

## Bilingual Education Transformation on Textiles Material Experiment

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**Abstract.** Bilingual education is a great attempt of high education reform in our country, and becomes the new question facing by many teachers. This study discuss a bilingual education of Textile Material Experiment on teaching efficiency by using a multi-media, foreign original textiles teaching materials, writing English lab report and laboratory operation. Result shows that using multi-media and bilingual teaching is feasible to improve teaching result on *Textiles Material Experiment*.

### Introduction

School of Textiles, one of the colleges in Tianjin Polytechnic University, has a characteristic especially in Textiles discipline. *Textiles Material Experiment (TME)* faces to all textiles related students in the university after learning of Textiles Materials. This course mains to master fundamental knowledge about fibers, yarns and fabrics, and learn all their physical testing, wearability test and function test for cultivating inter-disciplinary talents who work on textile-related research, inspection and textile products developments and trades in the future.

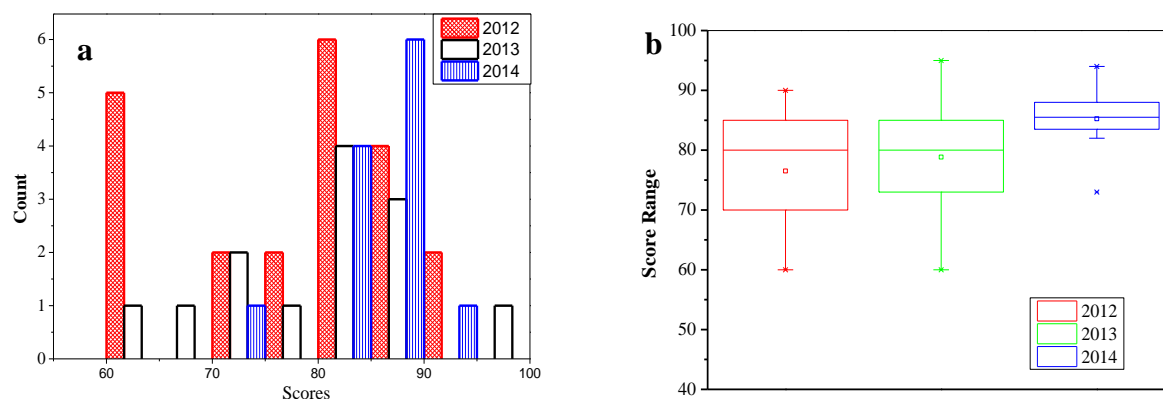
With deep development of our country's reform and opening-up, as well as more and more frequent international communications, a novel course teaching mode needs to be constructed to adapt social needs. Therefore, since 2001, Chinese Education Department has presented clearly that 5-10 % bilingual courses are strived for all universities [1]. Under such a background, bilingual course on textiles materials experiment was started facing to four-year undergraduate students engaging two-year international exchange in Germany [2]. This teaching reform and practice began by Prof. Zhang and Dr. Liu has carried out since 2012 in Tianjin Polytechnic University, to cultivate an inter-disciplinary talent of English and textiles for the society. It is also reported that bilingual education promotes flexible mind [3], and has significant role in supporting connections between dementia individual and families with their community [4] as well as quality of life of Latina breast cancer survivors [5] etc. In the past, bilingual education of textiles-related courses including Modern spinning technology [6], fancy yarn [7] and textiles materials [2] are opened in our college, School of Textiles, and achieved good teaching results. Different from these courses, *Textiles Materials Experiment*, as a independent course, comprehensive combines textiles materials and experimental teching, and appies many instruments and testing, as well as higher requirement for operation ability [8]. Therefore, it is more difficult to adopt bilingual teaching on *Textiles Materials Experiment*. Students not only strenthens textiles materials vocabulary, but also learns to describe testing principle and testing methods all times, and also discuss the testing results independently. Through biligual education, the listening and writting of professional English experession are improved, and the final writting lab report makes the future research article easily for pursuing advanced degrees students. In this study, the exploration and practise of bilingual teaching of Textiles Materials Experiment is studied, and the bilingual teaching efficiency is comparatively analyzed by test scores.

## Bilingual teaching practice of textile material experiment

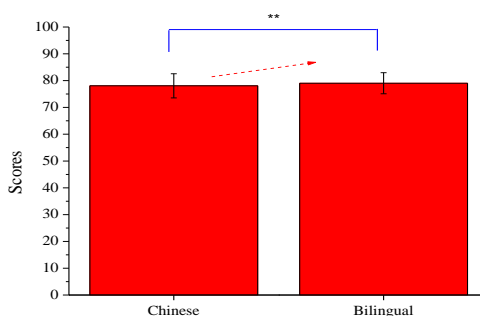
Textiles material experiment is one of compulsory courses for undergraduate major in all textiles engineering, design, inspection, trade as well as knitting engineering. The teaching plan sets the course in the third term for international class and fifth term for general class in writer's universities. Considering the English levels difference between two types of class, bilingual teaching merely directs to the students in international class. Prior to this course, it should guarantee that all the students have learned theory knowledge about textiles materials, textiles testing and textiles structures. This course focuses on physical training and apprehension of textiles materials theory, and then stimulates student working on textiles-related jobs in the future. Therefore, a more novel teaching method, bilingual education, can adapt to the economic globalization and rapid advance of science and technology.

The bilingual education chooses "Physical Testing of Textiles", complied by B.P. Saville, as the English teaching material, meanwhile, adopts "Textile Materials Science Experiment Technology" edited by Xufen Yu as Chinese teaching material. English and Chinese editions are both used to help students for further understand the contents and grasp textiles terminology through mutual English and Chinese teaching. In the teaching process, we made multimedia courseware with a combination of English and Chinese, and adopts the form both English and Chinese to explain the testing principles and methods, meanwhile, adds testing animation and pictures to describe the basic concepts vividly. The early of the course is dominant with Chinese, the middle part is in both Chinese and English, and the later part adopts English completely. In this way, experiments principles in both English and Chinese are mastered unconsciously.

## Bilingual teaching efficiency of Textile Material Experiment



**Figure 1.** Bilingual teaching evaluations. (a) Testing scores distribution and (b) statistical analysis of textiles majoring students in 2012, 2013 and 2014.



**Figure 2.** Testing scores of Chinese and Bilingual education in moisture regain of fibers, one of experiments in Textiles Materials Experiment.

To evaluate the bilingual teaching efficiency, Chinese teaching and bilingual teaching systems are compared at the same experiment. The resultant teaching efficiency was assessed by the class performance, testing operation and lab report. Both of lab reports in the teaching class were written in both English and Chinese report. Therein, for fifteen testing experiments, twelve lab reports for each students were received, thereof, eight English reports and four Chinese reports. The experiments for English lab report include fiber identification, fiber strength and elongation, moisture regain, fiber length and fineness, and fiber friction coefficient and surface resistance, as well as yarn count, twist and hairiness, blending ratio of yarns, tensile, tear and burst properties of fabrics tests. Chinese lab reports contain the determination for yarn quality (Part I and II), and drapability, softness, creaseability, air permeability of fabrics as well as wear-resisting, snagging resistance and pilling resistance of fabrics. This arrangement considers the English levels of diversified students and difficulty between Chinese and English lab reports. Outlines English lab report were title, abstract, introduction, experimental, results and discussion etc., conforming the article framework. Chinese lab report was arranged as format including title, principle, experimental, results and discussion parts. Each lab report was evaluated by scores, and the average score indicates the lab scores for each students. Teaching efficiency directly reflects by comprehensive scores, which consists of 30% classroom performance score and 70% lab score. Hundred percentage points system, 60 percent as the passing grade, was used to record the scores. Class performance score is judged by class attendance, experimental listening and answer, as well as hands-on skills. The experiment covers fiber, yarn and fabric, and functions tests, and done at fiber observation, yarn and fabric laboratory respectively in our school.

Table 1. One-way ANOVA analysis of Chinese and Bilingual education in determination on moisture regain of fibers, one of experiments in Textiles Materials.

	DF	Sum of Squares	Mean Square	F Value	Prob>F
<b>Model</b>	1	324.490	324.49	17.02	3.17E-4
<b>Error</b>	27	514.681	19.06		
<b>Total</b>	28	839.1724			

Teaching efficiency is evaluated from results of the latest three years since 2012-2015. The score distribution and statistical analysis in international class since 2012-2015 are shown in Figure 1. It is found that the scores in three years are all above 80. Due to the different English degree, average score rises gradually. Also, the score distribution becomes smaller and thus presents centralized. Take one experiment about moisture regain of cottons in example, the difference between Chinese and bilingual education is significant as confirmed in Table 1. In the English teaching process, firstly the experimental principle and parameter condition was explained in Chinese using multi-media; Secondly, the professional vocabulary about moisture regain test was given in English and Chinese; Finally, experimental procedure was described in detail and slowly in English, and meanwhile asked whether they understand or not. The purpose of the experimental was to first get the dry weight of cotton by mass conservation (less than 0.05%) and then calculate the moisture regain of cottons by equations. In the Chinese teaching process, all experimental principle, procedure, results and discussion are all expressed in Chinese. In the experimental procedure, three different moisture regain of cottons were used via changing contents of concentrated sulfuric acid and water to simulate varied atmospheric conditions. Students were divided into 3-4 groups to guarantee each one to manipulate the instrument. The teaching efficiency with these two methods is compared. Their respective mean value and standard deviation have displayed in Figure 2. Bilingual education increases the score from 82.83 to 89.72, 5 grade more than Chinese education. Therefore, the bilingual education can promote the scores, namely, the English writing ability and class performance. This is because more specialized vocabulary indicated in the class can improve the flexible mind and attention of all the whole class. It not only beneficial to English writing and listening capacity, and also memorizes the specialized words in the *Textiles Materials*. Therefore, the bilingual education on *Textiles Material*

**Experiments** deeply understands the textiles materials properties combining textiles theory and practices the professional English vocabulary, and English writing and listening ability.

## Conclusion

Bilingual education of “*Textiles Materials Experiment*” course by using multi-media, foreign original textiles teaching materials, writing English lab report in international class significantly improves English listening of professional terminology and writing ability of lab report. Evaluating teaching efficiency with hundred percentage points system, bilingual teaching and Chinese teaching has a significant difference. Ultimately, bilingual education increases the mean experimental scores of students, and receives a good class performance. Therefore, bilingual education on ***Textiles Materials Experiment*** promotes the teaching efficiency and learning effect. However, the assessment system in this research is one-sided, and the comprehensive experimental design ability and manipulative ability at guidance of teachers should be introduced for the comprehensive evaluation.

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