

# NJU SA 2014-2015

THE YEAR BOOK OF ARCHITECTURE PROGRAM SCHOOL OF ARCHITECTURE AND URBAN PLANNING

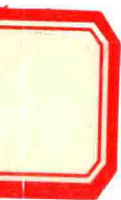
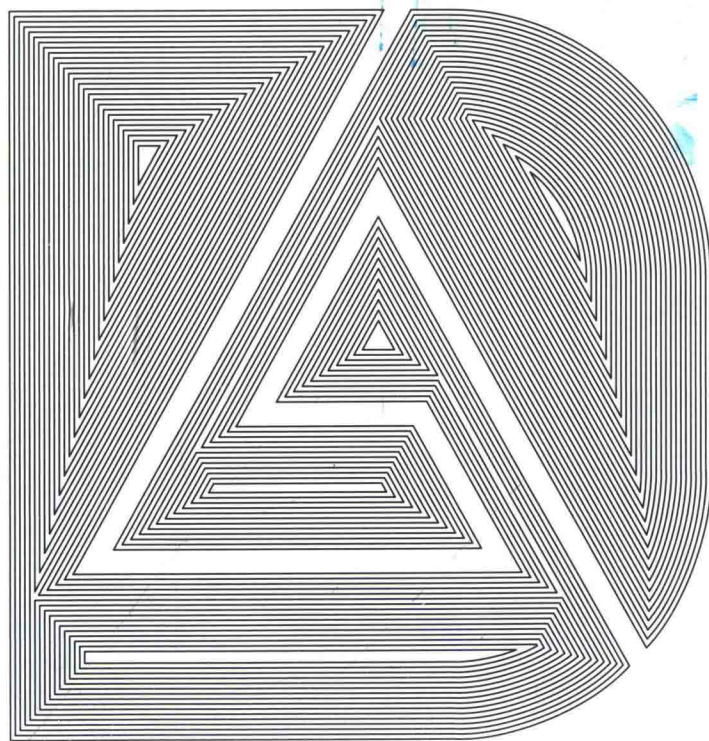
南京大学建筑与城市规划学院建筑系 教学年鉴

王丹丹 编

EDITOR: WANG DANDAN

东南大学出版社·南京

SOUTHEAST UNIVERSITY PRESS, NANJING



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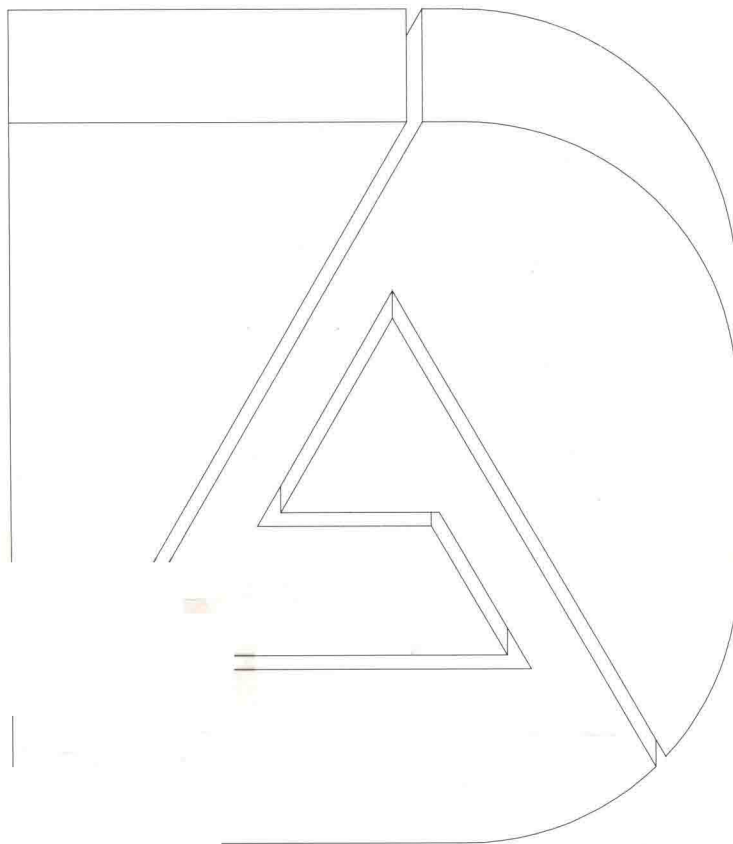
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教学纲要  
EDUCATIONAL PROGRAM





课程安排

CURRICULUM OUTLINE

	本科一年级	本科二年级	本科三年级
	Undergraduate Program 1st Year	Undergraduate Program 2nd Year	Undergraduate Program 3rd Year
设计课程	设计基础 Basic Design	建筑设计基础 Basic Design of Architecture 建筑设计（一） Architectural Design 1 建筑设计（二） Architectural Design 2	建筑设计（三） Architectural Design 3 建筑设计（四） Architectural Design 4 建筑设计（五） Architectural Design 5 建筑设计（六） Architectural Design 6
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建筑技术	理论、材料与结构力学 Theoretical, Material & Structural Statics Visual BASIC程序设计 Visual BASIC Programming	CAAD理论与实践 Theory and Practice of CAAD	建筑技术（一） 结构与构造 Architectural Technology 1: Structure & Construction 建筑技术（二） 建筑物理 Architectural Technology 2: Building Physics 建筑技术（三） 建筑设备 Architectural Technology 3: Building Equipment
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Graduation Project

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专业硕士毕业设计  
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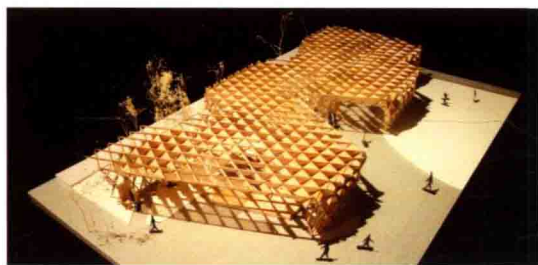
景观都市主义理论与方法  
Theory and Methodology of Landscape Urbanism

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Concepts and Application of GIS建筑理论研究  
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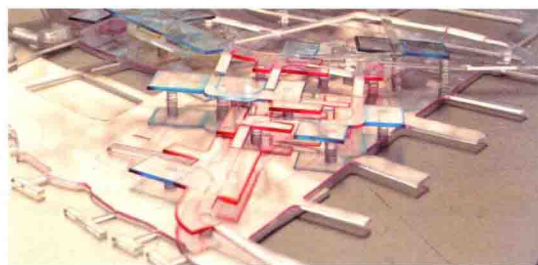
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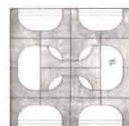
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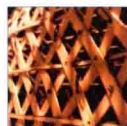
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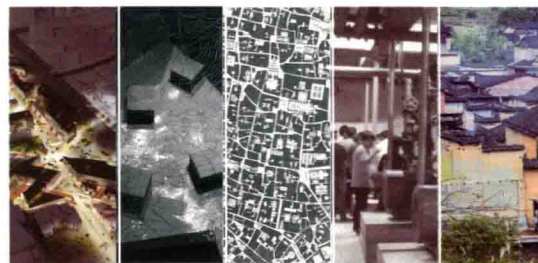
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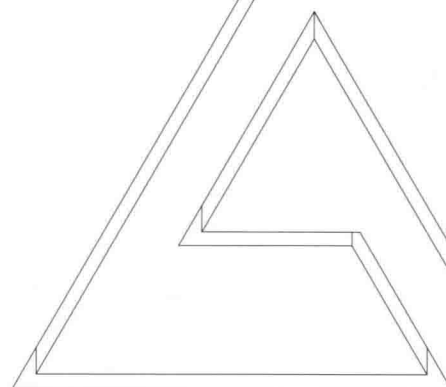
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教学论文  
ARTICLES ON EDUCATION



# 过渡与转换——对转型期建筑教育知识体系的思考

TRANSITION AND TRANSFORMATION: THINKING OF THE KNOWLEDGE SYSTEM OF ARCHITECTURAL EDUCATION

丁沃沃

## 1. 引言

改革开放以来,我国建筑教育得到了突飞猛进的发展,在“量”与“质”两个方面都得到了很大的提升。前些年为了适应国家建设的需要,“建筑学”在办学数量和招生数量两个方面数量大增,近年来提高建筑学教学质量的要求越来越受到重视,不断涌现各类教学改革。在此背景下,作为从事建筑学教育多年的教师,在此试图从学科发展的角度考量建筑学的知识体系及其教育模式。

## 2. 处于转型之中的建筑学

自法国巴黎美术学院奠定了建筑学教育的学院派教育体系以来,建筑教育在大学教育体系里已经历练了300多个年头<sup>[1]</sup>,在此过程中,无论在教育理念和教育方法上都经历了若干次大的变动或者说是改革。导致建筑学变革的是建筑学认识论的转变:建筑是“艺术”、建筑是“建造的艺术”、建筑是“居住的机器”以及建筑学必须“自治”,如此等等。本世纪初,当经济发展推动的城市化在全球蔓延之时,建筑的形式借势已经转化成了商品并产生了价值,建筑学的“自治”的概念即刻消解。此时,西方建筑学理论界因支撑建筑形式的理论基础开始变异而担忧,提醒西方建筑学的传统核心价值观正面临挑战。我们开始看到根植于西方古典审美理论的建筑学正面临着重构或者转型,其建筑教育也正处在变化之中。

在中国,我们有着自己几千年的建造文明史,也有着在世界建筑史之林中独树一帜的传统建筑。在中国建筑文化中,建筑被定义为“器”<sup>[2]</sup>,而非“艺”。然而,就设立在大学体系中的建筑学学科而言,我们却仅有100年左右的历史。不仅如此,目前我国大学中的建筑教育体系和其他许多学科一样是随着上个世纪初“西学东进”的潮流而从国外引进,从“认知”到“方法”都深深地烙上了西方建筑学的烙印。显然,对于作为“艺术”的建筑有着使用的功能,作为“用器”的建筑也有着艺术的价值。建筑是“艺术”或建筑是“用器”是同一事物的两种不同的认知角度,而两种不同的认识论会导致设计方法的不同。经历了近百年的发展,我国的建筑教育体系一方面延续了和西方建筑学可交流的共同认知和方法,另一方面为了适应我国自身来自社会和文化的变化,逐渐形成了自己的模式,培养了具有中国特色的优秀建筑师。尤其是改革开放的30年以来培养的大多数建筑师已经为国家的建设作出了有目共睹的贡献<sup>[3]</sup>。

当今,科学的发展、技术的进步以及多学科融合所产生的新的知识都给建筑学知识体系更新带来了挑战。对于我国建筑学来说,尽管与西方建筑学的发展路径不尽相同,快速的城市化进程使得我国的建筑学学科过早地面临到与发达国家同样的问题,即:如何理解我们的城市,如何改进我们的城市环境,以及如何使得我们的人造环境进入可持续发展的轨道。因此,对于进入21世纪的中国来说建筑的内涵也已扩展。在城市化进程中,建筑不再仅仅是一个“用器”,城市建筑已经构成了人们的“生活环境”。在城市中,讨论单体建筑已经没有意义,重要的是建筑与建筑的组合方式和建筑之间的城市空间。我们已经注意到了全球范围内的城市化进程似乎给中国建筑学学科的发展又带来了新的机遇,同时也意识到全球化的趋势导致建筑的文化特质比任何

时期更加受到重视。由于我们的建筑学学科体系依附于西方建筑学的评价体系,对建筑学与建筑的认知一直纠结于东西方文化差异而难以摆脱,因此重新梳理学科体系成为我们学科发展的必要任务。

当西方建筑学转型之际,我们更应该以我们自己的文化视角重新思考。建筑学是一个国家和地区的社会发展紧密联系在一起,建筑学学科的认知和发展不可能脱离它所处的社会发展阶段,因此,和学科发展直接相关的建筑教育改革从来都不仅仅源自学科发展的需求,还有来自社会发展的需要,这是重新建构学科核心知识体系的真正动力。因此,面对社会转型的机遇、科学进步的支撑、城市化进程的需求和文化自信的挑战,都促使我们对建筑学学科重新思考。立足本民族的文化,中国建筑学应该自己作出抉择,才会有新的机遇。

## 3. 建筑学科的知识亟待更新

建筑学科知识体系的构成主要取决于它所培养建筑师应具备的知识体系,目前公认最早的论著是罗马建筑师维特鲁威的《建筑十书》。维特鲁威认为:“建筑师只是要具备许多学科和种种技艺。以各种技艺完成的一切作品都要依靠这种知识的判断来检查。它是由手工艺和理论产生的。”<sup>[4]</sup>以维特鲁威的观点,建筑学中存在两种事物,即被赋予意义的事物和赋予意义的事物(拉丁文版本为Quod Significatur et Quod Significat),而建筑师应该精通这两种事物,“建筑师既要有天赋的才能,还要有钻研学问的本领。因为没有学问的才能或者没有才能的学问都不可能造出完美的技术人员”<sup>[4]</sup>。维特鲁威的《建筑十书》囊括了建筑师应该掌握的从大尺度的城市到细部的建筑材料、从涉及美学的比例与尺度到物理环境与机械原理等各类学问,奠定了建筑学科的核心知识体系的基础。

意大利文艺复兴是西方建筑学发展的重要时期,意大利建筑师和理论家阿尔伯蒂对建筑师的认识和维特鲁威不尽相同。在阿尔伯蒂看来建筑师应该是一个学者或绅士而不仅仅是一个工匠或手艺人<sup>[5]</sup>。在阿尔伯蒂建构的建筑学知识体系中主要是建筑形式的艺术及其美学理论,有关建筑建造的技术却被忽略。

欧洲自17世纪以来对建筑师的定位及其知识与技能形成了四种不同的角色,如:学术建筑师(Academic Architect)、手艺人或工匠(Craftsman-Builders)、市政工程师(Civil Engineer)以及稍后形成的社会学家(Social Scientist)。当巴黎美术学院的建筑教育在大学体系里设立之时,主要继承了文艺复兴的建筑学传统,选择了“学术建筑师”作为建筑学的培养目标<sup>[6]</sup>。作为大学的一个学科,巴黎美术学院的建筑学教育的课程体系秉承了大学的学术传统,建构了完整的课程体系。通过课程体系给未来的建筑师输送5类知识:分析类、科学类、建造类、艺术类、项目类。分析类主要分析和模仿优秀的建筑实例;科学类(要通过考试)包括数学、解析几何、静力学、材料性能、透视学、物理学、化学以及考古学;建造类包括做模型和结构分析;艺术类包括用炭笔画石膏模型的素描、各种装饰细部和临摹雕像;项目类包括建筑相关的各项指标构成<sup>[7]</sup>。可以看出,进入大学的建筑学延续并完善了维特鲁威时期奠定的建筑学的知识结构,该知识体系旨在将学术建筑师培养成一名有品位的学者,它奠定了西



方建筑学知识体系的基础。

梳理历史脉络不难发现，建筑学在西方经历了三百多年，从古典建筑到现代建筑，建筑的认识论发生巨大的转变，认识论的转变带来的是审美观的转变以及设计方法的变化；对自然界认知的更新和技术进步导致了设计知识和媒介的更新，最终都体现在了建筑形式的更替上。整个过程中，建筑学的认识论起到了引领作用<sup>[5]</sup>。在学科知识构成方面，虽然具体内容在不断更新和扩充，但是建筑学知识体系的构成没有发生根本的变化。概括起来包括了三个主要方面：建筑的认知理论、建筑设计的方法论以及和建筑学相关的科学与技术知识。

当我国在大学里设立建筑学学科之时就引进了西方建筑学的知识构成框架。正因如此，建筑学不再是工匠之手艺活而成为一门学问，仅此一点从根本上改变了我们传统意识中对建筑的认知。虽然大学里的建筑学按知识体系设立了相应的课程，但是知识体系和理论研究与建筑设计之间的关系一直并不十分清晰。实际上，是否沿用西方建筑学体系不是问题，关键在于当转化为“学科”而不再仅仅是“造物”的建筑学学科时，如果没有严谨的研究体系，学科的知识显然难以更新。其结果是在国际交流中，尽管我们能在竟图方面取胜，而在理论的建树方面我们却很少有独立的话语权。反映在建筑教育中，松散的知识构架和陈旧的知识使得学生在学习过程中感受不到知识对于建筑师的重要性。

如果说建筑学的知识结构没有变化的话，那么核心知识的内容应该随着时代的变迁而不断更新。当然，知识的更新需要研究的耕耘。笔者以为，如果建筑学依然作为一个学科在大学里存在的话，重视学科的相关研究、完善学科知识构成体系和内容不仅非常重要而又迫在眉睫。对于完善学科体系，我们主要有两个方面的任务：首先，城市化已经使得城市正在成为我们主要的生活场所，我们的城市物质空间的现状要求我们的建筑学亟待扩充城市方面的知识。基于我国的人口基数，高密度的城市物质形态将会成为我们的主要选择，它将给城市建筑学注入新的内涵和要求。其次，由于高密度城市形态将影响城市的整体气候状况，以此，城市物理和城市气候学将会成为建筑学知识体系中的重要组成部分<sup>[6]</sup>。这方面的研究不仅能够服务于我国的需求，也是对整个建筑学学科的贡献。此外，在全球化的趋势下，建筑文化的地域性特征比任何一个时候都备受关注<sup>[7]</sup>。理论研究证实，建筑的形式来源于对事物的认知与思考，形式的发生并不源于巧合或偶然<sup>[10]</sup>。目前就建筑教育而言，我们不缺时尚建筑范例，而缺乏对于形式生成原因的研究。

#### 4. 通识知识和设计能力

既然建筑学是大学中的一个学科，建筑学培养的人才就一定不是作为手艺人的建筑师，而应该是一个有学问的建筑师。何谓学问？建筑学科人才培养主要分为两个方面：其一，广博的知识和思辨能力；其二，形式的规律和设计能力。前者奠定了一个学者的基本素质，后者决定了其专业素养，缺一不可。进入21世纪以来，出于社会的需求和科学发展的需要，国际一流大学纷纷强调学科之间交叉与合作。在人才培养方面，开始强调通识教育，实际上是赋予新时期人才应该具备的共有的知识基础，为未

来的发展和变化做好准备。国际一流大学的建筑学也不例外，大学初期用以夯实学生的基础，提高学生一般知识素养，而将专业教育向研究生教育衍生。旨在当社会需求发生变化时，未来的新一代建筑师具备了能够应对社会发展需要的基本知识和专业素质。

建筑设计教学是建筑学教育体系中的重要环节，也是建筑教学体系中最具特色的部分。建筑设计课是建筑教育中的核心课程，在任何院校建筑学教育中都是最受重视的内容。在巴黎美术学院时期，建筑理论教育和设计教学分离，建筑设计教学的任务由学院聘请执业建筑师来承担。设计训练由设计导师(Patron)指导，在导师的工作坊受到训练<sup>[11]</sup>。美国的宾夕法尼亚大学的帕尔·克雷(Paul Cret)教授继承了巴黎美术学院的建筑学教育基本理念，同时改进了巴黎美术学院的校外导师工作坊式的建筑设计教学，将建筑设计作为正式课程引入大学，与理论课一样列入课程表<sup>[12]</sup>。这样，大学中的建筑设计课和工作坊的设计训练任务也更加多元。克雷认为通过设计课不仅训练设计技能，而且可以通过设计分析来学习建筑理论和历史理论<sup>[12]</sup>，从此大学里设计课不单纯是设计手法的训练，而且承担了传授知识的平台。建筑设计不仅贯穿于整个建筑学教育过程，而且成为检验学生是否能够获取学位的主要环节——学生独立的毕业设计。随着学科的发展，学校的建筑设计内容变得丰富多彩，建筑设计与理论研究相结合，甚至独立完成的毕业设计开始逐渐被由教师引领的研究性设计所取代<sup>[13]</sup>。

建筑设计教学在我国的建筑院校里受普遍受到重视，其重要程度居所有课程之首，设计教学的质量往往代表了一个学校的建筑学教学的质量。改革开放以来，由于国家建设快速发展，急需大量的建筑设计人才。为了配合这样的需求，建筑设计教学逐渐以模拟现实实践需求为主，目标是入职后能尽早上手出活。为此，大学短期内的确为市场输入了大量的有用的人才，尽管如此，一方面我们的设计教学始终还是满足不了现实市场对人才素质的要求，另一方面我们又意识到我们的学生在思维训练和创意训练方面远不如欧美大学，在未来竞争力方面显然处于弱势。那么，大学里具有如此重要地位的建筑设计课在建筑学教育中究竟承担怎样的角色？

其实，如果学习建造一个房子，那么最好的学习过程无疑应该在建造工地，只有通过工地的学习，才能真正地体验和理解真实建造的问题。如果为了学习建造建筑或房子同时知晓如何设计，那么可以直接去设计院或事务所从帮助制图开始学。通过设计院或事务所的工作体验可以理解真实的建筑设计，但也学不到建造，所以在工地学习过程依然不可缺失。进而，如果不仅为了建造房子和不仅为了设计一个要造的房子，而是为了理解设计房子或建筑的基本原理、思维方法和设计手法，学习对建筑形态的认定标准和一般规律，那就得进入学校进行专业学习。所以，学校的建筑设计课必须提供建筑设计的核心知识（而非全部）和建筑设计的一般道理，不可能提供的是市场上的设计实践和工地上的建造实践，设计实践和建造实践还要通过设计事务所和工地方能解决。很明显，大学里的建筑设计课程承担的知识传授的任务，不得不有着自身的训练规律和方式。训练的满足未来现实的需要，而不是即刻的需求。欧洲大陆有着最为成熟的职业教育体系，传统上就有因不同需要培养的设计人才。就建

筑学而言,就有许多高等专科学校(Hochschule),培养的人才同样进入设计市场,而且进入市场后立马上手。而欧洲大陆的大学建筑学的职业教育的出口通常在研究生层面(Diploma),应对的是不同的社会需求。因此,如果我们的市场急需立马能用的设计人才,不能简单地向研究型大学提要求,而是去多办些高职或大专来训练,这样既好又快。一个研究型大学的设计课程的设置不必纠结是否学生一出校门就会盖房子,也不必因刚出校门的学生不能马上上手施工图而感到惭愧,这些都会通过周而复始的工作得到解决。然而,一个大学倒是应该为没有给一个面向未来的建筑师足够的知识基础、应有的社会责任感和价值判断能力、进入社会后所应该具备的不断学习的能力以及能够应对国际竞争的专业素质而反思。

当下,我国社会发展正处于转型期,很多行业正处于转型之中,建筑教育亦然。就建筑设计课而言,笔者认为应该加强三个方面的训练:

首先,建筑设计课应该加强建造知识的训练。中国传统建筑虽然在意识上没有直接归属为“艺术”,但是它从来都讲究“建造的艺术”。真实的材料以及合情理的诗意表达才使得中国传统建筑具有永恒的魅力。因此,当我们意识到“建构”是中国建筑之魂而不再是简单的“形式符号”的时候,我们自己的独立创作才会开始。此外,融入建造知识的建筑设计训练才能务实地探讨建筑各个层次的形式问题,将建筑的形式问题落到实处。建造训练需要图纸表达,但并不是施工图训练,应该强调的是建造的逻辑如何表达设计的理念。

其次,建筑设计课应该加强思维逻辑训练。建筑学既是实践性很强的学科,又是理论领域较广的学科。然而在现实中,学生总是认为建筑理论听起来很有意思,但实际上并没有真正地重视。实际上,建筑理论的重要性在于帮助学生提高认知世界的能力,因此设计课应该成为一个平台,使学生基于建筑理论训练设计方法。我们通常强调设计过程,过程不仅仅只是简单地为了显示设计方案的从无到有,而是通过设计过程训练设计的思维。设计过程就是理论的思辨和演绎的过程,形式只是最终的结果。当然,建筑理论的教学也应该更加地通俗和明白<sup>[14]</sup>。

第三,建筑设计课应该加强研究和探索性训练。建筑学学科在其发展过程中一直不断更新自身的知识内容和技术方法,研究的意味着收集新信息、挖掘新和发现新问题<sup>[14]</sup>。然而在建筑学科里,研究的传统一直没有受到重视,学生也不太重视知识类的课程,误认为知识与设计无关。应该强调的是,虽然知识不能直接推演出建筑的形式,但是新知识的运用往往会带来建筑形式的创新。我们体会到在形式创新方面的落后,但还没有意识到这和我们不重视研究有着密不可分的关系。纵观历史,只有具备知识的设计者才有创造力,设计的创新需要新的知识来支撑。

## 5. 结语

作为学科的建筑学的任务已经不再是建造几幢能用的物体那么简单,城市化带来的对城市高密度物质空间的挑战已经将前所未遇的问题摆在了我们学科的面前,其中有科学问题值得我们去探索,如高密度的城市物质形态与城市气候环境的关联性问题,也有人文问题值得我们去思考。因此,建筑学需要研究,建筑设计需要新的知识去支撑。

## 1.Foreword

Since the reform and opening up, rapid development of architectural education has been achieved in China, which has been substantially improved in terms of both “quantity” and “quality”. In the past years, in order to accommodate the demand of national construction, quantity of both teaching schools and enrolled students of “architecture” increased tremendously, more and more attention was paid to the requirement of improving quality of architectural education, and various reforms of teaching methodology were emerged one after another. In this context, as a mentor carrying out architectural education for so many years, the author intends to examine the knowledge system and educational mode of architecture in the aspect of disciplinary development.

## 2.Architecture in Transition and Transformation

Since the academic education system of architectural education was established by the Ecole des Beaux-Arts in Paris, architectural education has gone through over 300 years in the system of higher education<sup>[1]</sup>. Several significant transformations or reforms in other words in terms of education idea and educational methodology have been experienced in this process. It is the evolution of architectural epistemology that has led to the transformation of architecture: architecture is “arts”, architecture is the “arts of construction”, architecture is the “machine for living”, and architecture must be of “autonomy”, and so on. At the beginning of this century, when urbanization driven by economic development was spreading across the world, the form of architecture was transformed into goods and value was created by relying on the trend of times, and the concrete of “autonomy” of architecture was dissolved immediately. For the time being, western theoretical circle of architecture began to worry about the initial variation of the theoretical basis behind the architectural form, alerting that the traditional core value of western architecture was confronted with challenges. We saw that the architecture being rooted in western classical aesthetic theory was faced with restructuring or transformation, and its architectural education was also in the process of transformation.

In China, we have thousands of years of civilization history of architecture, and also the unique traditional architecture in the diversified styles of world architectural history. In the Chinese architectural culture, building is defined as “ware”<sup>[2]</sup>, instead of “art”. However, in term of architectural discipline set up in the system of higher education, we have a history of just 100 years approximately. Moreover, the current architectural education system is still the one introduced in the tide of “eastward propagation of western learnings” like many other disciplines in Chinese colleges and universities, which are deeply stamped with the hallmark of western architecture



in the aspects from "cognition" to "methodology". Obviously, the building of "art" has the function of practical use, while the building of "ware" also has the artistic value. The "art" or "ware" of architecture is just the same thing derived from two different cognitive perspectives, and these two different epistemologies would result in different design methodologies. After several hundred years of development, the architectural education system in China, on the one hand, inherited the common cognition and methodology that can be exchanged with western architecture, and on the other hand, evolved and gradually took shape its own mode in order to accommodate the social and cultural demand in the country, and cultivated many outstanding architects with Chinese characteristics. In particular, most architects cultivated in the 30 years since reform and opening up have made universally recognized contributions to the construction of the nation<sup>[3]</sup>.

Today, new knowledge generated through development of science, advance of technologies, as well as integration of multiple disciplines brought challenges to the update of the knowledge system of architecture. For architecture in China, although it has a different path of development in comparison with western architecture, rapid urbanization make Chinese architecture discipline have to face with the same issues in an earlier phase as that faced in developed countries, that is, how to understand our cities, how to improve environment in our cities, and how to enable our man-made environment to step on a track of sustainable development. Therefore, the implication of architecture has been expanded for China into the 21st century. In the course of urbanization, building is not just a "ware", urban buildings constitute the "living environment" of mankind. In a city, discussion of single building does not make sense anymore, what more importance is the combination mode between buildings as well as the urban space among buildings. We have noticed that the world-wide urbanization process appears to have brought new opportunities again for the development of architecture discipline in China, and also realized that the cultural trait of architecture has received more attention than in any time because of the trend of globalization. Our disciplinary system of architecture is attached to the evaluation system of western architecture, and our cognition to architecture and buildings has always been tangled with the difference between eastern and western cultures which cannot be got rid of, so renewing the disciplinary system has become an imperative task for development of this discipline.

In the transition of western architecture, we should be even more thinking from our own cultural perspective. Architecture is a discipline that is closely connected with the social development of a country or a region, and cognition and development of architecture discipline cannot be separated from the social development phase

it belongs to, therefore, the architectural education reform that is directly related to disciplinary development never comes just from the demand of disciplinary development, but also from the demand of social development, this is the real momentum for re-establishing the core knowledge system of the discipline. Therefore, being confronted with the opportunity of social transition, support from advance of science, demand of the urbanization process and the challenge of cultural confidence, all make us to rethink the discipline of architecture. Based on our native culture, Chinese architecture should make its own choice, that's the new opportunity.

### 3. Architectural Knowledge Need Renewal

Composition of knowledge system of architecture discipline mainly depends on the knowledge system required for architects to be cultivated, and currently the recognized earliest literature is the *Ten Books on Architecture* by Vitruvius, a Roman architect. In the opinion of Vitruvius, "What required for an architect is just the acquisition of many disciplines and various kinds of craftsmanship. All works completed with various kinds of craftsmanship must be examined by judging with such knowledge. It is generated from craftsmanship and theories."<sup>[4]</sup> According to opinion of Vitruvius, there are two things in architecture, i.e. what is meant and what means (in Latin: quod significatur et quod significat), and an architect should master these two things, "an architect should have not only gifted talent, but also ability of studying knowledge, because neither talent without knowledge nor knowledge without talent may create perfect technicians"<sup>[4]</sup>. The *Ten Books on Architecture* by Vitruvius covers various kinds of knowledge that should be mastered by an architect, from large-scale city to detailed building materials, from aesthetic scale and dimensions to physical environment and mechanical principles, which laid down foundation for the core knowledge system of the architecture discipline.

Italian Renaissance is an important period for the development of western architecture, and the Italian architect and theorist Alberti has different understanding on architect from that of Vitruvius. In Alberti's opinion, an architect should be a scholar or gentleman, not just a builder or craftsman<sup>[5]</sup>. Art of architectural forms and their aesthetic theories are major subjects in the architectural knowledge system constructed by Alberti, and techniques about building construction are neglected.

Positioning for architects and their knowledge and skills consists of four different roles in Europe since the 17th century, including: the academic architect, the craftsman-builder, the civil engineer, and later the social scientist. When architectural education of the Ecole des Beaux-Arts in Paris was established in higher education system, it mainly succeeded the architecture tradition of the Renaissance, and selected "the academic architect" as its educational objective<sup>[6]</sup>. As a discipline in college,

curriculum system of architectural education in the Ecole des Beaux-Arts in Paris inherited the academic tradition of colleges, and constructed a complete curriculum system. It conveys 5 categories of knowledge to future architects through the curriculum system: analysis, science, construction, art and project. The category of analysis mainly includes analysis or simulation of outstanding architectural cases; the category of science (examination must be passed) includes mathematics, analytic geometry, statics, material properties, perspective, physics, chemistry and archaeology; the category of construction includes modelling and structure analysis; the category of art includes sketch of plaster models, various decorative details and copy of statues with charcoal pencil; and the category of project includes composition of various index relating to architecture<sup>[7]</sup>. We can see that the architecture in colleges inherited and improved the knowledge structure of architecture established in the period of Vitruvius, that system aimed to educate academic architect into an elegant scholar, which laid the foundation for the knowledge system of western architecture.

It is not difficult for us to find out by examining historical context that architecture has gone through over 300 years in western countries, from classical architecture to modern architecture, the epistemology of architecture has undergone tremendous transformation, and transformation of epistemology resulted in the evolution of aesthetics as well as changes of design methodology; update of cognition to nature and technical advance led to update of design knowledge and media, which was reflected by supersession of architectural forms ultimately. The epistemology of architecture played a leading role in the whole process<sup>[8]</sup>. In term of composition of disciplinary knowledge, the specific content is constantly being updated and expanded, but the composition of architectural knowledge system has not gone through any fundamental changes. Generally it consists of three primary aspects: cognitive theories of architecture, methodology of architectural design, as well as scientific and technological knowledge relating to architecture.

The framework of knowledge composition of western architecture was already introduced to China when architecture discipline was established in Chinese colleges. For this reason, architecture is no longer the craftsmanship of builders, but a branch of science, this alone changed the cognition to architecture in our traditional ideology fundamentally. Although relevant courses have been set up for architecture in colleges based on the knowledge system, the relationship between knowledge system as well as theoretical research and architectural design has not been clearly defined all the time. In fact, the question is not about whether to follow the system of western

architecture, but that when architectural discipline is transformed into "discipline" other than just "building", if there has no a strict research system, apparently the discipline would be difficult to be updated. As a result, we have the ability to win drawing competition in international exchanges, but we have little independent say in theoretical achievements. When reflected in architectural education, loose knowledge framework and obsolete content of knowledge are unable to make students sense the importance of knowledge to an architect in the process of learning.

If we say that the structure of architectural knowledge has not been changed, the content of core knowledge should be constantly updated over time. Of course, update of knowledge requires painstaking research. In the author's opinion, if architecture is still to exist as a discipline in colleges, focusing on research about this discipline, and improvement of composition system and content of the disciplinary knowledge is not only very important, but also imperative. In order to improve the disciplinary system, we have two primary tasks: first, urbanization has made cities become our main living places, and current situation of material space in our cities requires us to promptly expand urban-related knowledge in the discipline of architecture. Given the population base in China, high-density urban material morphology will be our primary option, which will infuse the urban architecture with new implications and requirements. And second, high-density urban form will affect overall climatic conditions in a city, therefore, urban physics and urban climatology will be important components in the knowledge system of architecture<sup>[9]</sup>. Research in such fields can not only serve the demand in China, but also make contributions to entire architecture discipline. In addition, with the trend of globalization, regional characteristics of architectural culture attract more attentions than any time<sup>[9]</sup>. Some theoretical researches show that architectural forms come from our cognition and thinking to objects, and occurrence of forms does not come from coincidence or accident<sup>[10]</sup>. Currently in term of architectural education, we are not lack of cases of stylish buildings, but of the research on causes for formation of forms.

#### 4. General Knowledge and Design Capability

Now that the architecture is a discipline in colleges, talents cultivated with architecture should certainly be no craftsman-type architects, but architects of scholarship. What does the scholarship mean? Education of talents with architectural discipline mainly includes two aspects: first, extensive knowledge and critical thinking skills; second, rules about forms and design capability. The former establishes basic quality for a scholar, and the latter determines his/her professional quality, neither one is dispensable. Since the beginning of the 21st century, given the demand of society and



requirement of scientific development, all first-class international universities have been emphasizing intersection and cooperation among different disciplines. And in term of talent cultivation, they emphasize general education, which in fact is to endow talents in the new era with required general knowledge base, and make them be prepared for future development and changes. It has no exception for architecture in first-class international universities. We should strengthen students' knowledge base, improve their general knowledge cultivation in early stage of higher education, and extend specialized education into postgraduate education. So in case of change of social demand, future new generation of architects will be equipped with basic knowledge and professional quality required to answer the demand of social development.

Teaching of architectural design is an important link in the system of architectural education, and also the most unique part in the system. The course of architectural design is a core course in architectural education, and is the most emphasized content of architectural education in any institution of higher education. In the period of the Ecole des Beaux-Arts in Paris, architectural theory education and design teaching were separated with each other; the task of architectural design teaching was undertaken by practice architects hired by the school, while design training was instructed by patrons, and students were trained at studio of their patrons<sup>[11]</sup>. Pro. Paul Cret from American University of Pennsylvania succeeded the fundamental idea of architectural education of the Ecole des Beaux-Arts in Paris, and improved the studio-style architectural design teaching by outside Patrons adopted by the Ecole des Beaux-Arts in Paris, and architectural design was introduced into colleges as formal course, which was listed in curriculum same as theoretical courses<sup>[12]</sup>. In this way, architectural design course and design training tasks in studio are more diversified. Cret believes that design course can not only train students with design skills, but also can allow students to learn architectural theories and historical theories through design analysis<sup>[12]</sup>, and since then design course in colleges is not just the training of design skills, but also the platform for imparting knowledge. Architectural design not only runs through the whole process of architectural education, but also becomes a key link to examine whether students can be qualified for degree award – graduation project completed by students independently. With development of the discipline, content of architectural design in schools is rich and colorful, architectural design is combined with theoretical research, and even independently completed graduation project starts to be replaced gradually by research-oriented design guided by professors<sup>[13]</sup>.

The architectural design teaching is emphasized universally in all architectural

colleges and universities in China, its importance overrides all other courses, and the quality of design teaching often represents the quality of architectural education of a school. Since the reform and opening up, with rapid development of national construction, the country was badly in need of a large number of architectural design talents, and in order to accommodate this demand, architectural design teaching was focusing on simulating the need of real-world practice, so that graduates can get started and undertake projects as soon as possible after stepping on their posts. Therefore, colleges did export large number of competent talents to market in a short period, nevertheless, on the one hand our design teaching still cannot meet the requirement of real-world market on quality of talents, and on the other hand, we realized that our students are far behind those from European and American colleges in terms of thinking training and creativity training, and are disadvantaged in term of competitiveness in future. So, what role should the architectural design course play in architectural education, given it is so important in higher education?

In fact, if one wants to learn how to build a house, the best learning process is no doubt the learning at construction site, it is only by studying at job site that one can actually experience and understand real-world construction. If the goal is to learn how to construct a building or house while get to know how to design, we can go to a design institute or firm to start from drawing work. We can understand real architectural design with working experience in a design institute or firm, but we cannot learn construction, so the learning process at construction site is indispensable. Furthermore, if the goal is not just to construct a house or design a house to be constructed, but to understand the fundamental principles, thinking methods and design methodology for designing a house or building, and to learn the identification standards and general rules of architectural form, we must study specialized courses in schools. Therefore, architectural design course in schools must offer core knowledge (not all knowledge) and general rationales of architectural design, it is impossible to offer design practice in market or construction practice at job site, the question of design practice and construction practice must be solved at design firms and construction sites. Apparently, architectural design course in colleges should undertake the task of imparting knowledge, so it must have its own training rules and methods. The goal of training is to meet real-world demand in the future, instead of immediate demand. Continental Europe has the most sophisticated vocational education system, and has the tradition of training design talents targeting different demands. In term of architecture, there are many Hochschulen, talents trained by them also enter the design market, and they can start work immediately