environment, the Internet provides a new social comparative environment for the development of students' self-consciousness. In such an environment, self-awareness will grow and develop. In general, in the Internet environment, students' perceptions of themselves are still inadequate. In reality, due to the limitations and constraints of various conditions, students' true feelings are hidden. On the Internet, it is possible for the subject's self to reassess the object itself.

2.2 The Influences of Internet Information Content on Students' Moral Character

The Internet belongs to the information virtual world and is an invisible and real living and learning environment. On the one hand, the Internet brings to students a wealth of learning information and learning methods that are flexible and have a strong sense of experience. This greatly expands students' horizons, enhances their enthusiasm for learning, and stimulates students' thinking ability. On the other hand, due to the lack of an online system of regulatory constraints, information on the Internet is varied and mixed, with mixed results. For young students whose outlook on life and world view is being formed and improved, their information judgment and resolution, as well as self-control The great challenge, for some improper speeches, spam and online fraud, pornographic violence information acquisition and access, often have a great negative impact on students' ideology and morality.

2.3 The Influences of Internet on Students' Physical and Mental Health

The Internet has now become a way and a state of student life learning, and it is indispensable. If the correct use of the Internet can improve young students' self-learning ability and improve their ability to use modern technology, however, if they addicted to Internet addiction, they will distract their attention, unmotivated thinking will become dull, and results will decline, leading directly between students. The contact and communication between students and teachers' parents weakens students' social attributes. For example, lack of normal social communication will lead to an increase in loneliness and depression, and in the long run it will lead to depression, self-containment, and other personality. In addition, indulging in online games for a long time makes the brain's central nervous system highly excited, which can cause adrenaline levels to rise, neurotransmitter secretion in the body to be disordered, reduce immune function, induce various diseases, and extremely severely affect student psychology healthy growth.[3]

2.4 The Influences of Internet Online Reading on Students' Learning Mode

In the era of big data, information is rapidly expanding in an explosive manner. Young students' reading of paper books is reduced, which are replaced by electronic modern reading methods such as e-books, smart phones, iPads, etc. There have been profound changes and e-books have become the main form of reading for students. It can be said that the electronic reading method subverts students' traditional learning methods and thinking modes: the convenience of learning and searching methods leads to the enhancement of students' utilitarian purpose in learning. At the same time, most of the network information is presented in a fragmented manner, which leads to fragmentation of students' reading time and broadens their knowledge. However, knowledge content is abundant, but it lacks understanding of things as a whole, and lacks the ability to train and train students' intrinsic logical thinking skills. This has led to the fragmented and mediocre nature of their thoughts and the lack of logical thinking skills.

3. The Positive and Negative Effects of Internet on Higher Vocational Students' Network Groups

3.1 Positive Effects
3.1.1 Facilitate College Students to Quickly Obtain All Kinds of Information Needed

In the Internet, members of the online community tend to share information, knowledge and knowledge that they know, and are familiar with, on the Internet, and other network members can also extract their own things online. Members who share the same hobbies, interests, and ideas often spontaneously form a self-organizing network. Young students can obtain useful information in various aspects through the self-organization of different goals and themes, especially those that are spontaneously formed based on learning objectives. Groups can greatly enrich university students' knowledge reserves and breadth of knowledge.

3.1.2 Improve Young Students' Ability to Analyze Problems

Due to the complexity of the self-organizing membership of the Internet and a large amount of information flooding the network, the ability of young college students to judge and analyze complex situations is severely tested. On the one hand, students, as self-organizing members, can actively participate in discussions and receive discussions, approvals, and suggestions from other members. On the other hand, new inspiration, new knowledge, and new knowledge can be learned from relevant discussions among members, exchanges related to communication and collisions, and inspired by different ideas so that students can develop their own analytical and cognitive skills. In addition, because of the network's self-shelving nature, students can freely and fully communicate with each other in virtual groups, and can fully open their minds and thinking is more active than ever.

3.1.3 Inspire Students' Creativity

Self-organizing members of the virtual network are free to express their opinions and ideas, relatively excluding the imprisonment of students' thoughts and abilities in the real world, and can reduce the ideal realm of conditional restraint for students in the modern society, and can inspire and release students' inspiration to a great extent to enhance students' creativity and awareness of innovation.

3.1.4 Develop Students' Teamwork Spirit

The formation and operation of network self-organization has altruistic characteristics. It is this characteristic that can spontaneously cause the interest of related members to form an organizational group. If you publish information that you know about yourself, share it with other members, and provide your own software, learning materials, movie advice, etc. to members of the group for free. In the era of big data, the completion of specialized projects requires the division of labor and collaboration to complete the task. The network can facilitate and enhance the coordination of operations, division of labor, and emotional communication among groups. In the process of completing the tasks, it has cultivated students' teamwork ability.

3.2 Negative Effects

3.2.1 Harmful Information and Wrong Ideas Are Easy to Spread

Due to the high degree of inclusiveness of the network and the psychological compatibility of the online community, various ideas and ideologies exist simultaneously. Due to the psychological compatibility of virtual groups, it is very likely that when a certain member spreads harmful information and wrong viewpoints, due to other members'

feelings of being insulted or neglected, misleading views and harmful information are widely spread across the network. For students with poor self-control and weak judgment ability, these misconceptions and information may directly affect their judgment, change their ideological views, weaken ideals and beliefs, and even their outlook on life and values, and give them the ideas of colleges and universities. Political education has a greater negative impact.

3.2.2 It Is Easy to Breed Liberalism and Anarchy

The hidden nature of the network makes it difficult to establish normative groups among self-organizing groups, making it easy for groups to breed liberalism, overemphasizing self-awareness, and emphasizing the claims and freedom of individual rights. In the past, this tendency may have been brought into real life. In China, it leads to contempt for discipline, morality, and laws and regulations, which is detrimental to the socialization of its health. At the same time, it also infringes on the harmonious development of the society and leads to an anarchist quagmire.

3.2.3 It Can Create a Personality Disorder and a Crisis of Confidence

If members of online groups indulge in online games and activities for a long time, and reduce the actual social communication activities, they will gradually alienate the actual human communication. For individuals, they will cause individuals to be isolated and closed, which are not conducive to new health; because online communication cannot meet each other It is difficult to verify the authenticity and reliability of information on both interactive topics and personal basic situations. Under the premise of incomplete network restriction mechanisms, it is easy to be used by criminals and indirectly affects the establishment and development of good relationships between individuals and others. There is a crisis of confidence among groups.

3.2.4 It Can Cause Misplaced Student Roles and Affect Their Normal Socialization

College students can play different roles on the Internet and experience the different role requirements that their roles bring. They can also make up for and develop his socialized experience of their roles and cultivate their recognition of different roles. However, long-term college students have always appeared in a virtual identity, which may make them appear in a masked state in real life, making them misunderstand their understanding of virtual networks and real life, which may seriously affect the correct judgment of things.[4]

4 Based on the Principles of Ideological and Political Education under the Network Groups

4.1 The Principle of Correct Orientation

Under the background of internet, the task of ideological and political education in higher vocational colleges is more arduous and complicated. It is necessary to grasp the correct orientation and essence of ideological and political education.[5] We must adhere to the orientation of Marxism, firmly grasp the party spirit of the ideological ideology of higher vocational education, grasp the initiative and dominance of network culture construction, and build the school network into a public opinion position for propagating Marxist theory and advanced culture; We should use teaching practices and other methods to conduct in-depth propaganda on socialist theory with Chinese characteristics, cultivate the patriotic sentiment of college students, develop a sense of solidarity and hard work, and promote the university students' continuous understanding of Recognition, understanding and support for the cause of socialism with Chinese characteristics.

4.2 The Principle of Self-Confidence and Openness

The biggest feature of network organization is openness, which can promote students' freedom and overall development on the basis of openness. However, while opening up, a large amount of good and bad information is also present on the Internet platform. To grasp well the ideological and political education for higher vocational students in the network environment, we must not only emphasize blocking and blocking information channels and dissemination of content, we must scientifically understand the laws of network operations, adhere to openness and freedom, and ensure full freedom rather than let alone, so we must be active and healthy. The information content of energy can be widely disseminated, providing young students with a transparent and pure online platform, allowing students to actively publish their opinions and speeches, and cultivate their ability to rationally judge affairs.

4.3 The Principle of Equal Interaction

Modern network education is the main method of education today. Educators must also establish an equal equivalence perspective, respect the laws of education, respect the subjectivity of students, and engage in honest and sincere interaction, actively strive for network positions, and take the initiative to communicate with students through active communication. Students' dynamics should promptly report the progress and results of the incidents on the campus network. Organize specialized personnel and technical personnel to clarify in time the cyber rumor is false information and enhance the timeliness and timeliness of the communication content.[6]

5. Countermeasures and Suggestions on Network Ideological and Political Education in Higher Vocational Colleges

The double-sided nature of the role of the young students in vocational colleges' online communities requires that the ideological and political education in colleges and universities can proceed from their own reality and actively exert the active role of the students' online communities, limiting its negative impact to the greatest extent, and guide the student network groups to become advanced thinking and self-organizing groups of positive energy.

5.1 Positively Enrich the Network Carriers and Actively Strive for Internet Public Opinion Fields

There are various virtual groups, self-organizations, forums and postings on the Internet. Instead of students who are full of curiosity and curiosity, the vocational students who are full of curiosity and thirst for curiosity go to the off-site website to join various virtual groups. The higher vocational schools are not as good as establishing online platforms that can attract students to join and guide students to build their own network organizations. This is also an effective way to prevent, control, and guide students away from negative influences. The use of the school's own resources and charm to attract and retain young students can start from three aspects[7]: First, the design and planning of online content and themes must closely reflect the reality of the current status of the university students, the realities of students and life. Let college students be interested and let them find the knowledge and information they desire. Second, develop a network management system to regulate and guide students' online behaviors from the institutional level. While ensuring the free and convenient nature of cyber virtual groups, students should be allowed to abide by the network behavior system, enjoy the convenience brought by the online community, always keep a clear understanding, comply with national laws and regulations, and do not violate the law by breaking the law. Third, implement a high degree of autonomy in the self-organization of the Internet, give full play to the role of college students' self-education and management, and be good at seizing the college students' Internet users willing to play a leading role. As the school functional departments must affirm and support their ideas and work, give full play to their typical exemplary guidance effect. Train and nurture the school's own opinion leaders and self-organized leaders to guide, regulate, in-

fect, and stimulate the direction and effectiveness of other Internet users and self-organization.

5.2 Take Preventive Measures and Actively Construct the Network Public Opinion Response Mechanism

The student management part of colleges and universities should proceed from the ideology of the party, proceed from the students' subject, further clarify the working mechanism of the analysis and pre-judgment of the Internet public opinion, and pay attention to the importance of the network ideological work. Starting from the party committee administration, various functional departments and secondary colleges, they will work together to build a three-tier network public opinion work system. While carrying out the public opinion analysis of campus networks, it is necessary to strengthen public opinion risk assessment, and to standardize and prescribe early-warning and emergency response mechanisms so as to prevent problems before they are discovered, to make early detection and early disposal, and to contain the risk of Internet public opinion in the bud. In addition, we must also pay attention to the students' own role, select and employ people who are interested in network work, and have high ideological awareness. Students with good overall abilities are school network information officers. They can regularly inspect the Internet and can accurately grasp the development of students' Internet public opinion. The students themselves have the strength to achieve the inherent stability and controllability of the school network lyric work.

5.3 Persist in Guiding College Students with Socialist Core Values to Improve Students' Internet Comprehensive Quality

The core values of socialism are the fundamental attributes and characteristics of the core values of socialism with Chinese characteristics in the new era.[8] We must use socialist core values as a guide, strengthen the guidance of online education, and integrate socialist values into the management of network self-organizing operations. On the other hand, it has transformed socialist core values into emotional identification and behavioral habits of young college students. Through the guidance of socialist core values, the college students will improve their network moral qualities, enrich their moral education through the education of patriotism and citizen moral education, improve their Internet literacy, and internalize their online behavior norms into their self-discipline. At the same time, it is necessary to improve the ability and judgment of college students to analyze network information at this stage, and to teach students that the network has an open

and interactive advantage. The network is not a place outside the law. Students are free to express their opinions and opinions, but they must abide by the network order. On the basis of improving cyber security and awareness of prevention, consciously resist the erosion and destruction of bad and harmful information.

5.4 Emphasize on the Cultivation of Network Leaders and Strengthen the Key Emphasis in Work to Enhance the Effectiveness of Work

In addition to strengthening the construction of ideological and political counselors and staff, vocational colleges ensure the directionality and standardization of school network organizations. In ideological and political education teachers, they generally have high ideological and theoretical levels and are familiar with network ideological education. The methods and methods can correctly analyze and judge in the complicated public opinion information and belong to the formal organizer in the network ideological and political education. On the other hand, we must also pay attention to the role of informal organization leaders in student network organizations. In fact, in the network operation, the strength of informal organizations must also be emphasized. They understand information technology and understand the laws of network operations, and they have many Network fans and supporters, they can be on-campus teachers and student officers, of course, may also be other people outside the school. We must attach great importance to this network organizer, pay attention to their strengths, and use them for their own use of their technical expertise to serve the construction, maintenance, and management of the ideological and political education network platform, and ensure that the operation of the school's network self-organization always centers around the school's daily life. Work and young students need to grow and develop to promote the effectiveness of ideological and political work on the Internet.

6. Conclusion

In brief, with the development of the times, the development of the Internet is changing with each passing day and affects the way of thinking and life style of learning of high vocational students. As higher vocational colleges, we should always research and analyze the new changes and new requirements brought by social development and information technology to ideological and political education. We should also fully analyze the new characteristics and trends presented, and actively guide young students to use them. Online media, relying on self-organization of online groups, expands the advantages of network ideo-

logical and political education and publicity, enhances the effectiveness of ideological and political education in higher vocational schools, and achieves the established goals of school ideological and political work.

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Paradigms and Methodologies for Knowledge Building

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Abstract: A diversity of methodologies can be utilized for knowledge building in social sciences, particularly in education. Nevertheless, in order to give meaning to the research findings and progressively create theories, an awareness of the epistemological framework appears to be necessary. The aim of this article is to present the main epistemological paradigms and their coherent correspondence with respective ontologies and corresponding methodologies. This article supports and describes four paradigms or epistemological traditions: logic empiricism, constructivism, conceptualism or Aristotelian tradition, and phenomenology. Understanding the diverse possible epistemologies as well as the coherence with methodologies is a necessary step for presenting well-informed research. Knowledge building requires comparison, replication, generalization or integration of results in theories, and all these processes need the critical instance of the epistemological and methodological coherence. Additionally some concrete examples of methodologies have been detailed to illustrate the diversity of available ways of knowledge building in education. The Review of Educational Theory, as a new journal that aims to create a scientific community, will increase the research quality by enhancing the epistemological and methodological awareness of their pieces of research.

Keywords: Knowledge building; Epistemologies; Research methodologies; Ontologies; Logic empiricism; Constructivism; Aristotelian tradition; Phenomenology

1. Introduction

The aim of a scientific journal is to serve research groups or individuals by publishing their original research or theoretical advances. The result is a progressive creation of a scientific community compromised in knowledge building within the scope of a field of human scientific endeavor. If the scientific community is involved in disciplines of social sciences, a diversity of methodologies has to be welcomed in today's potential methodological diversity. Nevertheless, in order to share properly theoretical advances, it's necessary to develop collective consciousness about ontological, epistemological and methodological matters. Otherwise the necessary critical discussion would be too poor and weak to support collective progresses.

When, in addition, the scientific community has different backgrounds, and/or the field scope is wide, the need to share epistemological unified languages increases. The required critical stance needs it. The comprehension and integration of different findings, coming from diverse research traditions, need accurate epistemological and methodological languages.

On the other hand, considering a single research piece and the need of communicating it with the maximum of quality standards, it seems appropriate present it as a coherent piece. By coherent we mean that explicitly or implicitly the correspondence between ontology, epistemology and methodology is appropriately articulated. Otherwise the repeatability and comparability of the findings would not easily be made, nor the relevance appropriately established.

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Additionally there is a need in our postmodern times to integrate findings in order to make comprehensive approaches to explain complex problems and situations. The integral theory[1] is widely used in different fields: medicine, leadership, political science, or education, among many others. To make possible the advances, the integral theory needs at the same time to differentiate and to integrate[2], which are two independent dimensions of complexity[3]. This can be done only after being aware of the epistemological and methodological reasonableness of the diverse findings.

The purpose of this article is to inform the use of research methods and techniques, providing their source of validity and relevance, as well as their interpretative framework. The declared objectives of providing a rationale for making possible dialog inside a critical community, presenting coherent and suitable pieces of research, or having an informed framework to contextualize research, converge in a single research, and what is immediately interesting to researchers: to increase the research quality.

The study of paradigms started with the work of Guba & Lincoln.[4] Creswell emphasized the paradigmatic way of thinking in the research design.[5] Additionally Mertens and Mackenzie & Knipe applied the paradigmatic rationale to educational research.[6] Although the important impact of these contributions, a systematic rationale for the paradigms in knowledge building remain to be done. In particular it's necessary to enhance the intra-paradigmatic coherence between epistemological, ontological and methodological rationales. The paradigmatic thinking is relevant to create methods and mixed methods.[7] In the design of a particular research, when is time to select the method (mixed or not), the appropriate understanding of paradigms for knowledge building can be a valuable tool in the decision-making process.

2. Rationales for the Paradigms

Following a phenomenological methodology we present four ways to substantiate the traditions or paradigms developed. These ways can be understood as rationales for the paradigms, which serve to sustain them, and to understand in depth their foundations and differences.

2.1 Aristotelian Philosophical Rationale

Aristotle[8] systematized the diverse and distinct forms of knowledge under the word episteme. But although episteme is usually translated as science, their meaning was broader than the definition that we use today. The broader sense could be translated as to know, to understand or to be acquainted with. Aristotle distinguished between three kinds of episteme: theoretike, praktike and poietike.[9] In the first one the focus was the research of truth and their necessary character, as in mathematics, physics or ontology. In the case of the episteme praktike the object of knowledge was the human behavior, and was centered in the perfection of the agent. It's the Aristotelian practical knowledge of ethics or politics oriented to the phronesis. The episteme poietike in turn was oriented to productive knowledge. This kind of episteme was guided by the poiesis and, unlike the two previous ones, more than one potential outcome is possible. The poiesis guides the perfection of the work. This kind of knowledge was identified by the word tekhne, which in Latin was translated as ars: a kind of rational human way of constructing knowledge, productive knowledge. Aristotle introduced also the nous, a direct intuition of truth. All those modalities together form in his system the Sophia, which requires therefore the contribution of different modalities of knowledge.
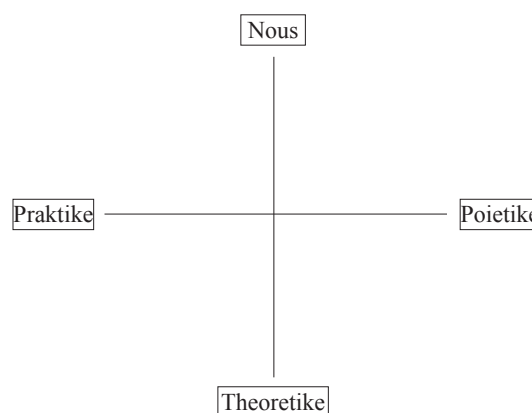
Figure 1. Aristotelian ways of knowing. Episteme and Nous.

The first statement in the path toward the identification of the paradigms is that, in correspondence with the Aristotelian view, they are four. In addition it seems reasonable to set up a correspondence between the epistemological paradigms and each one of the three episteme and the nous.

2.2 Wilber and the Comprehensive Rationale

Wilber (2001, 2005, 2007) presented a map of the human consciousness with four dimensions or quadrants and the different levels, lines, states and types characterizing all human consciousness manifestations. The quadrants are:

Table 1. Quadrants of the Wilber Theory

Upper left (UL): Subjective, I	Upper right (UR): Objective, It
Lower left (LL): Intersubjective, We	Lower right (LR): Interobjective, Its

Besides other considerations and advancing toward the map of knowledge or the epistemologies that the

Wilberian perspective implies, it has to be explained that the upper right quadrant (UR) refers to the objective world, that is, the material body and everything that can be observed in time and space, open to the knowledge of the positive sciences. The upper left quadrant (UL), the subjective world, includes thoughts, emotions, memories, states of mind, perceptions and sensations. The lower left quadrant (LL), in turn refers to the intersubjective world, including values, meanings, language, relationships and culture. And the lower right quadrant (LR) includes the interobjective world, comprising networks, systems, technology, government and the natural environment. As far as ontology is concerned, the meta-theory exposed allows situate pre-modern metaphysical perspectives as the result of the predominance of the subjective world (UL); the modern ones as the result of the emphasis on the objective (UR) and the postmodern ones as the result of the preponderance of the intersubjective character (LL). All the perspectives contribute but by themselves are insufficient, in Wilber view, to give account of the whole.

Considering the interior and exterior of each quadrant, eight zones can be created that define the different methodologies:[10]
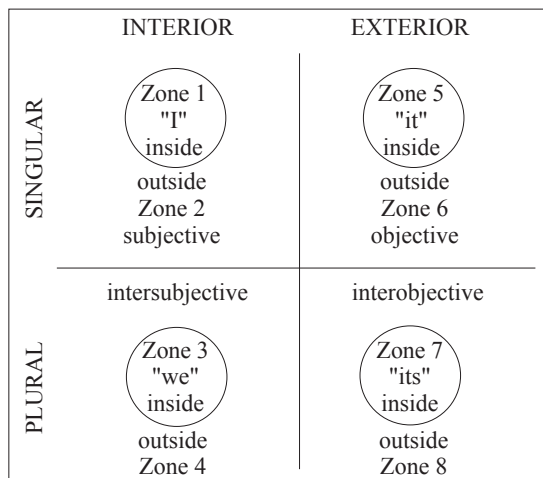

Image from Helfrich PM. Ken Wilber's AQAL metatheory: An overview; 2008.And from Wilber K, Integral spirituality; 2006, p. 36

Figure 2. Definition of zones in the Wilber's quadrants

- Top left quadrant UL (Subjective intention)

• Zone # 1: Introspection, phenomenology.

• Zone # 2: Structuralism

- Lower left quadrant-LL (Intersubjective cultural systems)

• Zone # 3: Hermeneutics

• Zone # 4: Cultural anthropology

- Right upper quadrant - UR (Objective behavior)

• Zone # 5: Autopoyesis

• Zone # 6: Empiricism, behaviorism

- Right lower quadrant-LR (Inter-objective social systems)

• Zone # 7: Social autopoyesis

• Zone # 8: Ecological sciences, systems theory, anthropology

These epistemological approaches constitute a map that is presented to summarize the totality of the human desire to create knowledge. Using a map does not mean that all dimensions are always going to be used, but all are considered as valuable ways of accounting for the phenomena and each one complements each other. The map helps to situate perspectives, to know in which way they contribute and how they can be complemented.

There is a meaningful correspondence with Aristotelian presented ways for creating knowledge:

Episteme theoretike: #6, empiricism, behaviorism

Episteme praktike: #3 #4, hermeneutics, cultural anthropology

Episteme tekhne: #8, but will require more refinement

Nous: #1 #2, phenomenology, structuralism

It has to be noted that autopoyesis (#5 and #7) are not ways of creating knowledge, because is the objective reality itself in the Wilber's model. The knowledge in these quadrants is only in the external dimension (#6 and #8). The knowledge must be separated respect to the object. In our purpose we are interested in knowledge creation.

On the other hand, Wilber proposes the interobjective quadrant (#8) social, as separated from the intersubjective (#3 #4) cultural. These two dimensions seem difficult to be separated, given their representational character. For this reason Gallifa (2018) placed them in the same Lower left quadrant. The interobjective world was characterized as the relations between objects. If objective knowledge corresponds to cognition, in the inter-objective quadrant, the correspondence is with metacognition, and with strategic, tacit, practical knowledge.[11] Gallifa (2018) proposed a redefinition of the interobjective quadrant approaching it to the Aristotelian tekhne. Wilber included also these relationships in that quadrant.[12]

2.3 The phenomenological rationale with the holonic theory.

Wilber supported his system in the concept of holon, which will help in our purpose of the progressive refinement of the paradigms. Wilber, after presenting the involution-evolution rationale, introduced the concept of holon that previously Koestler[13] formulated. "Reality is not composed of things or processes, it is not composed of atoms or quarks. It is not composed of 'wholes', nor does it have any 'parts'. Rather, it is composed of whole/part or holon units".[14] For example, an atom, a grain of sand, an animal, a symbol, are examples of holons. Holons can be considered themselves by definition as a whole and at the same time as part of another wider reality. Holons help to explain the hierarchical and heterarchical relationships within the evolutionary spectrum of physics, biology and consciousness.

A holon is therefore a "fundamental structural element common to all reality. Its definition as a whole or as a part will depend on the context. It is always complete and incomplete so, trying to maintain its identity or express its potential, it flows and extends into becoming. It could be said that a holon is a construct, but also it is a self-evident revelation, resulting from a natural phenomenology. Its symmetry provides structure and stability and its lack of definition provides asymmetries and movement. It is the 'root' event and the structural basis of the forms and of all the other events".[15]

2.3.1 Detailed dimensions of holons

Wilber synthesized what holons of any kind have in common. Every holon has four characterizing dimensions:[16]

Agency. Tendency to be a whole. Aristotelian entelechy, morphic unit/field (Sheldrake), canon (Koestler), self-asserting, relative autonomy and wholeness, yang. It manifests the tendency towards self-preservation, autonomy, self-responsibility, self-esteem. It assumes in this sense fixed forms or patterns, among which there are the 20 tenets. Wilber named this dimension deep structure. In pathological forms it manifests as alienation and repression.

Communion. Tendency to relationship, participatory, bonding, joining tendencies, expresses its partness, the ability to be part of a whole, attract other parties, relationship with something larger, self-adaptation, yin. Pathological forms: fusion and indisociation.

Self-transcendence, Self-transformation, creative novelty, creativity (Whitehead), each holon becomes a new whole/part that has its own new forms of agency and communion. It is about the impulse to experience freedom, to find cohesion and unity through a greater, deeper and broader totality. Articulated by 'symmetry breaks' (Prigogine) not equivalent rearrangements of the same stuff. Evolution is the result of self-transcendence at all levels: It is also called as 'Eros', that is, Spirit manifested in something else: matter, body, mind, soul, etc. In this dimension the 'telos' or purpose is manifested. If self-transcendence is not achieved, 'phobos' (fear, regression, panic, contraction and repression) is experienced.

Self-dissolution-autoinmanence. Self-dissolution of transcendence that can be termed as autoinmanence. Morphogenetic gradient in the manifest field. This means not only a manifest reality with some kind of support in the manifested reality, but also potential to evolve. Preservation of the current level or regression to previous levels. Wilber conceptualizes it as an instinct of death or Thanatos, a force opposed to Eros.

The four properties can be represented in axes, as Wilber proposed.[17] The simple representation of a holon is therefore:
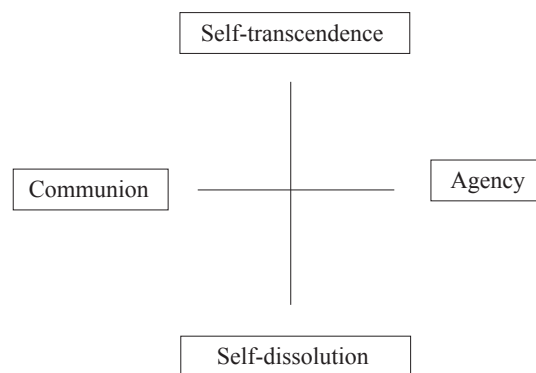
Figure 3.

Regarding our purpose, especially relevant is to find out whether or not in a paradigm for constructing knowledge the dimension of transcendence is implicated. When there is no transcendence the system collapses in a predictive system and phenomenological process is unnecessary. Another aspect from the observation of the holonic structure is that there is a correspondence with the paradigms that we are characterizing. For example the communion dimension is related to the intersubjective cultural vector and the implicit values that are the central part in hermeneutics and cultural anthropology, etc.

2.4 Constructivist Rationale in the Definition of the Paradigms

There are three questions around which to analyze the paradigms for constructing knowledge:[18]

Ontological: What is the form and nature of reality and what is there that can be known about it?

Epistemological: What is the nature of the relationship between the knower or would-be knower and what can be known?

Methodological: How can the inquirer (would-be knower) go about finding out whatever he or she believes that can be known?

In a given paradigm, or epistemological tradition, coherence in the response to these questions is expected to be a paradigmatic trait. Guba & Lincoln proposed that paradigms are human constructions, composed by sets of basic beliefs. "They are not open to proofs in any conventional sense. Advocates in any particular construction must rely in persuasiveness and utility rather than proof in arguing their position".[19]

Guba & Lincoln (1994) advocated for four paradigms. In our case we'll consider also four paradigms, following the rationales developed. The four traditions are: logical empiricism, and constructivism, in coincidence with Guba & Lincoln (1994), but we defined differently the other two: conceptualism and phenomenology, in correspondence with our development and as we'll justify appropriately in the presentation of the paradigms.

Once developed Aristotelian, integral, holonic and constructivist ways of reasoning, and putting together the considerations made, it can be easily observed a coincidence in the cited four traditions, which are developed in the next part. The traditions according to Guba & Lincoln (1994) can be named as paradigms or traditions for knowledge building.

3. Paradigms for Knowledge Building and Corresponding Methodologies

3.1. Logic Empirical Science

The logic empirical paradigm, also denominated as Galilean tradition or positivism/neo-positivism. The ontology is realism, which means that there is an external and objective reality (object-objectivity) separated from the subject that creates knowledge. The epistemology departs from the view of the natural world as opaque. Repetition of observations is needed in order to identify trends and inductively create hypothesis and theories. Logical deductive confrontation is also used to test theoretical consistence with the data (Popper). Changes of interest in scientific communities can be explained as change of paradigm.[20] Logical empiricism discarded the Aristotelian arguments from authority and relied in repetition of observations

and criticism instead of particular cases. The single case doesn't have wisdom. The methodology is observational and experimental, with the use of quantitative methods to characterize the reality though measurements. Finally the aim is the establishment of scientific laws that are relationships between variables or formulas. All the forms of behaviorism but also psychometrics fall in this vision of science.

3.1.1 Experimental and Observational Methodologies: Quantitative Methodology

Quantitative methods within an observational or experimental framework are used to test theoretical consistency and to propose new theories in education. This tradition need to start off from existing theories, identifying a gap in the knowledge and proposing observations, measurements, indexes or design experiments to test new hypothesis, and construct a theory sustained with empirical data, open to criticism. There are many methods, and educational research may use a wide diversity of them,[21] for example the movement of evidences-based research,[22] which is influencing many school reforms. The detailed description of concrete approaches is outside the purpose of a single article.

3.2 Constructivism

Constructivism is a paradigm of knowledge construction. Guba & Lincoln (1994) explained that this paradigm emerged at the same time of the evolution of social sciences in postmodernity, and was opposed to positivism and neo-positivism. Synthetizing, the ontology of the paradigm can be summarized in the sentence that the reality is a construction of the subject. In that sense the truth is relative and has contextual validity. The laws are not nomothetic but idiographic. Instead of the mechanistic metaphor of the previous paradigm, organismic metaphor is preferred, with evolutionary reasoning incorporated. The relative character of the knowledge is a trait of the epistemology of this paradigm. The methods are qualitative or a mixture of quantitative and qualitative. Rationality and criticism is present, and the paradigm is consistent with postmodern worldviews.

Constructivism applies a wide diversity of methods inside hermeneutics or ethnomethodology. Hermeneutics is the interpretation of experience and its meaning. Ethnomethodology comes from cultural anthropology and emic-etic visions[23] and sustains a wide range of methods. Methodological rationale in constructivist paradigm favors the systematization and use of qualitative techniques.

3.2.1 Ethnomethodology

Ethnographic research examines shared patterns of be-

havior, beliefs and language in cultural groups. Diverse subtypes of ethnography with different theoretical orientations and aims have been developed: "structural functionalism, symbolic interactionism, cultural and cognitive anthropology, feminism, Marxism, ethnomethodology, critical theory, cultural studies and postmodernism".[24] Two main forms emerged:

The realist, which is an objective account of the situations typically written by the researcher in third-person, reporting the "facts" and remaining in the background. This approach was described by Van Maanen.[25]

The critical approach, which includes in the research an advocacy perspective in response to current society, in which different systems serve to marginalize individuals from different classes, ethnic origins or gender. In this case researchers advocate for the emancipation of groups marginalized in the system.[26] For example critical ethnographers can study schools that provide privileges to certain type of students or counseling practices that serve to overlook the needs of underrepresented groups.

There is no a unique way to conduct Ethnography, but some common procedures may include the following steps:[27]

Appropriateness of ethnography, which is the appropriate methodology when there is a need to describe how a cultural group function and to explore the beliefs, language, behaviors, and issues such as power, resistance and dominance.

Identification and location of the culture-sharing group to be studied.

Selection of the cultural themes or issues to study about the group. May include topics as enculturation, socialization, learning, cognition, domination, inequality or child or adult development. The ethnographer begins the study by examining people interactions in ordinary settings and attempting to discern pervasive patterns such as lifecycles, events and cultural themes. Description about group's history, religion, politics, economy and environment, within the social structure, kinship, political structure and social relations among members of group may be described.

Study of the cultural concepts, using the particular ethnographic approach, being realist or critical oriented.

Fieldwork. Gather information where the group works and/or lives. Diverse kind of data, using diverse techniques, can be obtained. The time to data collection is extensive, involving prolonged time in the field. Participatory observation and description of patterns or topics about the group culture are different activities. Research issues like respecting people, reciprocity, deciding who owns the data, and ethics in all research aspects are central.

Final product. Narrative writing. Holistic cultural portrait of the group that incorporates the views of participants (emic) and the views of the researcher (etic). Final report incorporates the particular style (realist or critical).

3.3 Conceptualism, Productive Science

Tekhne, in the conceptualization of Aristotle, is the episteme oriented to the poiesis. More than one possible creative solution is possible. Tekhnes can be denominated as productive or applied sciences or simply arts (from the latin ars).[28] An example is tekhne retorike, the art of eloquence and persuasiveness. Therefore the interobjective epistemological dimension can be named as Aristotelian applied or productive science. Spence (1994) refers to it as Aristotelian tradition or the conceptualist way of building knowledge.

Aristotelian tradition was predominant in premodern traditions in Middle Age Europe. It was pervasive in scholastics were the seven major arts (trivium and quatrivium) organized curricula in the flourishing newborn universities. The main point of this episteme is that the nature is completely intelligible. The 'form' reveals the essence. There is no distinctiveness between them (hylemorfism). But only some trained observers can see the essence in the form. When the discovering is made truth is self-evident. A favorite case (specimen) represents the discovery. There is reliance in the authority sources coming from a given tradition.

The ontology was creationism (relationship creator-creature, as a similar relationship artist-artifact). The general methodology of the doctrine of signatures helped to create a tradition in a particular episteme. The doctrine of signatures was popular in Renaissance, and was discredited by Bacon and his emphasis in empiricism. In this way of constructing knowledge the nature of things is no other than his similarity. The similarity is only visible in a network of signs. Steps to obtain knowledge:[29]

Determination of the Aristotelian categories (substance, quality, quantity, form…)

To find out the truthful essence using similitudes (convenience, emulation, analogy and sympathy) between two realities: one well known and other unknown. Similitudes help in projecting knowledge from the known reality to the unknown.

This methodology helps to create traditions of knowledge. It works like a "guild", in which the novel appren-

tice is integrated to learn from the authority previously established. Spence (1994) considered Freudian Psychoanalysis as an example of Aristotelian episteme or conceptualist science.

3.3.1 Design-Based Research

Design-based research (DBR)[30] is a research based in a systematic process of analysis, design, development and evaluation of an intervention (a training program, a product or a process) as a solution to a complex educational problem.[31] The characteristics of the DBR, following the contributions of different authors, can be defined in different points:[32]

• Focuses complex problems in real contexts.

• Involves intensive collaboration between researchers and practitioners.

• Integrates recognized and hypothetical design principles to provide solutions to complex problems, but possible to be solved.

• Allows developing rigorous and reflective studies to experience and to create better innovative learning environments as well as to define new design principles.

• It requires long-term involvement that allows continuous improvement of protocols and issues.

• Maintains commitment both: to the theoretical building and extension of the theory and to the resolution of problems in the real world.

At the same time, DBR follows three principles. The research is:

Recursive (iterative): The iteration supposes a design and developmental process that allows the practitioners and experts to participate, in a complemented way, to the revision and reformulation of the process.

Reflective: Assume that most of the problems in the professional practice can't be solved with preconceived solutions.

Participative: reflects the change of perspective of considering the expert, the researcher and the designer as part of the same team with similar attributions at any of the stages of the research process.

The DBR is considered a mixed and dynamic methodology since there are decisions already taken and others that are taken during the research process. This justifies that some methodological concretions can't be defined or explained "a priori". The DBR is not defined by the methods it uses, but by the objective that pursues that is the sustained innovation.[33] The research process through

DBR is structured in phases and has a cyclical nature.[34] Next we define the different phases:

Preliminary phase: the research problem and the characteristics of the context are analyzed at the same time that a consistent conceptual framework is developed based on a good review of the literature and on the real needs of the context to be studied.

Phase of prototype: where a prototype of intervention (program or product) is designed, developed and reviewed. These three steps are repeated cyclically. Thanks to that a more advanced and more complex prototype is progressively being achieved.

Evaluation phase: the effectiveness of the intervention is analyzed. The principles of the design are documented and elaborated.

Nieveen[35] (1999) states that in order to guarantee quality in the application of a DBR methodology, four criteria must be taken into account: relevance (validity of content), consistency (construction validity), feasibility or functionality (practicality) and efficacy (effectiveness). In order to achieve the four, it will be necessary to define the corresponding mechanisms and verification strategies.

3.4 Phenomenology

Phenomenology is the study of phenomena and their essences. Distinctively phenomenology studies 'lived experience', which is how we immediately engage with a given phenomenon or aspect of human life.[36] The assumption is that we can only understand the world through our conscious awareness and experience of it. Usually phenomenology is considered a methodology or a single method inside the constructivist paradigm. We'll consider phenomenology not only as a methodology but also as a paradigm as we appropriately will justify.

Phenomenology was initiated by Husserl who wanted to discover a methodology to find the truth or the essence, but without following the path and corresponding worldview of the conventional science. Some mental habits of researchers for being trained inside the modern "scaffolding"[37] made research influenced by the prevailing categories of science. The problem is the implicit 'modern' science renouncement to the study of the subject and the subjective phenomena, as well as the study of the consciousness. This happen because the prevalence of the declared positivist statement to reject any kind of introspection.

Merleau Ponty (1945) systematized the alternative process for knowledge building. According this, phenomenology is based in four interrelated processes:[38]

1) Description: Process of constructing a narrative of the studied phenomena. Phenomenologist researcher gathers new data and returns one time and another to the description of the phenomena, which is manifested richer and complete each time that is described.

2) Phenomenological reduction: It's the intention of don't close quickly the research in a final theory, the need to retard and resist making quick theoretical interpretations to explain the phenomena. This trait is a self-imposed one, because the scientific bias of the mind of the researcher. It's very necessary to return to the description and to limit the interpretation and to apply existing theories. This reduction is made in order to respect the phenomena, which have to be manifested as pure as can be, without simplifications.

3) Eidetic reduction: Is the search for the essence, the aim of any phenomenological method. This phase requires the use of imagination and symbolic capabilities: It's the moment where the discovery is made. Sometimes all the data fit in an idea, an intuition a vision. Comes and it's imposed as a self-evident reality.

4) Intentionality: It's a trait of the consciousness. The transcendental subject, not the individual subject, once the previous points have been developed, is manifested in the researcher consciousness. The phenomenological path allows the manifestation of the transcendental dimension of the consciousness, which is an objective reality. This trait means that transcendence from the existing theories and models is possible, as well as the objective character of the findings.

When these four traits are present we'll consider the corresponding approach as belonging to he phenomenological tradition or paradigm. Fully phenomenological inspired methodologies are very different of the constructivist approaches and their manifest lack of concern for objective knowledge. That distinction is important and has been underestimated by some, possibly because some qualitative researchers share the common postmodern worldview and their characteristic relative lack of concern about objectivity.

Nevertheless a distinction can be made between phenomenology as a philosophical method that has for object the consciousness of the transcendental subject, and phenomenology as a constructivist method available to any field of knowledge. Giorgi (2012) developed a phenomenological method for researching humans in a psychological way. He explained that psychologically phenomenologist are interested in specifically human consciousness, and because of that limited interest, the

phenomenological method needs to be pretranscendental. Psychology, in effect, is interested in how a human consciousness relates to a specifically human world.[39] Van den Berg emphasized that "insights into experience as lived, or the phenomenal level, was what was critical for psychologists to understand".[40] "The criteria necessary in order for a qualitative scientific method to qualify itself as phenomenological in a descriptive Husserlian sense, one would have to employ (1) description (2) within the attitude of the phenomenological reduction, and (3) seek the most invariant meanings for a context".[41] This kind of minimization of phenomenological general approach can be denominated as applied phenomenology. "In applied phenomenology reality is comprehended through embodied experience. Through close examination of individual experiences, phenomenological analysts seek to capture the meaning and common features, or essences, of an experience or event. The truth of the event, as an abstract entity, is subjective and knowable only through embodied perception; we create meaning through the experience of moving through space and across time".[42] Phenomenology as a method can be situated inside the constructivist paradigm. Otherwise when there is intentionality of the consciousness acting, it can be traced a parallelism with the nous and with the holonic transcendent dimension. These correspondences justify our proposal: the consideration of phenomenology as a paradigm.

An example of phenomenology applied to psychoanalysis is the psychology of Jung. Hostie[43] recovered Jungian psychology for the phenomenology, after explaining the problems to consider Freudian psychoanalysis as a phenomenological based methodology.

3.4.1 Grounded Theory

The same as in other epistemological paradigms or traditions, a diversity of methods can be included as phenomenological. The Huserlian phenomenological method itself can be an example, but another example of phenomenological inspired method is grounded theory. We'll present it and at the same time justify why we consider it as phenomenological. Grounded theory didn't come directly from phenomenology, but their methodological path accomplishes the phenomenological minimum requirements of an applied phenomenology and can be considered, when is well developed, as a fully phenomenological methodology. Grounded theory methods emerged from the collaboration of sociologists Glaser and Strauss during the 1960s. Glaser and Strauss challenged "the arbitrary division of theory and research; the prevailing view of qualitative research as primarily a precursor to more 'rigorous' quantitative methods by claiming the legitimacy of

qualitative work in its own right; the belief that qualitative methods were impressionistic and unsystematic; the separation of data collection and analysis phases of research; and the assumption that qualitative research only produced descriptive case-studies rather than theory development. They articulated explicit analytic procedures and research strategies that previously had remained implicit among qualitative researchers".[44] "Grounded theory originates from sociology, specifically from symbolic interactionism, which posits that meaning is negotiated and understood through interactions with others in social processes. These social processes have structures, implied or explicit codes of conduct, and procedures that circumscribe how interactions unfold and shape the meaning that comes from them".[45] "Glaser and Strauss portray their methods as compatible with traditional positivistic assumptions of an external reality that researchers can discover and record".[46] This separates grounded theory from constructivism.

"Grounded theory is a general methodology for developing theory grounded in data, systematically gathered and analyzed. Theory evolves during actual research, and it does this as continuous interplay between analysis and data collection. A central feature of this analytic approach is 'a general method of [constant] comparative analysis'",[47] hence "the approach is often referred to as the constant comparative method".[48] "Theory consists of 'plausible' relationships proposed among concepts and sets of concepts (Though only plausible, its plausibility is to be strengthened through continued research)… They do not believe it sufficient merely to report or give voice to the viewpoints of the people, groups or organizations studied. Researchers assume the further responsibility of interpreting what is observed, heard, or read".[49] "Explicit mandate to strive toward verification of its resulting hypotheses (statements of relationships between concepts). This is done throghout the curse of a research project, rather than assuming that verification is possible only through follow-up quantitative research. Enhanced also by its procedures is the possibility of developing theory of great conceptual density and with considerable meaningful variation. Conceptual density refers to richness of concept development and relationships –which rest on great familiarity with associated data and are checked out systematically with these data. Researchers in psychology and anthropology are increasingly using grounded theory procedures. Researchers in practitioner fields such as education, social work, and nursing have increasingly used grounded theory procedures alone or in conjunction with other methodologies".[50]

"Theories are interpretations made from given perspectives as adopted or researched by researchers. To say that a given theory is an interpretation –and therefore fallible-is not at all to deny that judgments can be made about the soundness or probable usefulness of it. All interpretations, whether or not they have the features or status of theory, are temporally limited- in a dual sense. First, they are always provisional, Second, like many other kinds of knowledge, theories are limited in time: Researchers and theorists are not gods, but men and women living in certain eras, immersed in certain societies, subject to current ideas and ideologies, and so forth. Hence as conditions change at any level of the conditional matrix, this affects the validity of theories –that is, their relation to contemporary social reality. Theories are constantly becoming outdated or in need of qualification".[51] In short "theories are embedded 'in history' –historical epochs, eras, and moments are to be taken into account in the creation, judgment, revision and reformulation of theories".[52]

Grounded theory methods include the following steps:[53]

1) Simultaneous involvement in data collection and analysis phases of research. Grounded theory works are empirical based studies, whether their data sources are autobiographies, published accounts, public records, novels, intensive interviews, case-studies, participant observer field notes or personal journals.

2) Creation of analytic codes and categories developed from data, not from preconceived hypotheses; Computer software (e.g., NUD.IST or ATLAS/ti) can be useful in categorization processes.[54]

3) Development of middle-range theories to explain behavior and processes. Constant comparison, repeated comparison of segments of data within and across cases, asking questions, looking for negative or disconfirming cases, 'flip/flopping' concepts, metaphors and similes, waving the 'red flag'.

4) Memo-making, that is, writing analytic notes to explicate and fill out categories, the crucial intermediate step between coding data and writing first drafts. Types of memos: Defining codes and open data exploration, identifying and developing concepts, asking questions about the data, working out relationships among concepts, refining and adjusting data collection or operations of analysis and integrating concepts or summarizing.

5) Theoretical sampling: Sampling for theory construction, not for representativeness of a given population, to check and refine the analyst's emerging conceptual categories.

6) Delay of the literature review.[55] As a result, "the empiricism inherent in grounded theory methods makes them less congenial to those postmodernists who advocate abandoning empirical research with thinking, feeling, acting human beings. These postmodernists may, however, be amenable to studying pre-established texts".[56] "A grounded theory analysis starts with data and remains close to the data. Levels of abstraction are built directly upon the data and are checked and refined by gathering further data".[57]

"Insofar as theory that is developed through this methodology is able to specify consequences and their related conditions, the theorist can claim predictability for it, in the limited sense that if elsewhere approximately similar conditions obtain, the approximately similar consequences should occur.[58] A study is more phenomenological if: It doesn't end in a definitive theory, returns to data description, uses intuition, reflections about memos, but specially if the conditions of the interaction (time, space) are part of the analysis. In that case transcendence and profundity increases and the phenomenological transcendental function operates as a manifestation of the intentionality of conscience.

Grounded Theory methodology has a long tradition in education, as Hutchinson[59] reported. Interestingly enough these pioneer studies shared the Husserlian orientation, similarly to the development presented here.

4. Conclusions

4.1 Paradigms for Knowledge Building

We developed from Aristotle, integral theory, phenomenological holonistic considerations and constructivism four paradigms for knowledge building. For each one we introduced the ontological and methodological correspondences to each epistemology. We presented a methodology in each paradigm as an example to present concretions of the theoretical approaches. Thus, different rationales converged in establishing four epistemological paradigms for knowledge building:

1) Logical empirical

2) Constructivist

3) Conceptualist or Aristotelian

4) Phenomenological

These traditions can be considered meta-paradigmatic. Within each one there are concrete paradigms, normal science (Kuhn), methodologies, methods and techniques.

Additionally these traditions cover the Aristotelian ways of constructing knowledge: Episteme (logical empirical, extended to diverse conventional sciences), the relation with praxis oriented to phronesis, related with the human behavior (constructivism), the tekhne with the orientation to poiesis (productive or conceptualist sciences or arts) and the nous (approached by phenomenology). Together constitute the Sophia, or wisdom.

The corresponding ontologies to the epistemological paradigms are: logical empiricist ontology can be realism and mecanicism (sciences from modernity), constructivism corresponds with relativism and organicism (sciences in postmodernity), pragmatic and productive sciences correspond to applied sciences and the "authority" within a tradition (premodern epistemes), and phenomenology corresponds to holism and integralism (the emerging current worldview).

4.2 Methodologies

The ways for creating knowledge, once the meta-paradigms are established, have to be coherent with each ontology and epistemology. We presented the rationale of four methodologies, and presented in detail three of them. Corresponding to each epistemological tradition, the methodologies are:

1) Experimental and observational (logical empiricism)

2) Hermeneutical and anthropological (constructivism)

3) Conceptualist and design-based (Aristotelian episteme tekhne)

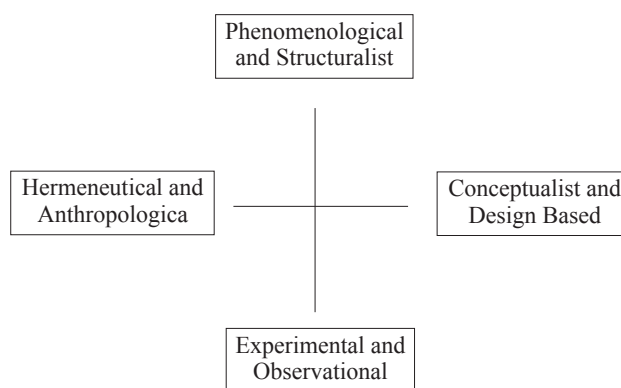4) Phenomenological and structuralist (phenomenology)

Figure 4. Examples of research methodologies corresponding to each tradition.

4.3 Comparative Table

A comparison between the different paradigms can be summarized in the following table:

Table 2. Paradigms for knowledge building

Paradigms:	Logic empirical science	Constructivism	Conceptualism or productive science	Phenomenology
Epistemology	Episteme theoretike	Episteme praktike	Episteme poietike	Nous
Ontology	Realism. Mechanicism	Reality constructed by the subject. Organicism	Creationism artist-artifact. Authority within a tradition	Essence and intentionality of consciousness. Holism and integralism
Methodology	Experimental and observational	Hermeneutical and anthropological	Conceptualist and design-based	Phenomenological and structuralist
Examples of methodologies in education	Evidences-based research	Ethnomethodology	Design-based research	Grounded theory

4.4 Final Remark

Epistemological informed research is a need in today research projects about complex problems or when researches are proposing findings to answer the need of integral approaches. Epistemological and methodological awareness can be an asset of a research intended to have quality and impact.

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Early Exploration and Practice of Professional Music Education during China's Modern Period 1912-1919

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Abstract: Cai Yuanpei, the first Minister of Education, attached great importance to "aesthetic education", which was a key part of the new education aims developed under his guidance. It was Cai's focus on "aesthetic education" and "education" that Beijing University Music Research Society and National Beijing Girls' Higher Normal School and the like began to explore and practice the modern Chinese professional music education.

1. Introduction

In 1912, the Republic of China was established. Cai Yuanpei, the first Minister of Education, attached great importance to "aesthetic education", which was a key part of the new education aims developed under his guidance. While he was studying in Germany, he was most impressed by aesthetic education, and he once said, "I am deeply impressed by the aesthetic education in Germany, and I am willing to advocate such education to the best of my power." Since we have the more scientific, reasonable and efficient research methods, research means and research patterns, it is possible to know and understand the history more clearly and comprehensively and thus more research achievements will be achieved.

2. Aesthetic Education and Professional Music Education

Despite long history of the thought and practice of aesthetic education, there has not been a universally recognized definition of "aesthetic education", and in China, Cai was the first to define it. In the "Aesthetic Education" entry in the Encyclopedia of Education, he stated, "Aesthetic education is to apply aesthetic theories to education with an aim to cultivate feelings." This definition summarized the relations among aesthetic education, aesthetics, and education. However, it did not specify the unique nature of aesthetic education, which led to such a misunderstanding that "aesthetic education" was the education of aesthetics.[1]

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Then what is "aesthetic education"? It refers to the education that cultivates students' ability to understand, love, and create beauty. It is also called in Chinese "Meigan (sense of beauty) education" or "Shenmei (aesthetic) education", and it has become an indispensable part of comprehensive development education.

It was precisely because of Cai's advocacy for "aesthetic education" and "education" that in July 1912, the Ministry of Education changed regular schools' Music and Singing class from an "elective subject" to a "required course", and later in December, it issued the Regulations for Normal Schools. In December 1912, the Ministry of Education issued the Regulations for Normal Schools. Then in February 1913, the Ministry issued the Regulations for Higher Normal Schools and the Curriculum Standards for Higher Normal Schools, which stipulated that Music and Singing class should be a required course in the foundation year (one year) and an elective subject in undergraduate years (three years). Following the promulgation of such regulations, the Zhejiang Official Secondary Normal School established the Specialized Division of Drawing and Handicraft in the fall of 1912; the Sichuan Higher Normal School established the Specialized Division of Music, Singing, and Sports in 1915; the Beijing Higher Normal School successively offered elementary and advanced music master classes in 1916.[2]

3. Cai Yuanpei (1868-1940)
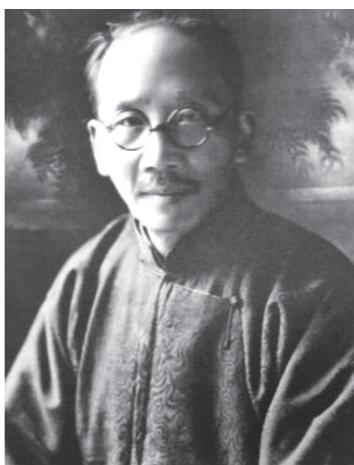
Cai Yuanpei was the first Minister of Education of the Republic of China, and an educator, revolutionary, and politician in modern and contemporary China. In 1912, he guided the formulation of the first decree of modern Chinese higher education, the "University Decree".

He always regarded education as the fundamental approach to save the country, and he promoted ideological

and academic freedom. Besides, as the principal of Beijing University, he also developed a deep understanding of how government bureaucracy impeded and damaged education. Therefore, Cai was an active advocate and supporter of educational independence, and he offered theoretic guidance for this cause. In March 1922, he published the article "A Discussion of Educational Independence" in the New Education, explaining basic viewpoints and approaches of educational independence, and the article has become an important part of the educational independent thought.

To achieve true independence of education, Cai developed specific measures including ones that sought independence of educational funding, independence of educational administration, and independence of education from religion. Among these measures, the plan to achieve independence of educational administration divided the country into a number of university districts, each of which established a university to organize and handle affairs concerning higher specialized education, primary and secondary education, social education, and other cultural and academic issues in the district. As for the university affairs, they would be chaired by an education committee consisted of university professors, and this committee would also elect the principal for the university. Then the principals of the universities in all districts would establish a higher education conference to handle affairs in these university districts. The Ministry of Education would be only responsible for affairs deemed by the higher education conference as related to the central government, as well as education statistics and reports. It would not interfere with the affairs of university districts, and the Minister must be approved by the conference. This idea served as the underlying framework for the Nanjing National Government's early implementation of the "university district system".[3]

Cai believed that universities should become institutions where people study profound knowledge. This was the guiding ideology of his guidelines of running the school, and also the starting point of his university education thought. As early as May 16, 1912, when he attended the opening ceremony of Beijing University as the Minister of Education, he proposed in his speech that "university is a place where profound knowledge is studied." After assuming the post of the principal of Beijing University, he repeatedly expressed this idea. On January 9, 1917, in his inaugural speech as the principal, he explained clearly to the students, "All of you gentlemen who come here to learn must have objectives in mind. In finding out whether your objectives are righteous or not, you must understand

the nature of university. A person nowadays who goes to vocational schools would get a job after graduation as a matter of course, but going to university is different. Those who go to universities as the students are supposed to study the profound knowledge.University is a place where profound knowledge is studied."

In February 1912, Cai published his famous paper on education titled "Opinions on the New Education", in which he systematically expounded the idea of combining "five concepts", namely "national military education," "pragmatic education," "civic moral education," "worldview education," and "aesthetic education". Among these concepts, "aesthetic education" was considered the most important approach of conducting worldview education, a bridge that connected the phenomenal world and the substantial world for people. The importance of aesthetic education originated from its characteristics, and there was nothing else but two kinds of awareness that stood in people's way from the phenomenal world to the substantial world: one was the awareness of the difference between others and oneself, and the other was the awareness of seeking happiness.

Pragmatic education was considered by Cai as a means to make the country rich, for he believed that the competition among countries in the world boiled down to not only military power, but also financial resources. Therefore, to survive in this competitive world, a country must strengthen its science and technology education to increase productivity and develop its national economy to become rich and powerful.

He also compared "liberty, equality, fraternity",[4] the moral concept of the modern Western bourgeoisie, to the "justice, tolerance, benevolence" promoted by the ancient Chinese Confucian school. He advocated drawing on foreign cultures and at the same time, that "we must choose and learn from those that can be 'digested'," and that "they must be 'eaten' and 'digested' by 'me', instead of assimilating to one another." He criticized some weak-willed people who would immediately "discard their 'me-ness' and assimilate to others" once they studied abroad.

Cai Yuanpei made indelible contributions to modern and contemporary Chinese education and revolution. First, only since Cai Yuanpei has China formed a relatively complete education system and that of bourgeois education thoughts. Second, his promotion of "freedom of thought and acceptance of diversity" made Beijing University the birthplace of the New Culture Movement, creating conditions for the New Democratic Revolution. Third, he protected a group of talented scholars with ad-

vanced ideas for the Chinese nation. He not only laid a solid foundation for the formation of bourgeois university education theories in the modern and contemporary China, but also contributed many penetrating insights including attaching importance to scientific research work of universities, advocating "freedom of thought and acceptance of diversity", emphasizing the development of students' personalities, and advocating "communication between arts and sciences",[5] as well as "allowing learned experts who understand education to conduct democratic management of universities". These insights have exerted major impact on later generations.

4. Beijing University Music Research Society (1919-1922)

The Beijing University Music Group is the earliest established music association among China's higher education institutions. In early 1916, Beijing University established the Beijing University Music Group, which soon expanded into two groups, Chinese music and Western music. It was then renamed "Beijing University Music Theory Research Society" on June 6, 1918, and on December 20, its name changed to "Music Seminar". Then on January 27, 1919, it was again renamed "Beijing University Music Research Society" and Cai Yuanpei served as the president alongside his post of the principal of the university.

Beijing University Music Research Society was a music association for amateurs. It aimed to "study music, cultivate temperament, and develop aesthetic education", and its main activities were to spread Chinese and foreign music knowledge and skills. The society successively invited well-known Chinese and foreign musicians in Beijing at the time, such as Xiao Youmei, Chen Zhongzi, Wang Lu, Zhao Zijing, Zha Shijian, Wu Zhuosheng, Niulun (British), and Madam Hashimen (Netherlands) as mentors to give specialist guidance to society members.[6] In April 1922, it also invited Liu Tianhua as the Chinese music mentor. According to statistics, by the fall of 1920, the society had more than 200 members, and there were groups for Sizhu (silk and bamboo music), Kunqu opera, Guqin (ancient Chinese zither), piano, bowed stringed instruments, singing, and others, and attached to this society was also a 50-member Sizhu Improvement Society. Members of the Music Research Society were mainly Beijing University students at the time, and in addition to a small number of regular teachers who were paid by the university, there were some other honorary mentors who were not the university's regular teachers and did not get paid.

In addition to providing music learning guidance for its

members, the society also successively held several public concerts in Beijing. The contents of these music performances basically followed the principle of "combining the strengths of China and the West",[7] setting a precedent for the co-appearance of Chinese folk music and Western music in a performance. During the society's three-year active period, it edited and published fifteen issues of the music journal Music Magazine. Prior to this, it was probably that only Li Shutong had edited and published one issue respectively for the Little Music Magazine in Japan and the White Poplar in Shanghai. Therefore, it is safe to say that this magazine is the earliest music periodical that has been officially published in China, and it had an important social impact in terms of introducing music theories, advocating music education, and promoting music activities.

In 1922, after it was renamed "Institute of Music", the society's influence of it further expanded. It not only cultivated a certain number of singing and performing talents and music teachers, but also brightened the social music life of the time and played a positive role in creating a new social atmosphere and promoting social music education.

5. Other Important Universities and Organizations

In addition to the "Beijing University Music Group (Music Seminar)", other music education institutions/groups during this period include:[8]

The National Beijing Girls' Higher Normal School was renamed Beijing Girls' Normal School after the founding of the Republic of China in 1912.

Chengdu Higher Normal School, Specialized Division of Music, Singing, and Sports:

The Specialized Division of Music, Singing, and Sports

of Chengdu Higher Normal School established in Chengdu in 1915.

6. Conclusion

We are living in the era that modern Chinese professional music education is being explored and practiced. Guided by Cai's idea of "aesthetic education" and practice of "education", Beijing University Music Research Society, National Beijing Girls' Higher Normal School and Chengdu Higher Normal School established subjects related to music, making Chinese professional music education enter the early exploration and practice period from the enlightenment period. Cai was the vital leader of the development of Chinese professional music education in the era.

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Whether Achilles Could Catch Up the Turtle

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Abstract: Can a person chase up a turtle? This might sound like a very stupid question. However, this question had been disturbing mathematicians for many centuries. It is possible to solve the paradox of Achilles and the turtle with only high school knowledge. This is the beauty of calculus, the concept that mathematicians struggled to invent and improve. In more than 2000 years, mathematicians tried different ways to study and invent calculus, and the invention finally led to a revolution in the world of math.

Keywords: Achilles Paradox; Calculus; History; Newton; Leibniz; Limit; Riemann Sum

1. Introduction

Can a person chase up a turtle? This might sound like a very stupid question. However, this question had been disturbing mathematicians for many centuries.

In the history of Greek, Achilles was the hero who can run fastest in the world. In 5th century B.C., ancient Greek mathematician Zeno proposed an interesting paradox. He assumed that a turtle was l feet in front of a normal person, Achilles. They started to run on the same straight path at the same time. He also assumed that Achilles' velocity was 10 times of the turtle's, which means if the turtle ran at the velocity of v feet per second, Achilles could run at the velocity of 10v feet per second, meanwhile, the turtle could run 1/10 of the distance Achilles ran. In this case, when Achilles ran l feet and arrived at the starting point of the turtle, the turtle already has ran $l/10$ feet forward. When Achilles ran another $l/10$ feet, the turtle was $l/100$ feet in front of him. According to this assumption, whenever Achilles ran to the point where the turtle was at, the turtle would always be in front of him. The distance was getting shorter and shorter, but Achilles will never be able to chase up the turtle. At that time, although everybody knew that a normal person could chase up a turtle easily in reality, nobody could explain this paradox, until the theory of calculus had been developed.[1]

2. Calculus and Achilles Paradox

When I read about this paradox on the internet, I was taking AP Calculus at school. Such a challenging but interesting question really attracted me and made me keeping thinking, then a bold idea came up to my mind, I wondered if I could solve this paradox according to my knowledge of calculus. At this time, I started to figure out the question, expecting to obtain the explanation through Qualitative analysis and quantitative analysis. At the very beginning, I started with listing out all the knowledge we had learned in Calculus. Then, I used a set of terms to indicate the distance Achilles traveled each time to chase the turtle, l, $l/10$, $l/100$, $l/100^{n-1}$. I found out that it is a geometric sequence, a sequence made by multiplying by some fixed value each time. Then, this sequence reminded me the formula that helps me to calculate the sum of it, $\frac{a_1(1 - q^n)}{1 - q}$, where a_1 was the first number of the sequence,

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q was the value that the sequence multiplied each time, and n is the total number of the term of the sequence. When I tried to use the formula to help me to solve the problem, I realized that according to what Zeno assumed, n was infinity, ∞. I substituted all corresponding numbers into the formula, the total distance needed to chase up the turtle was equal to $\frac{l(1-.1^{\infty})}{1-.1}$. Since limit of a number between but not include -1 and 1 equaled to 0 when its power was ∞, we could simplify it into $l/.9$, which was further concluded that the total distance Achilles needed to chase up the turtle was $10l/9$ feet.

Finally, a mysterious and challenging question had been solved by only using high school and even lower leveled knowledge. Although I had successfully solved the problem, but a new confusion had been raised to me, why were mathematicians disturbed by such an easy question? And what eventually gave them the chance to solve the problem? When I read through the history of math and calculus, I found that the existence of calculus changed the way people knew about math. Calculus was the thing that helped them to solve the problem.

3. The Development of Calculus

3.1 The History of Calculus

Calculus, which included integration, differentiation and knowledge of limitation, did not just appear in a sudden. Scientists and mathematicians had been learning and discovering it for many centuries. At first, people knew about integration more, they used it more in science and normal life. In 3rd century B.C., ancient Greek scientist and mathematician Archimedes already discussed some methods and thoughts that are related to calculus in the books Measurement of a Circle and On the Sphere and the Cylinder, the introduction of finding the area under curves, sphere crowns and spiral, the volume of rotating hyperbola became the fundamental and starting parts of calculus. In 3rd century A.C., ancient Chinese mathematician Hui Liu also contributed to the development of calculus, his theory about cutting spheres and calculating the volume of objects was also a part of integration.

After that, although people were still trying to learn more about the knowledge of calculus, only little progress was made until 16th century. Luca Valerio, an Italian mathematician, restarted the discussion of the calculus in his book De quadratura parabolae due to the needs of it in scientific and mechanic problems. About the same time, Kepler, a German mathematician, proposed a way to calculate the area by thinking it as sums of lines, although he was not able to tell a precise way to find the answer, this method gave the development of calculus a great inspiration. After Kepler, many other mathematicians and scientists further studied and improved the method. Cavalieri used his own method to calculate the sum of lines, he successfully figured out the area under the curve $y=x^n$, his method was further improved, and it was used to calculate the volume of some objects. Roberval used an easier way to calculate the area; he considered it as the sums of rectangle strips. This theory became an important leading of integration.[3] Around then, Fermat made another big step forward. He not only made some assumptions and deductions about parabolas and hyperbolas, but also introduced the way to find maximum and minimum with the derivative that equaled to zero. His method is still widely used nowadays.[2] Other than them, Rene Descartes, Girard Desargues, Isaac Barrow, Evangelista Torricelli and many other mathematicians provided vital knowledge foundation for the establishment of calculus.

At the end of 17th century, calculus finally became a recognized math concept. Gottfried Wilhelm Leibniz and Isaac Newton were known as the major contributors to the development of calculus. Many people considered them as the inventors of calculus. However, most people believed that they developed it independently; they used different kinds of notations for calculus. The reason why they were called the inventor and major developer of calculus was related with the fact that they connected and summarized two concepts which had been never found before. One was tangent line, which was the major problem of differentiation. Another was quadrature, which was the major problem of integration.

3.2 Newton and Leibniz

It had been believed that Newton did not publish anything about calculus until 1693. According to Newton's claim, he did not publish anything because he was afraid of being ridiculed by people. As a result, his complete theory was first shown to people until 1704. In 1671, Newton wrote the book Methodus fluxionum et se-rierum infinitarum, the hand scripts were used among mathematicians for discussing and researching when Newton was still alive, but the English translation did not come out until 1736, after his death.[3] In this book, Newton talked about calculus in the problems of movement. He objected his previous opinion that a variable was a stationary set of infinitesimal elements; instead, he claimed that variables were produced by the continuous movement of points, lines and planes. He solved the problems of differentiation that gave the distance traveled and asked for instantaneous velocity. He also solved the problem of integration that gave the

velocity and needed to solve for distance traveled in time. Other than these, Newton also accomplished many other things in calculus, he wrote many reports and drew many important conclusions.

As for Leibniz, he was considered as the first person who published articles about calculus, the first calculus article was published in 1684. Although this article was ambiguous, it still talked about some major thoughts in calculus. In the article, calculus was defined firsttime, so it was considered as a huge step in the history of math. Leibniz also used some notations and rules in the article that people still use nowadays. His notations and rules were a lot easier to write and use than what Newton used. In the rest of his life, Leibniz kept studying calculus, he wrote down the thoughts and process that led him to invent calculus from 1714 to 1716, but the article was not published until 1846. Moreover, after his death, people found a lot of valuable notes about calculus, according to his notes, his first theory of differentiation was completed in 1675, which is earlier than Newton did.

Because Newton and Leibniz invented calculus almost at the same time, and both England and Germany wanted to make the invention theirs, many scholars argued about the inventor of calculus. Both of them started with infinitesimals, but Newton spent more time and researches on kinematic related problems, while Leibniz emphasized more about geometric problems. Also, there were lots of proofs in Leibniz' notes and articles that could tell he probably invented earlier than Newton. However, Leibniz was still doubted that he copied from Newton's work. Since 1695, many English scholars had called Newton the inventor of calculus, and German mathematicians followed with their opinion that it belonged to Leibniz. At that time, Newton was so well known, although he certainly contributed a lot in different fields, his knowledge and thoughts were still over admired by many people. Additionally, the Royal Society of England which had very high status claimed the invention belonged to Newton. Many people believed so; Leibniz was not as widely recognized until his death. In addition, England did not use Leibniz' easier ways of writing, instead, they used Newton's, which slowed down their process of science and math discovery. Nowadays, people admit both of their works, thanks to their invention; people are able to use calculus to solve many problems in not only science, but also daily life.[4]

Although Newton and Leibniz successfully established calculus system, but it was still not accurate and completed. In the next few centuries, people kept studying and improving calculus, which made it better.

4. Limit and Riemann Sum

4.1 Limit

But how did the theory of Newton, Leibniz and many other mathematicians helped to solve the problem of Achilles and the turtle? In their theory of calculus, there was a concept called limit. Generally, limit was when a variable that kept approaching but could never reach a value A. When it was close enough, we say it could never equal to the value A, but it is accurate enough to evaluate the value as A. This concept was not accurately written until Augustin Louis Cauchy and Karl Theodor Wilhelm Weierstraß. Although in Newton's and Leibniz' theory, the concept of limit was not accurately discussed, it was still enough to answer Zeno's paradox. In the paradox, it was true that Achilles needed infinity times to chase up the turtle, in the theory of limit, we could consider the times Achilles attempted as the variable that was approaching a value, the turtle, but he could never reach it. However, there was a limit, when Achilles was close enough, his distance traveled could be evaluated the same as the turtle's, so he could finally chase up. In other word, people used to commonly believe that if the person needed infinity attempts to chase up another, then the distance and time he needed to chase up was also infinity, which means he could never chase up. However, limit suggested infinity could lead to limited distance and time, limited distance and time could also lead to an infinity answer. Also, in our method, $(\frac{1}{2})^\infty$

equaled to 0 because the number was getting smaller and approached 0, so we say its limit is 0.[5]

After Achilles finally chased up the turtle, the knowledge of limit had helped people to solve more problems, and it also led to some other concepts and methods of calculation in calculus. There was a similar example of Achilles, when 1 is divided by 3, we can get 0.333…, it was an infinite decimal, we used it to multiply three, we got 0.999…, another infinite decimal that approached 1 but did not equal to 1. With the help of limit, the limit of 0.999… could be evaluated as 1 because it infinitively approached 1, in short, 0.999… is 1.

4.2 Riemann Sum

Another example of utilizing limit is Riemann sum. Although there was not specific proof of Riemann sum on text book, but I was still able to find out the reason using limit. Riemann sum was the method to calculate the area under curves by considering the area as many rectangles with the same width. Although there would be some dif-

ference, when the amount of rectangle increased, the difference decrease, the area of rectangle approached the original area, when infinite amount of rectangle summed up, we could say they had the same area. In this case, mathematicians introduced sigma, $\sum$ to further prove the Riemann sum. Generally, sigma meant the sum of a set of polynomials, $\sum_{i=m}^{b} c_b$=cm+cm+1+cm+2+…+cb which m was the beginning of the polynomials, b was the end, and cb was the polynomial structure. In our problem, we said that the area was the sum of all the rectangles, and the number of rectangle was approaching infinity, so we could get ,

$\lim_{k\to\infty} \sum_{n=1}^{n=k} \Delta x f(x_n)$ which 1 was the first rectangle, k was the last rectangle, Δx was the width between two closest points, which was also the same width of each rectangle, *f(xn)* was the length of a rectangle, which would change in each of them. Then, *F(xn)* was used to represent the y value at the point *x=xn*. According to Mean Value Theorem, which suggested $\frac{F(x_n) - F(x_{n-1})}{\Delta x}$ was the point of secant line, which was *f(xn)* when the interval was cut into infinite part. So, when I substituted, I got $\lim_{k\to\infty} \sum_{n=1}^{n=k} \Delta x \frac{F(x_n) - F(x_{n-1})}{\Delta x}$, which could be further simplified, $\lim_{k\to\infty} \sum_{n=1}^{n=k} F(x_n) - F(x_{n-1})$.

Due to the definition of sigma, the formula equaled to $\lim_{k\to\infty} F(x_2) - F(x_1) + F(x_3) - F(x_2) + … + F(x_k) - F(x_{k-1})$.

Then, I crossed out the plus and minus of the same polynomials, I got $\lim_{k\to\infty} F(x_k) - F(x_1)$, which equaled to $\int_{x_1}^{x_k} f(x)dx$ due to the definition of definite integration. So

far, I proved the definite integral, , $\int_{x_1}^{x_k} f(x)dx$ to indicate the actual area bounded by the the curve and the coordinate axis. Therefore, I had successfully proved the Riemann sum by myself with the knowledge we learnt in calculus class.

5. Conclusion

All in all, calculus had improved and changed our life slowly in thousands of years. Many difficult problems had been solved by using calculus, and by learning it, I had proven myself ready for more challenge and exciting problems. In my process of researching, I found there was a problem which is similar with the story of Achilles in the knowledge of philosophy. Although today we can use the knowledge of limitation and integration to explain that problem, but we still could not find a solution to the problem with the concepts in the field of philosophy. Calculus still has many interesting secrets to be found, and I will work on.

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Sub headings: **Bold and Italic,** font size 12

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The introduction of the paper should start with an explanation of why a particular research is being conducted and conclude with the selected research approach. Authors must ensure that a non-technical reader would be able to understand the introduction, including the technical goals and objectives, any technical issues faced and its application in the real world. It would be beneficial for the readers if the authors provided a clear, one sentence purpose statement of the research. It would be advisable to keep the length of the introduction to approximately 1/2 page (1-2 paragraphs).

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