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语法创造未来：未来学习者培育行动

HOW CMYK SHAPES THE FUTURE: ACTION FOR NURTURING THE LEARNER FOR THE FUTURE

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目录

先导篇

未来教育是一项重要的教育议题，也是陈一丹基金会长期关注的教育话题。自2020年以来，陈一丹基金会开展了一系列有关未来教育和未来学习者的研究，提出面向未来社会发展需求的未来学习者素养框架（LFCF）以及未来教育语法（CMYK）。为了进一步引发国内外相关组织与学者对未来教育的关注，基金会继续推动未来教育语法应用研究，形成了《语法创造未来：未来学习者培育行动》报告。

1

未来教育：教育学和未来学的共同关注

人类对于未来的想象及其应对举措的建构有着悠久的历史渊源，未来教育作为其中的一个重要脉络历来深受国际社会关注。未来学奠基者阿尔文·托夫勒（Alvin Toffler）出版于1970年的《未来的冲击》引起强烈反响，由于个人与社会将因变革太快而成为未来冲击的受害者，托勒夫深信“对未来的合理探索可以为现在提供许多有价值的借鉴，倘若不把未来当作一种习惯性工具而善加运用，我们将更难把握个人及社会的问题”（Toffler，1970，p.2）。大约在同一时期，教育科学发展出一个新兴分支学科“教育未来学”，旨在运用未来学的基本理论研究教育的发展趋势，预测教育发展的未来，探讨未来教育的模式。时至今日，未来教育早已成为全球性话题，深受不同国际社会组织关注。美国社会学家伊曼纽尔·沃勒斯坦（Immanuel Wallerstein）曾就世界的未来发微，“我们正徘徊在黑暗的森林中，对我们应该朝哪个方向前进还不够清楚。我们迫切需要共同讨论这个问题，并且这个讨论必须是真正的全球性的”（Wallerstein，2001，p.ix）。

国内外社会对于未来教育的关注，正体现了这种讨论的“全球性”。经济合作与发展组织在2015年启动了“教育2030：未来的教育与技能”项目，并于2018年提出了《OECD学习框架2030》以回答学习者如何在未来的世界中生存与发展的问题，继而在2019年发布《OECD学习罗盘2030》以发展一种新的学习框架，描述塑造未来一代所需要的能力。近年来经合组织又陆续发布了《回到教育的未来：OECD关于学校教育的四种图景》（2020）《塑造教育的趋势》（2022）等研究成果，表明了未来教育探索的持续性和重要性。除经合组织外，联合国教科文组织也致力于研究未来教育，于2019年成立了“教育的未来”国际委员会，旨在重新想象知识和学习如何能够塑造人类和地球的未来，并发布了《一起重新构想我们的未来：为教育打造新的社会契约》（2022）研究报告。在中国，未来教育亦是一个重要且持续发酵的教育话题。

客观而言，未来教育面临着各种挑战。从形式上看，科技的飞速发展不断冲击着传统的教育模式，使之分化出各种新形态，如在线教育的广泛应用，早已大大改变了有限空间、有限时间内针对有限群体的面对面教学方式，相应的知识组织形式、讲授模式和师生互动形式都随之而变，对未来教育而言，教学方法的创新是一项持续性的议题。从内容上看，知识的变革及其分化随着人类科研活动的快速进展呈现出无止尽的趋势，以学习尽可能多的科目或知识来培养学生为未来职业和社会生活作准备的目标，遭受着知识大爆炸的倾轧；人工智能的出现及其更迭速度之快更是对人类知识学习活动带来了深刻挑战，亦即人类学习的重要意义部分已经被机器学习展现的巨大成效所瓦解。种种情况表明，我们需要不断重新思考未来教育的方向，以更好应对未来人类社会。

2

未来学习者素养框架(LFCF)与未来教育语法(CMYK)

2020年陈一丹基金会为更好应对未来教育的问题，发起了“未来学习者素养”项目（LFCF，Learner for the Future Competence Frame），与来自北京师范大学、芬兰赫尔辛基大学的研究团队合作，就未来教育与未来学习者的培养展开研究。2022年，在由陈一丹基金会举办的“构想未来学习生态：家庭、学校、社会”国际教育论坛上，团队发布了《未来学习者的素养和教育》（Competence and Education of the Learner for the Future）研究报告。报告指出，“联结和创造未来生活”是塑造教育的原则之一，为了应对充满不确定性的未来社会，教育需要培养拥有无限成长可能的“未来学习者”。报告进而提出创新的“未来教育语法”（CMYK），旨在为未来学习者教育提供实践路径。

报告一经发布，深受社会各界关注。为了进一步提升“未来教育语法”的实践性和应用性，陈一丹基金会聚焦“未来教育语法”应用模式，面向教育生态系统，即家庭、学校、社会三大场域构建教育项目元类群，生成创新教育项目，以期为未来教育实践提供资源。

3

未来教育语法：CMYK的生成机制

CMYK，即未来教育语法是一套以未来学习者素养为导向的跨学科项目元（PU）开发系统，它为未来学习者教育实施提供了方法论基础。这套项目开发系统包含有丰富、可持续迭代的二级指标，而跨学科项目元（PU），便是经由CMYK内部元素的组构而来，在这一过程中，跨学科项目元（PU）互联互通，同一序列的项目元（PUn+）将形成一条项目链（Project Chain， PC）并自成一体。在家庭、学校和社会不同教育场景建构的项目链，将有效生成一个广泛连接但又开放的生态教育系统。其简要公式如下：

PU=素养颗粒C*教学方法M*学习年段Y*知识K

C

指的是未来学习者素养框架（LFCF）中的素养，它是面向未来学习者的核心教育目标。在《未来学习者的素养与教育》报告中，我们发布了包括5大一级素养和31项二级素养的素养框架，这一框架继续作为未来教育语法应用研究的基础，而且它本身具有可迭代性。我们的目标是继续构想和探索未来教育的方向，并准备随时增加新核心素养，以不断发展未来学习者的能力。

M

指的是以PBL为基础的多种教学方法的整合和运用。PBL通过项目化的学习方式，让学生参与解决真实世界问题的项目来促进他们的学习和发展，从而使他们更好应对现实生活中的挑战。

Y

指的是处于不同年龄阶段的未来学习者，包括儿童、青少年、成年人等不同群体，由于他们具有不同的认知过程和学习模式，因此项目元的开发，要基于学习者的认知发展阶段和教学需求模式进行适应性改造，从而最大程度优化未来教育语法的实施效果。

K

指的是全学科知识结构，通常包括大艺术类、大工程类、自然类和人文社会类四个领域，K作为项目元的实践材料，面向具体情景而生成，具有高度灵活性。

在探究CMYK的应用模式时，我们认为以下三类整合性教育行动是最为重要的，一是阅读，二是探究，三是审美。为此，我们确立了三条项目链，分别是面向家庭的“亲子阅读”，面向学校的“综合实践”，以及面向社会的“美育”，它们分别注重培育未来学习者的“阅读力”“探究力”“审美力”。下文将对这三大整合性教育行动以及项目链实践模式进行探讨，并运用CMYK未来教育语法生成机制进行项目元开发。

模式生态篇

面向生态：
不同教育场景中的
未来教育语法

在教育实践阶段，未来学习者素养无疑会以交叉融合的方式渗透在实施过程中，并以整合性的行动模式体现出来。我们认为，在未来学习者核心素养的培养过程中，最为重要的整合性行动有以下三种，一是“阅读”；二是“探究”；三是“审美”。这三者既是至关重要的基础技能，也是核心素养培养的基本教育行动，而且这三者都将贯穿每个人各个生命阶段，对每个人的终身发展具有重要价值，也是每个人自我教育的长期目标。它们的发展需要一个能将“家-校-社”联合起来的教育生态，从而给予我们一个具有新型时间和空间维度的教育世界。

1

家庭教育场景中的未来教育语法：阅读力培育项目链

1.1

培育终身阅读者，从家庭开始

随着公民素质持续提升和家庭教育日益受到重视，如何通过家庭教育培养适应社会发展的未来公民成为家长、教育工作者、教育研究者聚焦的热点问题。而阅读是家庭中最为熟悉、常见、亲切的学习情境。CMYK未来教育语法试图为家庭教育和亲子阅读的变革提供新视角、新模式和新策略。

早期阅读，蕴含着培养未来终身阅读者的价值旨归

终身阅读者的主要特征在于具有强烈的阅读兴趣，深厚的阅读能力和积极的阅读体验。换言之，他们乐于阅读且善于阅读。而要成为终身阅读者，则离不开对儿童早期阅读习惯的培养和阅读能力的开发。

父母是儿童的第一任老师，亲子阅读是父母给儿童的充满爱与智慧的礼物。亲子阅读是指家长和孩子共同阅读书籍，以阅读为纽带，彼此分享阅读的互动式早期阅读法。在人生的最初阶段，家长以亲子阅读为桥梁，支持儿童产生阅读兴趣，培养阅读习惯，提高阅读质量对于儿童获得解决问题的经验以及面对未来挑战具有重要意义。具体而言，亲子阅读的价值主要集中在提升儿童学习能力和丰盈儿童未来素养两方面：

亲子阅读能提升儿童学习能力。阅读是儿童了解世界的重要窗口。亲子阅读的过程中，父母与儿童分享经验、建构知识，培养儿童专注倾听、好奇探索、大胆表达的学习品质，提升儿童阅读能力，支持儿童通过阅读来学习，进而与现实世界对话、接触和互动。

亲子阅读能丰盈儿童未来素养。父母与孩子的亲密接触，能够让儿童在充满爱的环境下实现全人发展。在充满爱的环境下，儿童能感受阅读带来的安详、惬意，享受阅读带来的意义感和幸福感，有助于儿童培养积极的情绪体验，健全人格发展，最终实现未来核心素养协同发展。

早期阅读的重要理论、发展预期及行为表现

早期阅读理论涉及何时开始阅读、阅读发展阶段和行为分析等重要理论。关于何时是开始阅读的最佳时期，目前有“阅读准备理论”和“早期读写理论”两种重要观点。持有阅读准备理论的教育者常常认为儿童在6岁半前认知、情感和社会性还不够成熟，无法从阅读指导中获益。某研究通过对来自32个国家超过20万名读者进行调查研究，发现全世界阅读能力排名前4的国家里，有3个国家都不让儿童在7岁之前接受正式的阅读教育（崔利斯，等，2016）。

然而，自20世纪80年代开始，早期读写理论逐渐取代阅读准备理论。研究发现，儿童的读写能力自婴幼儿时期就开始崭露，且随着认知、情感和社会性不断成熟而持续提高。因此，家长需创设丰富的阅读环境，鼓励儿童积极参与到阅读活动中来，培养儿童终身阅读的兴趣（安•S. 爱泼斯坦，等，2018）。

作为家长如何激发阅读兴趣，开展温馨的亲子阅读活动，就需要了解和掌握儿童阅读的发展预期及其行为的分析。通过对比与整合国内外教育教学指导性文件，我们将早期阅读发展分为：阅读意愿及兴趣，阅读理解能力及书面表达欲望和初步技能。

目标1:儿童表现出较强的阅读意愿及兴趣

3～4岁	1. 主动要求成人讲故事、读图书。 2. 能够感受韵律之美，喜欢跟读韵律感强的儿歌、童谣。 3. 爱护图书，不乱撕、乱扔。 4.在成人的支持下，能够分辨韵律相近或者以同样发音开头的两个单词。
4～5岁	1. 反复看自己喜欢的图书。 2. 喜欢把听过的故事或看过的图书讲给别人听。 3. 对生活中常见的标识、符号感兴趣，知道它们表示一定的意义。
5～6岁	1. 专注地阅读图书。 2. 喜欢与他人一起谈论图书和故事的有关内容。 3. 对图书和生活情境中的文字符号感兴趣，知道文字表示一定的意义。

目标2:儿童表现出初步的阅读理解能力

词汇及印刷品理解

3～4岁	1.能区分画画和阅读材料之间的异同，并且了解阅读材料（书籍等）具有一定的意义。
4～5岁	1.儿童展现出声韵认知，能识别出单词中声调的变化。 2.了解阅读规则，并能在阅读中有所体现。
5～6岁	1.对书面语言及印刷品有了初步的了解。例如，理解目的不同会使用到不同的印刷品。能够认识书本的不同部分，例如扉页、题目等。 2.在阅读简单的记忆文本时，指向单音节单词。

目标2:儿童表现出初步的阅读理解能力

阅读理解

3～4岁	1. 能听懂短小的儿歌或故事。 2. 会看画面，能根据画面说出图中有什么，发生了什么事等。 3. 能理解图书上的文字是和画面对应的，是用来表达画面意义的。
4～5岁	1. 能大体讲出所听故事主要内容。 2. 能根据连续画面提供的信息，大致说出故事的情节。 3. 能随着作品的展开产生喜悦、担忧等相应的情绪反应，体会作品所表达的情绪情感。
5～6岁	1. 能说出所阅读的幼儿文学作品的主要内容。 2. 能根据故事的部分情节或图书画面的线索猜想故事情节的发展，或续编、创编故事。 3. 对看过的图书、听过的故事能说出自己的看法。 4. 能初步感受文学语言的美。

目标3:具有书面表达的愿望和初步技能

3～4岁	1. 喜欢用涂涂画画的方式表达一定意思。
4～5岁	1. 愿意用图画和符号表达自己的愿望和想法。 2. 在成人提醒下，写写画画时姿势正确。
5～6岁	1. 愿意用图画和符号表现事物或者故事。 2. 会正确书写自己的名字。 3. 写画时姿势正确。

表1 阅读的发展预期及其行为表现

根据阅读发展预期及其行为表现，我们认为CMYK未来教育语法有利于亲子阅读的开展，并且主要表现在以下三个方面的优势上：

CMYK帮助儿童逐步建立起阅读兴趣和良好的阅读习惯。随着社会的进步和人工智能的开发，电视、网络已经逐渐成为了儿童的成长伴侣，加之大多数家庭缺乏良好的阅读环境、氛围，导致很多儿童难以建立起阅读兴趣，无法产生良好的阅读习惯。鉴于此，CMYK未来教育语法通过开发有趣、贴合幼儿生活经验的亲子阅读案例，让儿童在阅读中体会到亲子阅读过程中蕴含的爱与智慧。

CMYK帮助家长建立科学亲子阅读观念，培养适宜儿童年龄发展特点的亲子阅读策略。对于“何时读”“如何读”和“读什么”等问题一直是萦绕在家长心头的困惑，亲子阅读过程中的急于追求阅读效果的功利主义和三天打鱼、两天晒网的形式主义等，也常常弄巧成拙，导致亲子阅读在家庭的受欢迎程度大打折扣，影响亲子阅读的质量。因此，CMYK未来教育语法为家长提供丰富立体的亲子阅读策略，帮助家长了解幼儿发展的年龄特点，及时给予幼儿适宜的指导，支持幼儿全面发展。

CMYK帮助家长营造良好的阅读环境。由于各种原因，目前的客观情况是家长往往无法通过更多的渠道了解阅读指导策略。基于此，CMYK未来教育语法通过积极倡导科学的亲子阅读理念和提供易得的策略指导，建立亲子阅读场所，激发家长辅导孩子阅读的热情等方式，营造良好的亲子阅读环境。

总而言之，我们希望CMYK未来教育语法通过科学的育儿理念、策略，帮助教育者建立儿童-家长-园所-社会的亲子阅读生态圈，从小培养儿童阅读兴趣和良好的阅读习惯，为儿童的终身发展奠定坚实基础。

1.2

未来教育语法与亲子阅读：开发思路与培育策略

CMYK的亲子阅读方法论

CMYK未来教育语法综合阅读循环圈理论、最近发展区理论和分级阅读理论核心理念，探索具有整合性、发展性、灵活性的亲子阅读方法，并在此基础上，通过儿童早期发展阶段的特点，基于CMYK的生成机制，我们建构了亲子阅读CMYK立方体。

(1) 基本阅读理论

“阅读循环圈”理论最早由艾登•钱伯斯于1991 年在《打造儿童阅读环境》一书中首次提出。钱伯斯阅读循环圈理论认为，每一次的阅读过程都是一个循环圈，由选择、阅读、反应和有思想和指导能力的成年阅读者四个活动要素组成，每一个活动要素完成之后，都会有引导性的导入下一个活动，进而形成了一个循环圈。

选择——指代为儿童阅读提供丰富的图书储备，让儿童能够自主选择感兴趣的图书进行阅读。

阅读——指代深入阅读，即阅读的过程需注重儿童阅读能力的提升，而不是浮于表面，蜻蜓点水式的略读，而应当是从阅读理解中收获有用的内容。

反应——指代儿童对阅读内容和阅读过程的情绪体验，是儿童阅读内化的过程。

有能力的成年阅读者——指代儿童身边具有较高阅读能力的阅读者，在与儿童共同阅读或互动过程中，能起到促进儿童乐于阅读、善于阅读的作用。

值得一提的是，“阅读循环圈”理论并非以上要素的简单组合和单调循环，而是通过“阅读循环圈”不断激发阅读兴趣、培养阅读能力和增强阅读体验的过程，是指向“成就终身阅读者”终极目标的螺旋上升的过程。

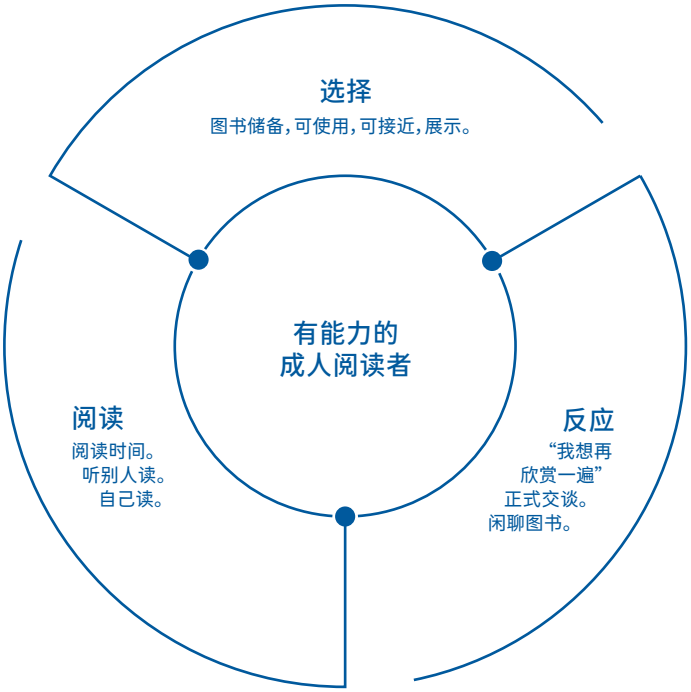


图1“阅读循环圈”

最近发展区理论。维果斯基将“最近发展区理论”界定在“儿童现有的独立解决问题的水平”和“通过成人或更有经验的同伴的帮助而能达到的潜在的发展水平”之间的区域（维果斯基，等，2004）。维果斯基认为，教育者应当着眼于发掘儿童的潜能，而非儿童特定的发展水平。因此，亲子阅读过程中，通过亲子互动，来引导和帮助儿童达成潜在的发展水平，挖掘儿童丰富的阅读潜力，引导儿童逐步实现成为终身阅读者。

分级阅读理论。分级阅读指依据不同阶段的儿童身心发展规律，根据儿童的阅读能力水平为其匹配相适应的读物与阅读指导，是一种在全世界范围内推行的成熟阅读推广理念（王妍妍，2023）。

分级阅读教育体系已成为许多阅读发达国家与地区进行语言教育的系统化、科学化范式。例如，蓝思（Lexile）等。学者们在借鉴国外分级阅读标准体系的基础上，结合国内实际情况，研发了《中国儿童青少年分级阅读内容选择标准》《中国儿童青少年分级阅读水平评价标准》等，开发了学生阅读水平测评与阅读发展促进体系（SLARE），并推出一套

《儿童分级阅读书系》，用以探索分级阅读的系统化研究。随着人工智能的兴起，徐升国等人（2022）预测，未来分级阅读将向智能阅读的趋势发展，通过人工智能技术和阅读深度结合，实现阅读能力的精准测评和阅读内容的精准推送。

（2）面向Y：儿童早期阅读发展阶段概述

通过整理国内外关于儿童早期阅读发展阶段、年龄特点及具体表现，我们发现儿童早期阅读发展阶段存在五个主要的阶段，每个阶段都有其典型的表现。具体内容见下列表格。

Y(Year):年龄阶段	大致年龄阶段	典型表现
准备期$Y_{1\text{-}P}$	0-1岁	1. 婴儿能够区别语言和其他声音，并做出不同的反应。 2. 婴儿是天生的倾听者。 3. 6个月左右的婴儿会出现咬书、抓拍书及撕书的动作。 4. 8个月左右婴儿会对书产生兴趣，会动手翻书。
萌芽期$Y_{2\text{-}E}$	1-3岁	1. 儿童能够看图指物。 2. 儿童能说出图上的东西。 3. 2岁左右，儿童交流时逐渐出现比较完整的句子。 4. 2-3岁时，儿童会用简单句进行沟通和交流。
飞跃期$Y_{3\text{-}S}$	3-4岁	1. 儿童对阅读感兴趣，会主动要求家长讲故事、读图书。 2. 儿童会耐心倾听家长讲述故事。 3. 儿童能区分画画和阅读材料之间的异同，并且了解阅读材料（书籍等）具有一定的意义。 4. 4岁左右，儿童能听懂短小的儿歌或故事。 5. 4岁左右，儿童会看画面，能根据画面说出图中有什么，发生了什么事等。
延展期$Y_{4\text{-}E}$	4-5岁	1. 4-5岁左右，儿童会向家长和同伴表达共同阅读的愿望。 2. 儿童能模仿家长或书籍的语句进行简单的创编。 3. 儿童初步表达愿意与同伴分享共同阅读的书籍。 4. 儿童愿意分享和表达自己阅读过的书籍。 5. 儿童能随着作品的展开产生喜悦、担忧等相应的情绪反应，体会作品所表达的情绪情感。
融通期$Y_{5\text{-}C}$	5岁及以上	1. 儿童能专注地自主读书，也喜欢与他人一起谈论图书和故事的有关内容。 2. 在阅读时，儿童能初步理解简单的故事情节，能根据故事的部分情节或图书画面的线索猜想故事情节的发展，或续编、创编故事。 3. 儿童对图书和生活情境中的文字符号感兴趣，愿意用图画和符号表现事物或故事。 4. 儿童能说出所阅读的幼儿文学作品的主要内容。对看过的图书、听过的故事能说出自己的看法。 5. 成人能够进行写作与文学创作。 6. 成人能够深刻理解文学作品。成人可以深入理解作者创作文学作品的初衷、背景知识以及作者希望表达的各类隐喻和深刻内涵。 7. 成人能够结合自己的处境，代入到文学作品中，产生个性化的理解。 8. 成人乐于与人探讨对某个文学作品的赏析，能够尊重不同人的理解和表达。

表2 儿童早期阅读发展阶段及典型表现

(3) 面向M与K：儿童早期阅读培养策略概述

依据亲子阅读的目的，研究者提出三点早期阅读的策略：创设丰富的阅读环境，与幼儿进行真正的对话，在使用语言中获得乐趣。

首先，CMYK倡导家长创设儿童阅读之“境”。CMYK倡导随心、随处、随时的阅读。一是，父母需为孩子提供丰富且适宜的书籍，让孩子能够选择感兴趣的书籍进行随心阅读。书籍的内容应该尽可能包罗万象，参照健康、语言、社会、科学和艺术五大发展领域，可以将书籍分为：给孩子生存活力的书籍；培养孩子阅读能力的书籍；感受情绪情感的书籍；体验自然和科学的书籍以及提升审美体验的书籍。依据书籍的功能，书籍也可分为布书、洞洞书、立体书、纸质书、图画书、绘本、文学作品等，结合孩子不同年龄阶段的需求，要提供不同功能的书籍。二是，父母可以在家里的任意角落摆放书筐，或打造小书房，让书籍能触手可及，实现随处阅读。三是，父母可以与孩子在午休前、运动后等安静的时间进行阅读，也可与孩子有机会体验睡前亲子阅读的美好时光，实现随时阅读。

Y:年龄阶段 年龄阶段:Y	推荐书籍种类	K:发展领域	推荐书籍种类
Y1-P	布书、卡片书	K1-H	给孩子生存活力的书籍
Y2-E	折纸书、贴纸书、洞洞书、点读书、绘本	K2-L	培养孩子阅读能力的书籍
Y3-S	折纸书、贴纸书、洞洞书、绘本	K3-S	感受情绪情感的书籍
Y4-E	折纸书、贴纸书、洞洞书、绘本、图画书、立体书	K4-S	体验自然和科学的书籍
Y5-C	绘本、立体书、桥梁书、文学作品	K5-A	提升审美体验的书籍

表3 CMYK亲子阅读推荐书目种类

其次，CMYK倡导家长追随儿童阅读之“需”。亲子阅读的方法是广泛灵活、因势利导的。常用的亲子阅读方法分为：大声朗读法、持续默读法、交互式阅读法、游戏法和角色表演法。其中，交互式阅读还涵盖儿歌吟唱法、点读识认法、随机引导法，游戏法还包括讲做结合法、游戏体验法等，角色表演法具体能有故事表演法、合作表演法等，通常而言，在一次阅读活动，往往是一种方法或多种方法的结合，让孩子在阅读过程中提升阅读能力，体验阅读的乐趣。

最后，CMYK倡导家长共享儿童阅读之“悦”。叶芝曾倡导的：教育不是注满一桶水，而是点燃一把火。家长在亲子教育中，要注重激发和培养孩子阅读兴趣。一方面，家长需以身作则，培养自身的阅读习惯，引导儿童从电视、游戏机等易沉迷的游戏里转向阅读中来，激发儿童阅读的兴趣，支持儿童在亲子互动过程中感受阅读的满足感和幸福感。其次，家长可依照固定的阅读计划，定期为孩子朗读，让孩子从小养成良好阅读习惯。阅读中，家长需注重自身语音语调，用独具表现力的声音，来演绎故事中的人物和情节，让故事更丰满，更具吸引力。最后，父母还应积极回答孩子提出的问题。

亲子阅读项目元的生成机制和培育策略

(1) 生成机制：亲子阅读的CMYK立方体

综合心理学、教育学等领域的理论，围绕“成就终身阅读者”的目标，以及儿童阅读早期发展阶段和培育策略，我们构建了亲子阅读CMYK立方体，这也是亲子阅读项目元的核心开发思路。

该立方体以未来学生素养的发展为X轴，以儿童发展领域为Y轴，以准备阶段（选择）、阅读活动（阅读）、拓展活动（反应）为 Z 轴构建而成。单次亲子阅读活动中，XYZ 轴的单一或多元元素会相互组合，构建一个小立方体。XYZ 轴的各个元素会随着儿童年龄增长和发展阶段提升，呈现螺旋上升发展趋势，因此，即便在单次亲子阅读活动中，立方体的组成元素相同，然而，立方体最终呈现的体积和形状也不尽相同。

同时，随着时间螺旋上升的发展趋势，同时在立方体的内外部发生。在时间维度上，立方体之间将沿着螺旋攀升的轨迹不断解构-重组-提升和进阶，最终相互融合成为一个五彩斑斓的整体。

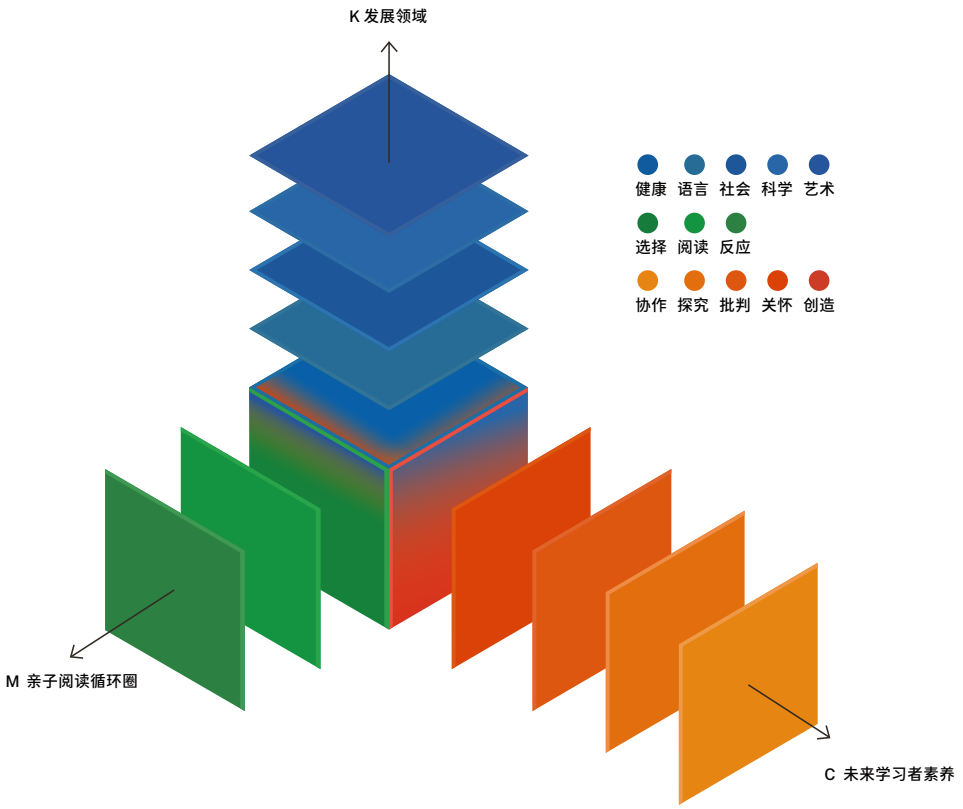


图2 亲子阅读CMYK立方体

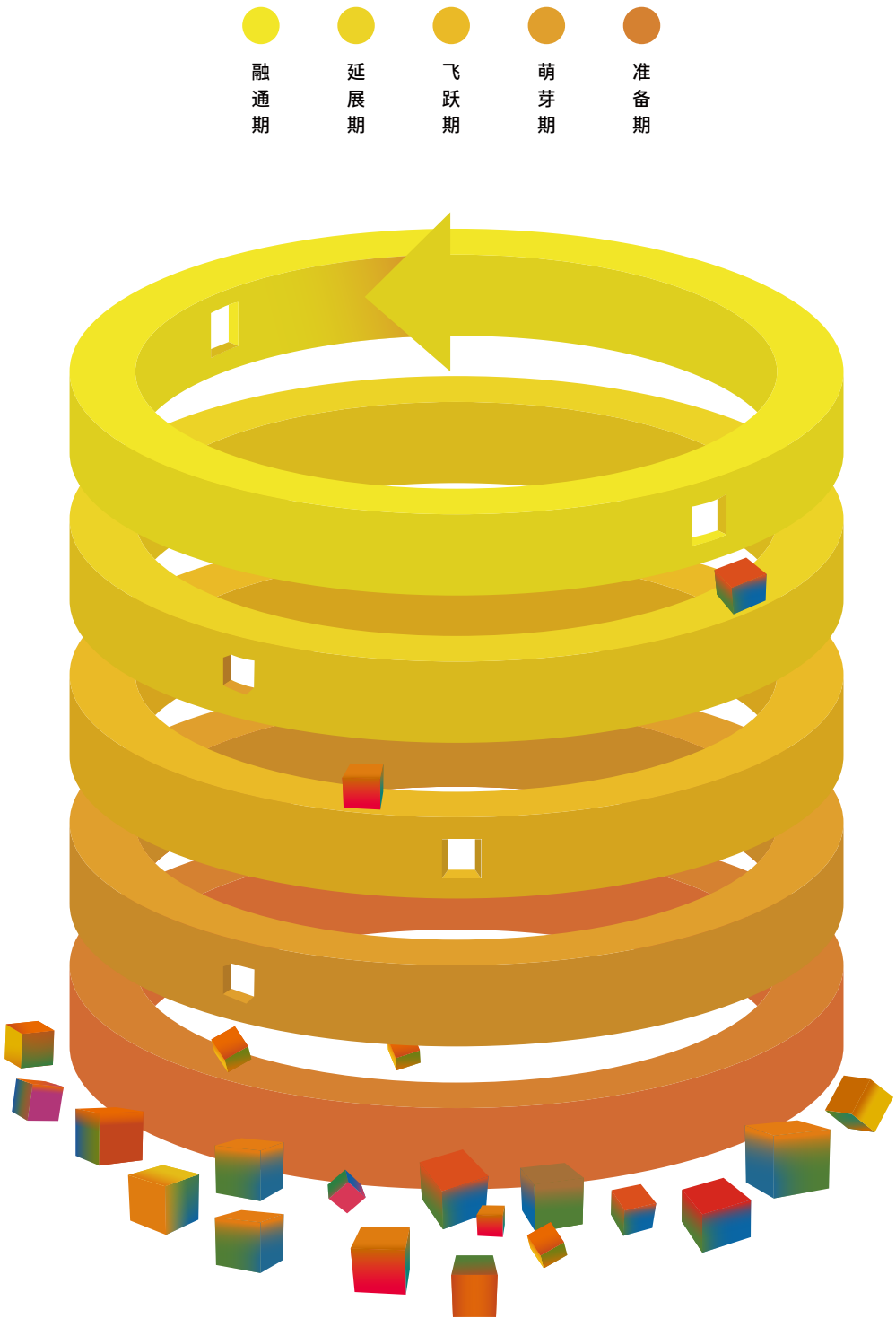


图3 终身阅读者生长态

通过对亲子阅读CMYK立方体进一步解码， CMYK的理念将在亲子阅读的实践运用中更多元、更灵活。在亲子阅读CMYK立方体中，各要素内涵如下：

未来学习者素养C：

$C_{1\text{-}C}$	协作	Collaboration
$C_{2\text{-}C}$	关怀	Care
$C_{3\text{-}C}$	批判	Critical Thinking
$C_{4\text{-}E}$	探究	Exploration
$C_{5\text{-}C}$	创造	Creativity

方法M：

亲子阅读循环圈：M_1

$M_{1\text{-}1\text{-}S}$	选择	Selection
$M_{1\text{-}2\text{-}R}$	阅读	Reading
$M_{1\text{-}3\text{-}R}$	反应	Response

常用阅读方法：M_2

$M_{2\text{-}1\text{-}R}$	大声朗读	Reading Aloud
$M_{2\text{-}2\text{-}S}$	持续默读	Sustained Silent Reading
$M_{2\text{-}3\text{-}I}$	交互式阅读	Interactive Reading
$M_{2\text{-}4\text{-}P}$	游戏	Playing Games
$M_{2\text{-}5\text{-}R}$	角色表演	Role Playing

年龄阶段Y：

$Y_{1\text{-}P}$	准备期	Preparing Period
$Y_{2\text{-}E}$	萌芽期	Embryonic Period
$Y_{3\text{-}S}$	飞跃期	Spanning Period
$Y_{4\text{-}E}$	延展期	Extension Period
$Y_{5\text{-}C}$	融通期	Comprehensive Study Period

发展领域K：

$K_{1\text{-}H}$	健康	Health
$K_{2\text{-}L}$	语言	Language
$K_{3\text{-}S}$	社会	Social Skills
$K_{4\text{-}S}$	科学	Science
$K_{5\text{-}A}$	艺术	Arts

进一步的，根据CMYK的生成机制，我们可以把亲子阅读CMYK立方体以表格形式呈现：

COMPETENCE C 素养	METHOD M 方法		YEAR Y 年龄阶段	KNOWLEDGE K 发展领域
未来学习者素养 C	亲子阅读循环圈 M_1	常用阅读方法 M_2	年龄阶段 Y	发展领域 K
$C_{1\text{-}C}$	$M_{1\text{-}1\text{-}S}$	$M_{2\text{-}1\text{-}R}$	$Y_{1\text{-}P}$	$K_{1\text{-}H}$
$C_{2\text{-}C}$		$M_{2\text{-}2\text{-}S}$	$Y_{2\text{-}E}$	$K_{2\text{-}L}$
$C_{3\text{-}C}$	$M_{1\text{-}2\text{-}R}$	$M_{2\text{-}3\text{-}I}$	$Y_{3\text{-}S}$	$K_{3\text{-}S}$
$C_{4\text{-}C}$		$M_{2\text{-}4\text{-}P}$	$Y_{4\text{-}E}$	$K_{4\text{-}S}$
$C_{5\text{-}C}$	$M_{1\text{-}3\text{-}R}$	$M_{2\text{-}5\text{-}R}$	$Y_{5\text{-}C}$	$K_{5\text{-}A}$

表4 儿童未来教育语法视阈下的亲子阅读核心素养模型

聚焦儿童亲子阅读发展阶段和典型特征，链接CMYK未来教育语法中的未来学习者素养，整理出儿童未来教育语法视阈下的亲子阅读核心素养发展公式：

$$N_1C+N_2M+N_3Y+N_4K=(N_1+N_2+N_3+N_4)CMYK$$

其中，$M=N_1M_1+N_2M_2$

由以上公式，可以看出，在亲子阅读活动中，素养、方法、年龄阶段和发展领域均可自由组合， 且随着儿童阅读能力和语言发展水平不断提升，儿童的阅读潜力也在不断丰富，每次对书籍的理解以及阅读后的获得感和成就感也各有不同，因此，阅读兼具未来学习者框架的灵活多变和阅读循环圈的螺旋发展的两大特点，是循序渐进且螺旋递增的过程。

（2）培育策略：亲子阅读项目元

阅读活动兼具循序渐进的发展性和全面发展的综合性，为进一步推动未来教育语法在亲子阅读领域的实践指导与运用，以培养终身阅读者为导向，聚焦“激发阅读兴趣、培养阅读能力、增强阅读体验”三维目标，沿着孩子发展的阶段特征，将CMYK的元素进行灵活组合，进行亲子阅读案例开发。依照亲子阅读活动涉及发展领域不同，可以将亲子阅读活动分为三个层面：单领域切入、双领域整合、多领域融合。

模式	说明	案例
单领域切入	亲子阅读活动仅仅通过单一发展领域核心经验进行切入和开展。	从语言领域切入，开发“读书真好玩”案例。
双领域整合	亲子阅读系列活动中整合两个发展领域的核心经验。	整合科学领域和艺术领域，开发“颜色变变变”案例。
多领域融合	亲子阅读系列活动中围绕某一主题，融合多领域的核心经验。	融合语言领域、科学领域、艺术领域、社会领域和健康领域，开发“吹气国王鼓起了腮帮子”“城乡公益悦读计划”等案例。

表5 CMYK亲子阅读项目元开发说明

最终，根据亲子阅读CMYK立方体，以及亲子阅读的三个生成层面，我们可以在单领域、双领域和多领域视角中，自主且自由地生成具有高度实践性的亲子阅读项目元。下文所呈现的三个基本项目元，便是亲子阅读在实践过程中的有效培养策略。

案例名称	读书真好玩		
阅读阶段	准备期及以上年龄段	持续时间	每天坚持5-30分钟
核心素养			
协作:倾听 探究:好奇心 专注			
学习目标			
认知目标	让孩子感受声音的律动,开展初期的探索。		
能力目标	培养倾听的习惯,促进孩子感知觉发展,飞跃期及以上的孩子,逐步培养孩子自主阅读的能力。		
情感目标	培养孩子阅读的兴趣,链接孩子阅读与积极的情绪体验,丰富孩子早期阅读体验。		

表6 单领域切入

案例名称	颜色变变变		
阅读阶段	萌芽期及飞跃期年龄段	持续时间	1-2 周
核心素养			
协作:倾听 有效沟通 分享 探究:好奇心 发现问题 果敢 专注 试错		批判:推理 求异 反思 创造:发散	
学习目标			
认知目标	孩子感受不同的颜色、知道三原色,理解颜色的变化,理解彩虹这种自然现象。		
能力目标	孩子能够识别不同的颜色,通过不同颜色的组合探索出不同的颜色。		
情感目标	培养孩子阅读的兴趣,提升孩子发现美、感受美的情趣。		

表7 双领域整合

案例名称	吹气国王鼓起了腮帮子		
阅读阶段	飞跃期及以上年龄段	持续时间	3-4 周

核心素养

协作:倾听 有效沟通 积极 分享
探究:好奇心 发现问题 果敢 专注 规划 试错
批判:推理 求异 反思
创造:发散 溯源 跨界 整合 突破定式
关怀:责任意识

学习目标

认知目标 了解风的特性和作用。
能力目标 培养孩子阅读能力,能够将阅读到的故事分享给周围的人听,提升孩子主动探究的能力。
情感目标 培养孩子阅读的兴趣,激发孩子主动探究的好奇心,愿意与他人分享阅读的快乐。

表8 多领域融合

2

学校教育场景中的未来教育语法：探究力培育项目链

尽管创新教育和教学改革的呼声从未停止，但普通学校教育，尤其是处于大学入学准备关键阶段的中学教育，多以学科知识的单科教学为主，强调课堂知识的静态传授与吸收；以考试测验和分数为教学成果的检验标准，专注于升学目标，忽视了学生在具体的经验情境中进行实践学习的潜力与前景，从而错失培育探究力的诸多宝贵机会。与传统课堂模式相区别的“综合实践活动”，能够更有效促进学生的探究力发展。因此，我们基于未来教育语法，以跨学科综合、手操性、经验学习等基本要素为亮点，生成探究力培育的“综合实践教育”项目元。

2.1

给未来真正的准备：探究力培育的有机融合

探究性综合实践在学校教育中的价值与旨归

如何激发学生自主自发的学习动机，引导自我成长和自我发展，从而帮助他们获得更好的学习效果是学校教育中一个核心议题。

大量研究表明关注自身技能和知识进步的任务目标导向，比采用“能力目标”评价更有利于学生的学习和成长。这主要是因为，采取“任务目标”导向的学生能够调动更好的学习模式，包括有效的认知策略、愿意在需要时寻求帮助、更倾向于从事具有挑战性的任务，对学校和作为学习者的自己有更加积极的感受。（Anderman & Maehr,1994；Ryan et al.，1997）。

此外，学生也有“自主决定”的需求，但这类需求很难在既定课堂教学中得到满足。“自主决定理论”认为学生具有三类需求：能力感；与他人的关联感；自主感（Deci & Ryan,1985）。其中，“能力感”包括了解和相信一个人能够取得各种成果；“关联感”涉及个体与社会群体中的其他人建立令人满意的联系；“自主感”涉及发起和调节自己的行为。在传统的课堂教学中，学生很难获得此类“自主感”的需求。

“综合实践教育” 因其遵从经验的规律，也与实际生活的情境相联系。更加符合“任务目标”的学习导向需求，从而有利于学生获得能力感、关联感和自主感，进一步满足学习者的“自主决定”的需求。最终，能够全面促进学生探究力的发展，是一种非常有效且不可或缺的学校教育形式。

CMYK综合实践理论

(1) 综合实践的本质及其认知发展过程

探究性综合实践是一种不同于传统学校教育的“新教育”。根据杜威的观点，这种“新教育”需要增加个性的表达和培养，是自由活动，是向经验学习，是将技能和技巧当作实现现实需要的手段，是使学生了解不断变化的世界（杜威，2015，第6页）。因此，综合实践教育的本质是一种杜威式的“主动作业”，它从“冲动”的产生开始，到“观察”周围的种种情况，并由回忆或由经验丰富的人的劝告和警示而获得以往在相似情况中发生的事情的“知识”，最后综合观测、回忆而推断它们的意义，从而作出“判断”（见图4）（杜威，2015，第33-35页）。

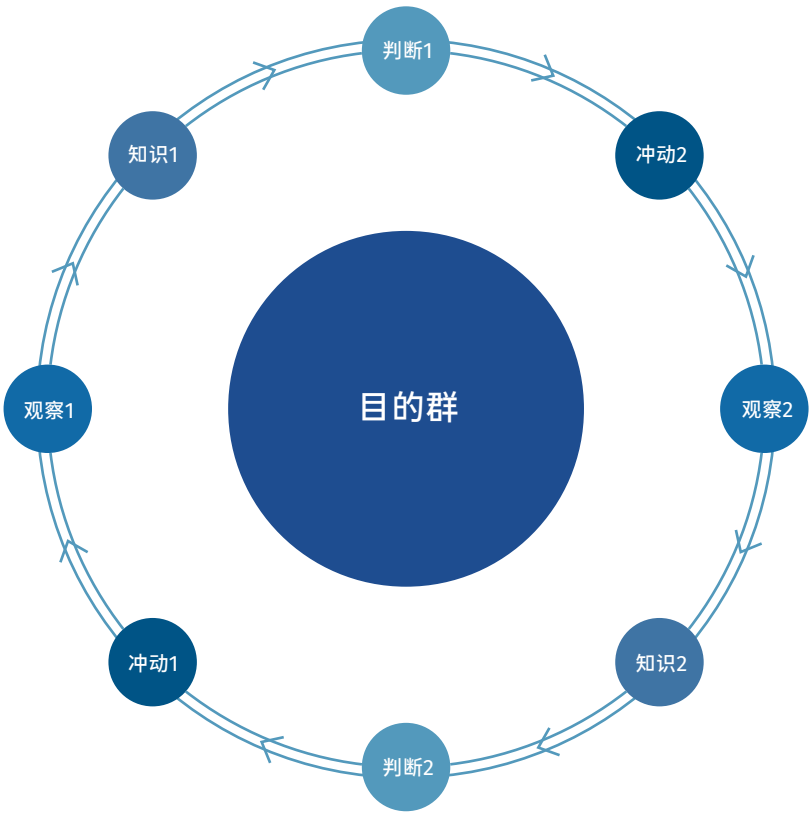


图4 杜威的经验学习模型

综合实践教育的本质还涉及一种皮亚杰式的建构主义认知发展观。即在开展综合实践活动过程中，个体实现了从对世界的具体现象观到抽象的建构主义观的发展过程，也是从主动的自我中心观到反思的内在认识模式的发展过程。这一过程是个人与环境之间的互动循环，学习的关键就在于概念本身对世界经验的适应过程，以及将世事与经验同化为现有概念和模式的过程的相互作用。在此基础上，科尔布确认了经验活动的基本学习过程，亦即“经验、概念、反思、行动”这四个维度是学习者思维发展的基本连续性过程（Kolb，2014，pp.34-35）。由此科尔布提出经典的“经验学习圈”理论，该理论认为经验学习活动包括“具体经验、省思观察、抽象概念、主动验证”这四个阶段（见图5）。

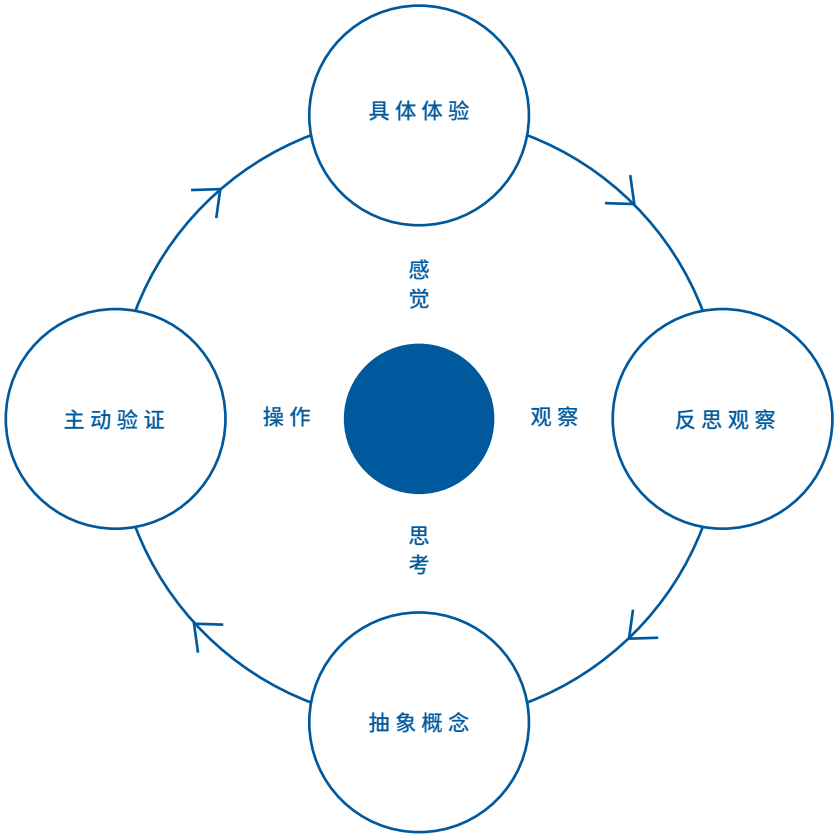


图5 科尔布的经验学习圈

上述理论分析表明，探究性综合实践教育存在四个基本的认知发展过程，即经验（Experience）、观察（Observation）、概念（Conceptualization）、验证（Experiment），我们简称为EOCE横向理论。这一理论表明，学习者在综合实践教育项目元中将历经四个基本过程，实现探究性知识的积累和认知迭代发展。

I. 经验阶段 E

在这一阶段，学习者从特殊的经验中学习，对所接触的人事物产生强烈的感觉，并由经验激发出学习的意愿。

II. 观察阶段 O

在活动开展过程中，学习者观察自我与团队的各项行为，注重记录活动开展过程中遇到的问题，学会从不同角度看问题，并对问题进行初步思考。

III. 概念阶段 C

学习者需要从具象经验和观察反思中抽身而出，让思维跳跃进入抽象层面，仔细打磨和抛光前期累积的经验与观察材料，尝试概念化自己所经验到以及所观察到的人、事、物及其背后的知识、学理，将经验活动结构化为系统性理念，为下一步行动奠定基础。

IV. 验证阶段 E

学习者根据概念阶段的成果，对项目进行复盘，并思考一个基本问题：“如果重新开始，怎么做会更好”，从而与团队商讨并实验完成项目的各种更优的方式，并尝试将学习所得应用到真实生活情境之中。

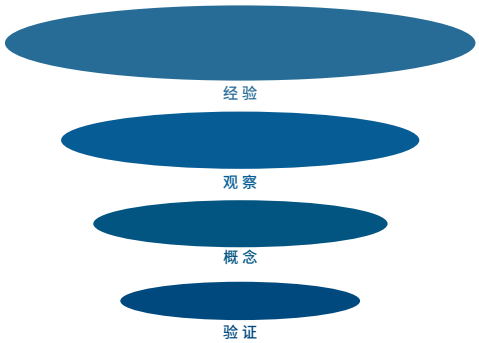


图6 EOCE理论

根据EOCE理论，学生将能够从具体的实践活动中概念化知识，并能够验证自己的假设从而深化知识的理解，打通学科知识和实践活动，最终学会在现实生活中解决问题、应用知识。EOCE理论与CMYK未来教育语法最关键的联系在于EOCE与未来核心素养的胶合。

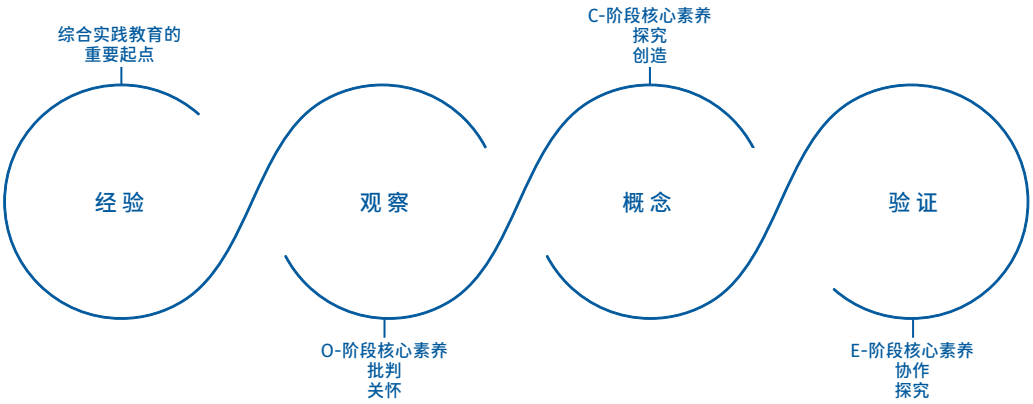


图7 未来学习者素养与EOCE理论的关系

如图7所示，学习者在综合实践活动中每个成长阶段都包裹了一定素养。素养C与EOCE是相辅相成，相互胶合的关系。在第一阶段的经验中，学生获得充分且具体的实践经验是项目元教育的重要起点。在第二阶段的观察中，要求学生对现实情境具有充分的“关怀”，能够看见、乃至意识到经验的全部，并且能够辨明是非、分清真理与意见，这就要求对现实经验加以批判。第三阶段的概念化则是对具体经验的抽象，学生既要能够复盘、探究经验过程，也需要具备创造力，能够将经验事实概念化。第四阶段则要求学生检验自己的假设并及时修正认识的偏差和错误，这一阶段也要求高度的团队合作，并在实验过程中不断探究，重新发现问题并解决问题。

（2）CMYK综合实践的螺旋生成状态

未来学习者理念认为，在未来教育生态系统中，“螺旋生成”是学习进程的总态势。换言之，学习者凭借已有知识背景进入系统，通过各类学习项目元推动中间态的更新，在生态系统中实现自我丰富与成长，而中间态的“螺旋生成”就成为了未来学习者的发展样态。

综合实践教育同样会历经“螺旋生成”的过程。科尔布指出，经验式学习是一种“螺旋上升过程”（Kolb，2012）。在经验学习圈中，一个项目循环周期的结束是下一个项目循环周期的开始，也就是说，下一个循环周期的认知发展起点于上一个周期的认知发展程度，下图呈现了这一循环机制。

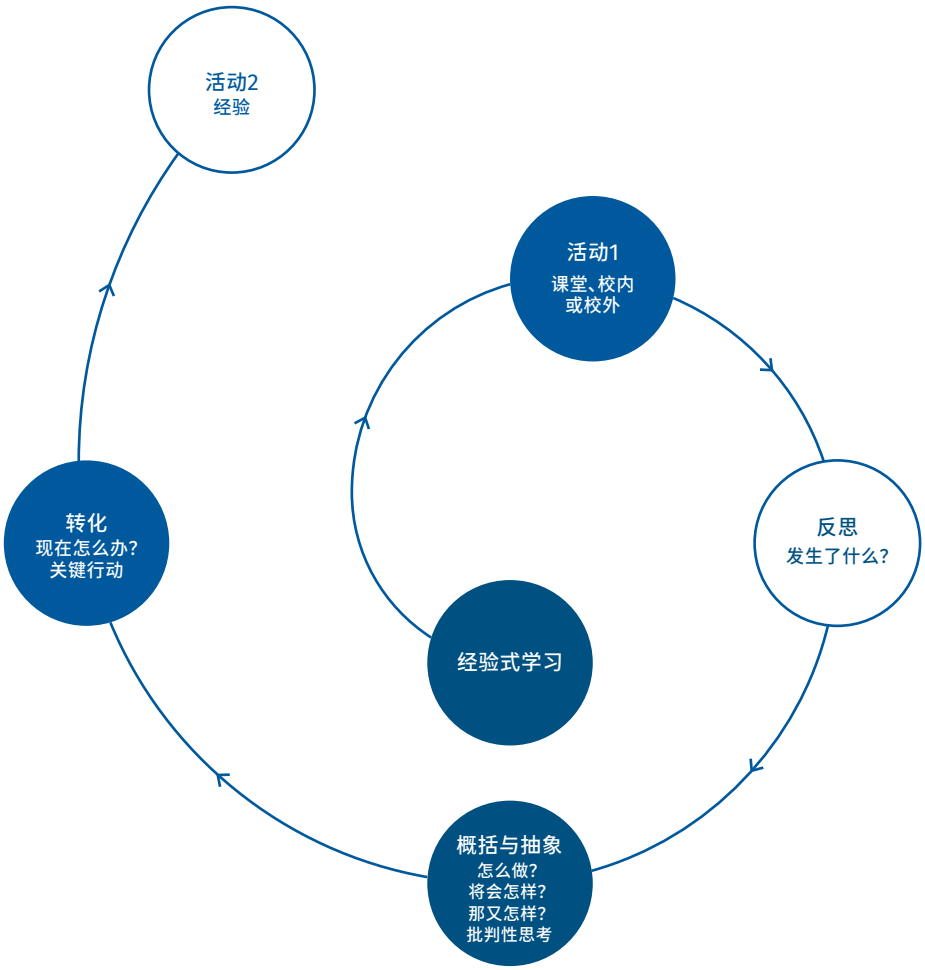


图8 经验式学习周期的循环原理

因此，综合实践教育项目的教育过程不是一个个割裂的单一项目式教学，而是一系列具有认知逻辑生成的“螺旋上升”的过程。当项目层次越丰富，学生的思维发展迭代越快。我们鼓励学习者深入思考，发展批判性思维技能，并通过系列项目元的周期性活动，将他们的学习不断转化为行动。最终，综合实践项目元不断激发未来学习者探究能力的螺旋式生长，如下图所示。

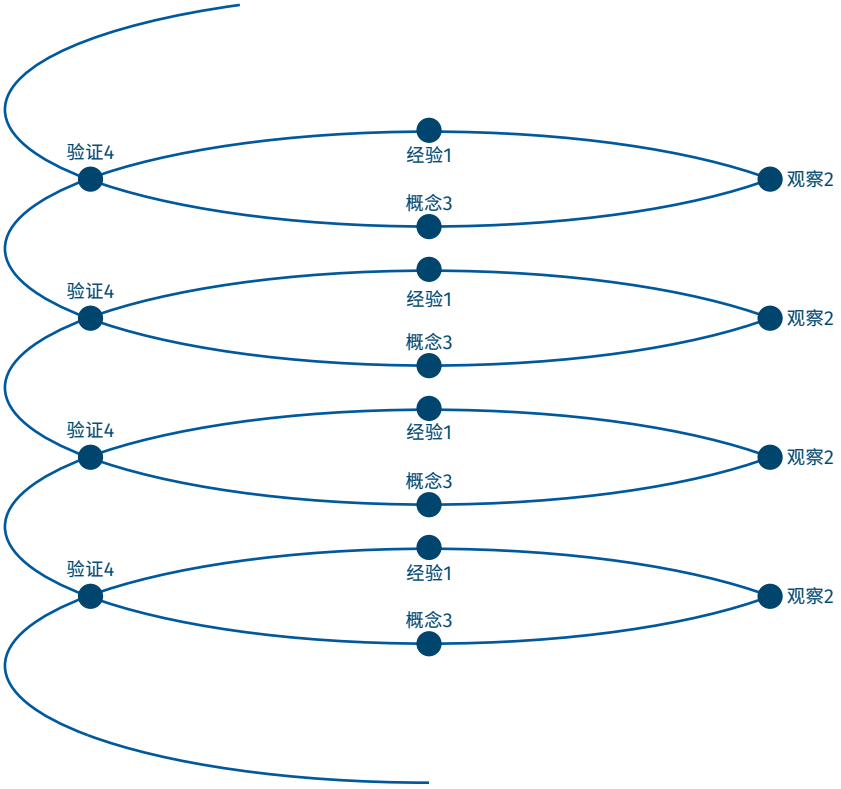


图9 EOCE螺旋图

通过以上分析，CMYK综合实践理论具有横纵理论的形态，它以EOCE为学习者认知发展的成长基底，以“螺旋生成”为进步阶梯，不断培育和促进学习者探究力的发展。

(3) 面向K：综合实践的STHEM知识模型

对于学校教育而言，综合实践教育应涉及哪些学科知识？这个问题显然不能通过百科全书式的简单汇集来解决，而是需要考虑综合实践教育的特性以进行适应性改造。基于项目的STEM课程因其具有跨学科课程和实践课程的双重特性，可以作为综合实践教育项目设计的重要表现途径之一。而STEM的创新形式——STEAM教育，即在STEM教育中加入了“A元素”（Art），强调人文文化精神价值的重要性。这在学科综合、学科分类和具体课程等维度上，为我们提供了一个组织教学材料的方式。

然而，STEM及其衍生理念STEAM课程目前在中国的教育实践活动中存在着一些问题，包括：专业STEAM教师队伍小，课程整合能力弱；STEAM跨学科课程支持系统的缺乏；STEAM课程整合的形式主义化，项目主题的窄化或泛化（李学书，2019）。此外，A课程主要强调艺术科目，缺乏了人文学科和社会科学的维度。但客观而言，STEAM教育表明了STEM教育具有无限延展性的可能，可以根据社会发展需要来整合不同学科，形成STEM+等教育改革形态，发展包容性更强的跨学科综合素养教育（李学书，2019，第62页）。

基于以上背景，我们提出用“人文”（Humanity）代替“艺术”（Art），创造性搭建“STHEM”模型作为K的对象，从而避免了人文学科的缺失。具体的知识颗粒，如下图所示。

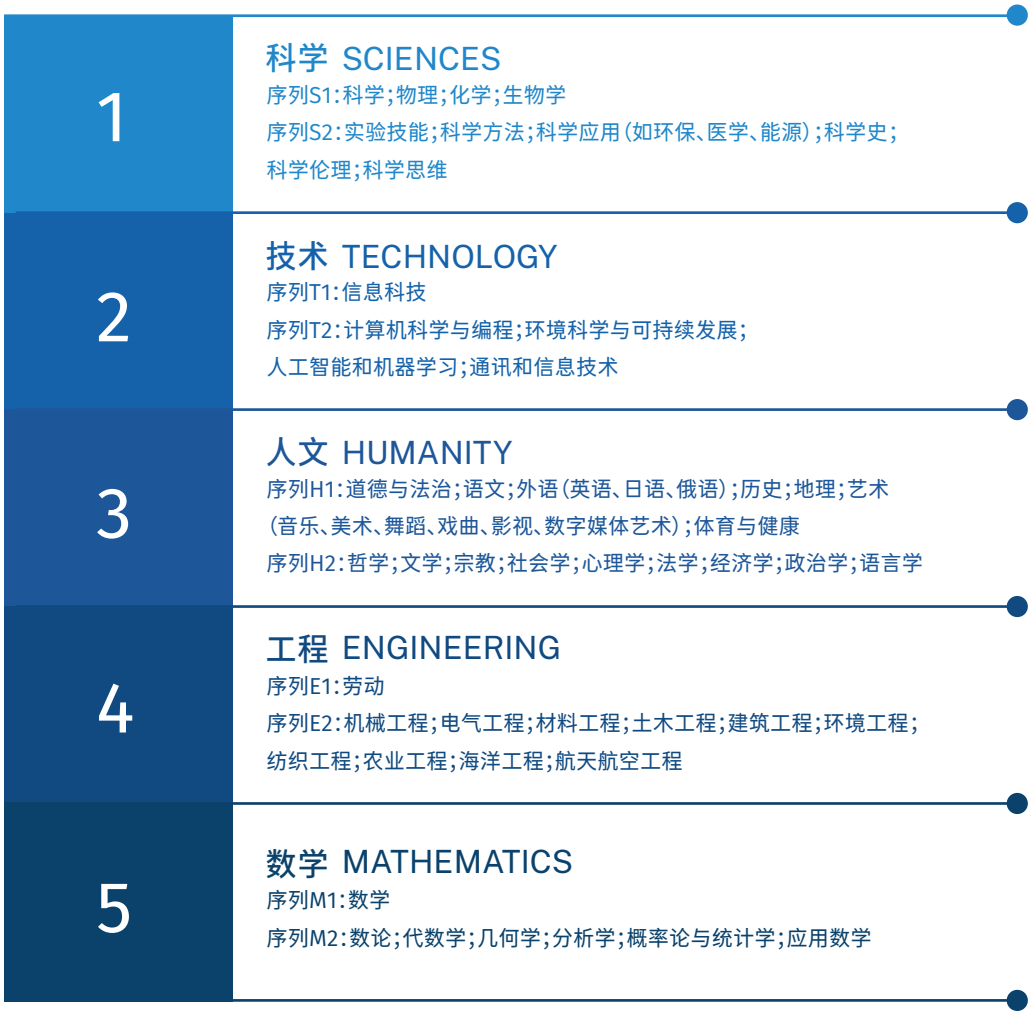


图10 综合实践的STHEM知识模型

更重要的是，CMYK未来教育语法为STHEM跨学科课程的设计和开展提供了有效的支持，同时解决了已有的STEAM教育在实践活动中缺乏支持系统的问题。

2.2

未来教育语法与探究力培育：开发思路与培育策略

CMYK综合实践项目元的展开

CMYK综合实践项目元的展开，需要先确定综合实践的开展主题，然后再根据CMYK未来教育语法生成机制进行项目元的开发。下文我们将以“生命”主题为例，对项目元开发思路进行阐释。

(1) “生命”主题的综合价值

选择“生命”作为探究项目元的主题，是因为“生命”主题的重要性及其教育价值。从大约45亿年前至35亿年前的原始生命时代到当今的后人类时代，“生命”这一概念始终是与我们相伴相生的存在。一个具有无限成长可能的未来学习者，一定是一个对生命及其存在形态的过去、现在和未来都有所了解、有所体悟，乃至有所想象的人。生命具有从微生物到全宇宙的完整特性，要求多学科交叉的知识才能真正加以理解。生命不是一种知识，也不是一套理论，生命是一种活生生的实践，可以说，生命的意义就在于体验本身。而综合实践教育所具有的跨学科性与经验性，恰恰与“生命”这一主题息息相关。

此外，与传统的学校综合实践活动课程的内容组织关系，即“人与自我、人与自然、人与社会”相比，“生命”主题的组织关系将具有更高的维度和更丰富的层次。这主要来自于对生命存在形式的新理解。在大数据、人工智能、数字经济、数字治理、社交媒体、生物工程、基因技术、3D打印等科技飞速发展的后人类主义的“赛博格”阶段，“生命”的概念并非仅仅指涉人类与自然界的生命体，还包括人与技术、有机物与无机物的边界消失之后的新生命认知概念。比如对人类而言，人工智能可能会超过人的智能，从而对人形成压倒性的控制；碳基生命与硅基生命的融合可能会创造出新型“人类”或“半人类”半机械的生命新形态。这迫使我们不得不思考后人类时代的生命体问题。

根据亲生命假说（the biophilia hypothesis），人类天生具有一种与自然和其他形态的生命联系的愿望。因此，我们将“生命”主题拆解为三个新的子主题：“人与社会”（理解人类生命体）；“人与自然”（理解自然界的生命体）；“人与赛博格”（理解后人类时代生命体）。如下图所示。

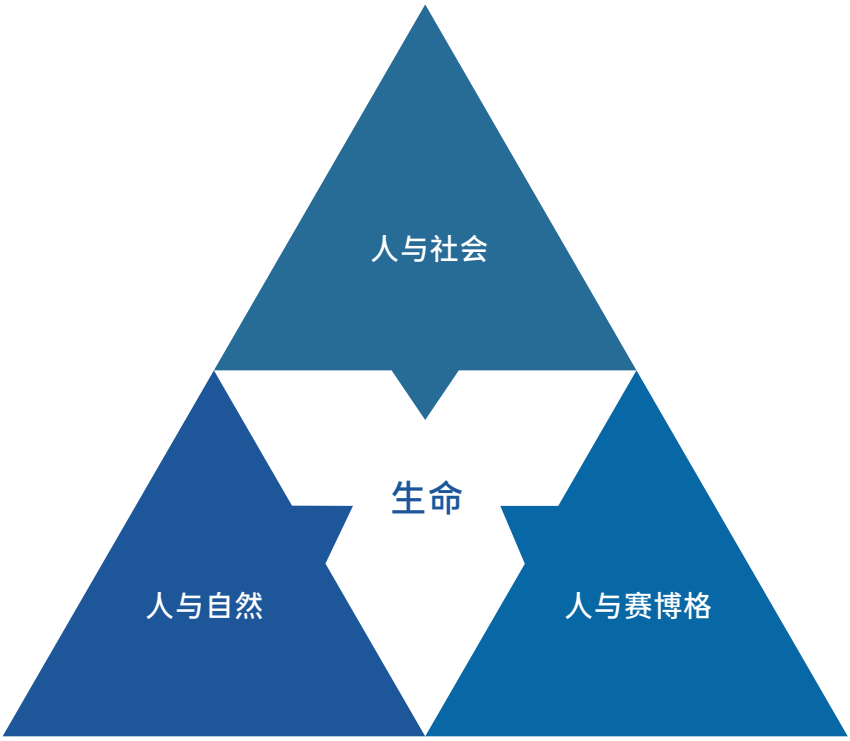


图11 人类与生命的关系结构

人与社会

理解人类生命体是生命主题的一个重要起点。人类生命不仅仅是作为生物体的存在，还包括身体、心理、社交、精神等多个层面；人类生命也不仅仅是作为个体的存在，还包括整体的人类社会。历史上许多著名哲学家和教育家热衷于从各个维度分析人与社会这一基本命题。此外，人与社会的命题是人类中心主义的。在此人类中心主义并非贬义，而是一种选择，涉及人类生命的起源与演变、人类社群的形成和社会建制、人类未来的可能命运等与人类这一生命体紧密结合的问题。因此，理解人的生命形态需要透彻理解人与人类社会的本质。

人与自然

人类是自然界的一部分，我们的生存和发展都依赖于自然资源和环境，同时人类的活动也对自然环境产生了影响。人与自然的互动具有超越“人类中心主义”的价值，让我们意识到远在人类生命之外的自然界的生命力量，这无疑有利于培养环境保护意识和促进可持续性发展的理念。与此同时，人与自然的关系具有互利性。最近一项在十八个国家展开的调查表明，生活在绿地或沿海地区的人具有更高的整体积极幸福感，经常去绿地或蓝色空间（沿海或内陆）进行娱乐活动的人遭受的心理困扰也较少（White et al，2021）。另一项研究指出，自然界的气味、景象和声音，能够有效舒缓我们的感官，帮助我们实现完全的“在场”（Hasbach，2022）。

人与赛博格

根据当娜•哈拉维（Donna Haraway）的定义，赛博格（Cyborg）是一种后人类，是一种机械合成的有机体，其重点是将机械的、数字的、集成电路的运转方式和有机体的、生化的、基因的生命经验结合起来，产生一种新型的生命体（Haraway，1991，p.1）。尽管大多数人将“赛博格”视为一种距离自己很遥远的、属于科幻文艺领域的概念，然而，当移动互联网、虚拟现实、人工智能等新技术在21世纪初逐步介入人类日常生活后，我们已经是一种初级赛博格了。在数字化人工制品环境下成长起来的儿童也不再是传统意义上的儿童，而是“赛博儿童”（cyberkids）。这既是未来教育所要面对的现实问题，也是我们综合实践教育不得不面对的重要实践探索。

(2) “生命”综合实践项目元的CMYK教育形式与风格

人类、自然、赛博格这三个衍生自生命的子主题，是开发生命综合实践教育项目的基本主题单位。根据CMYK未来教育语法，将这三个主题单位转化为教育项目元需要首先确认方法M，它们分别是面向人与社会的“教育剧场”、面向人与自然的“游中学”、面向人与赛博格的“赛博格教育”。

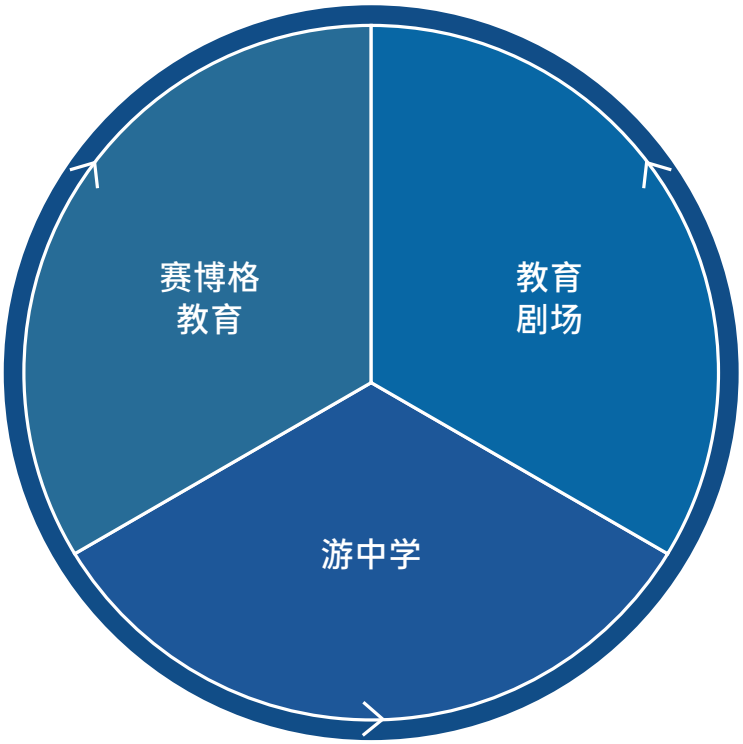


图12 “生命”综合实践教育形式

教育剧场　Theatre in Education, TIE

教育剧场是一种项目式教育形式，运用戏剧元素和戏剧方法，以角色育人。其优势在于，我们可以选择各种充分展现“人与社会”张力的剧本，让学生通过深入解读并演绎作品，在喜剧表演的综合实践活动中学习人类社会的喜怒哀乐。

教育戏剧特有的教学形式有“戏剧定格”，也称定格照片、即兴定格，即让表演者将所要表达的内容用定格画面的形式呈现出来，感受肢体动作在情景创设、角色扮演、明确关系、情绪表达、信息传递方面的作用，这一方法能够帮助学生进入情境，扮演角色，发展故事，并借此启发原创的灵感。在一场完整的戏剧排练中，定格通常包括单人定格、双人定格、多人定格。在完成各个情节的定格之后，进行“连续定格”则可以呈现一个情节连贯的故事轮廓。

游中学　Learning by Travel, LBT

了解自然界生命体的最好形式就是走进自然，接触自然，感受自然，理解自然。因此“游中学”综合实践项目旨在让学生在自然生态（如森林、海岛、沙漠、草原等场所）进行户外探索，在实地考察和研究中学习和了解人类与自然的生命。

赛博格教育　Cyborg Education, CE

伴随“赛博格”的流行，教育领域出现了相关的教育理论和实践方法，即“赛博格教育学”（cyborg pedagogy），旨在将人与机器的融合应用于教育过程中。这是学习赛博格生命形态的有效方式，我们通过开展赛博格PBL教育，以“人机交互”为基本教学方法，帮助学生了解赛博格，理解人类与赛博格的关系。

以上三大教育方法也考虑了学习风格的归类和管理问题。众所周知，并非所有的学生都具有相同的学习偏好，学界亦存在多种学习风格理论。因此，根据最基础的分类，我们将综合实践教育项目元设计为三类“学习者风格”（Study Style，简称SS），分别是人文精神（humanity）、冒险精神（adventure）与科技精神（technology）。

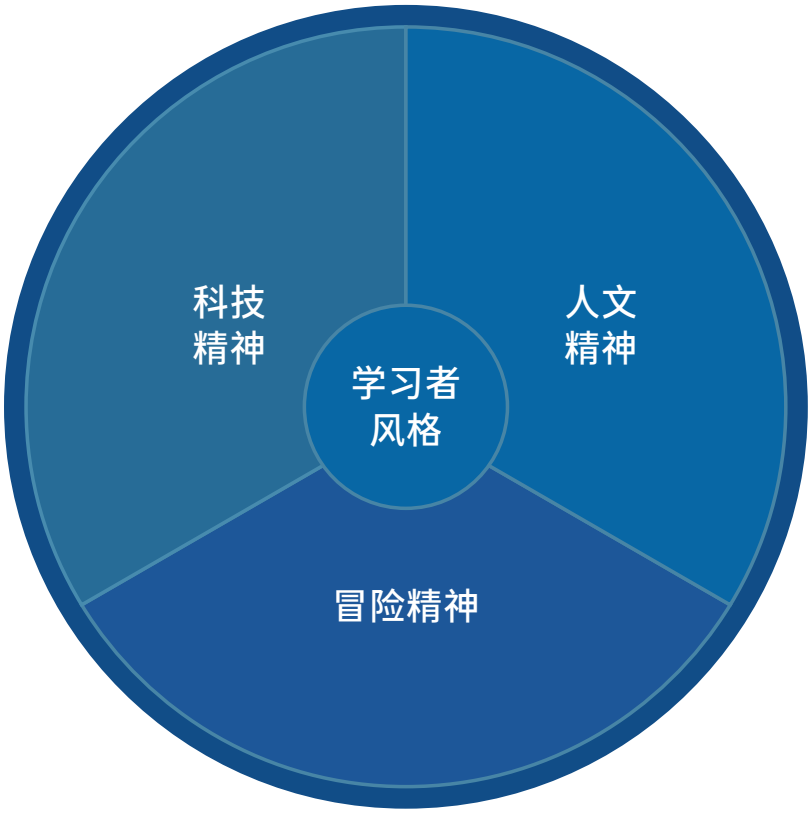


图13 学习者风格

“教育剧场”主打“室内-人文”风格。

其知识模块以人文学科和社会学科为主，其发生场所更多在剧场里，属于室内综合实践活动板块，适合于那些本身偏向人文类活动或希望体验、探索人文精神的学习者。

“游中学”主打“户外-冒险”风格。

主要以探索自然界，如山川、湖泊、雨林等地学习人与自然的知识，充满冒险性和刺激性，适合于具有户外活动偏好或希望体验冒险性自然探索的学习者。

“赛博格教育”主打“无界-科技”风格。

其知识板块将偏向理工学科，学生将学习大量的科技类知识，开发和建造“赛博格”设备，适合于科技迷选手，也适合希望体验充满科技感项目的学习者。

CMYK综合实践项目元的生成机制

未来教育语法的特点是其具有编码系统的功能，我们能够通过对各要素进行编码，从而自动形成清晰明确、可持续、可迭代的项目元生成机制。有关“生命”综合实践教育项目元的编码系统，主要由三个部分组成，如表9所示。

编码类别	编码	内容
生命L	Ls	人与社会
	Ln	人与自然
	Lc	人与赛博格
素养C	$C_{1\text{-}E}$	探究
	$C_{2\text{-}C}$	批判
	$C_{3\text{-}C}$	协作
	$C_{4\text{-}C}$	创造
	$C_{5\text{-}C}$	关怀
学习者风格SS	$SS_{1\text{-}Hum.}$	人文精神
	$SS_{2\text{-}Adv.}$	冒险精神
	$SS_{3\text{-}Tec.}$	科技精神

表9 CMYK综合实践编码

我们通过将“生命”探究性综合实践编码系统融合到CMYK未来教育语法的生成机制当中，便可获得CMYK生命综合实践教育项目元，其生成机制如图14所示。

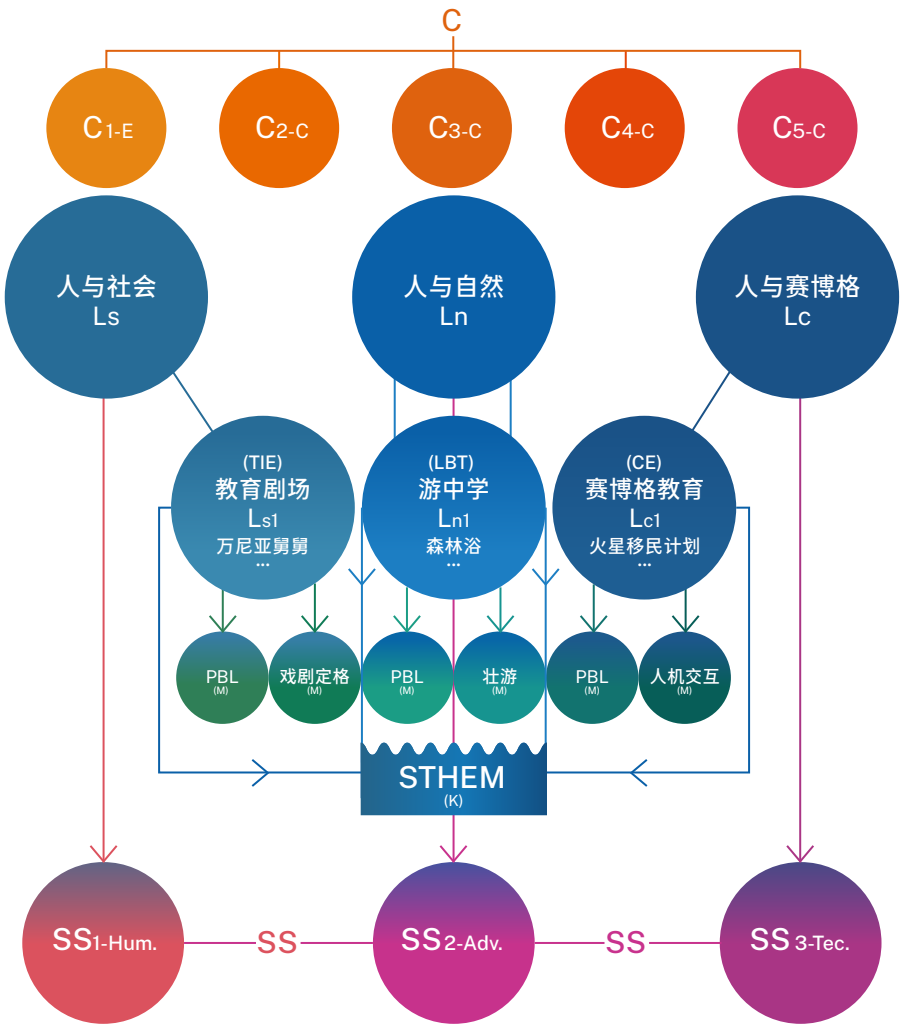


图14 CMYK综合实践项目元生成机制

由上图可见，生命项目元（PUlife）矩阵的开发路径主要有3条，每一条路径都可以生成n+1个项目元，因此项目元总量是3*（n+1）个。这意味着，我们所建立的生成机制可以根据现实需求产出对应的项目元，具有永久迭代性，是一个高效、便捷的综合实践教育项目开发系统。其基本公式如下：

$$PU_{life}=C*L(L_s/L_n/L_c)*M(PBL+M_s/M_n/M_c)*STHEM*SS(Hum./Adv./Tec.)$$

综合实践PU工具表

为了更好指导实践，促进综合实践教育项目的落地，下文我们将分别从3条生命项目元开发路径中生成4个案例，形成共包含12个项目元的案例集，以示范例。并且，我们提供了各类实践工具表，用于项目的开展和管理。

PUlife				
TIE				
编号	LS1	LS2	LS3	LS4
主题	茶馆	雷雨	仲夏夜之梦	万尼亚舅舅
LBT				
编号	LN1	LN2	LN3	LN4
主题	森林浴	1m² 可移动城市	行路甘南	重返文艺复兴
CE				
编号	LC1	LC2	LC3	LC4
主题	火星移民计划	3D未来世界	24h逆赛博格世界	脑机接口

表10 “生命”主题综合实践PU案例集

在PU实践板块，我们提供了5个非常重要的工具表。它们分别是：综合实践教育项目的整体指南（表11）；项目元实施过程中的成长记录表（表12）；面向“教育剧场（TIE）”“游中学”（LBT）“赛博格教育”（CE）三类PU的实践指南（表13、14、15）。

四 步 指 南		
步骤	学生任务	导师任务
1 项目前期	制定行动指南	协助
2 项目中期	按指南行动	伴随指导
3 成果展示	展示项目相关成果	导师点评
4 项目复盘	EOCE圆桌会议	介入与评价

表11 综合实践教育项目指南

在前文中，我们建立了EOCE理论模型作为监控系统，确保综合实践活动的开展符合学生的认知发展过程，充分展现教育价值。因此，在项目运行过程中，我们推荐学生使用EOCE记录表，从而觉察、监控自己的认知发展过程。

EOCE记录表		
PU名称		
学员信息		
编号	指引性问题	记录内容
1 经验	你注意到……了吗?	前期
		中期
		后期
2 观察	为什么会这样呢?	前期
		中期
		后期
3 概念	这在现实生活中发生吗?	前期
		中期
		后期
4 验证	你现在要做什么?	前期
		中期
		后期

表12　EOCE成长记录表

TIE指南		
项目前期	1 准备剧本 2 招募戏剧指导老师 3 确定场地 4 小组人员分工	
项目中期	剧务	服装与妆造 道具与舞台 音乐与灯光 海报设计，宣传
	排练	台词与剧情 动作定格 串台
	彩排表演	全体成员舞台经验的打磨
项目后期	成果展示	正式演出
	项目复盘	EOCE圆桌会议

表13　教育剧场实践指南

LBT指南		
项目前期	确定地点 行程规划 招募领队 物资筹备 知识智囊团	
项目中期	领队 讲解 记录	
项目后期	成果展示	自然生态考察报告
	项目复盘	EOCE圆桌会议

表14　游中学实践指南

CE指南		
项目前期	召开计划会 知识讲座	
项目中期	资料整理阶段 赛博想象阶段 赛博构造阶段	
项目后期	成果展示	赛博作品展示
	项目复盘	EOCE圆桌会议

表15　赛博格教育指南

3

社会教育场景中的未来教育语法：审美力培育项目链

美育是通往完善人性的主要路径之一。人与其他动物本质上的差异，在于人类的精神性特质。教育活动的根本任务之一激发人类精神动力，以培养完整成熟的人格。无论是在西方还是在中国教育史上，以美之陶冶来完成人格教育均受到重视。在教育日益个性多元化的当今时代，社会教育场景中的美育因其更具生活化，更符合自由探索意义而更契合人们对美育的联想。

3.1

美育活动的教育价值及CMYK美育理论

以美育培育更全面的未来学习者

“现代美育之父”席勒以“美育”一词指称促进人类人性化之感性冲动和理性冲动的和谐统一，获得最幸福的存在和独立自由的过程。感性冲动和理性冲动的统一意味着同时拥有多样的形式和丰实的内容，兼具理性思考之锐利与感性想象之浪漫。在中国，所谓“兴于诗，成于乐”“潜移默化”“陶冶性情”“内化于心”等人格化育方法在现代教育话语体系下均被冠以“美育”之名。可见，美育内涵丰富且具有不可忽视的教育价值。

围绕美和艺术的本质论、“美”的教育意义、美育如何实施三个根本性问题，主要有实用主义、表现主义、形式主义、存在主义四类美育思想，其核心要义分别为经验体验、自我表达、形式创作以及关怀觉醒。这四类主流美育思想的一个共同特点在于，均把想象作为思想核心或者是论述要点。易言之，“想象”是贯穿于西方思想史和美学史中的核心概念，在美育中占有重要一席。

想象力在艺术创作中的作用是公认的。想象力一定程度上是艺术家创造力的体现，赋予了艺术依托于真实世界但又超越真实世界的品性。此外，人类的诗歌、文学、雕塑、绘画以及所有宗教、哲学的实际运作都依赖于想象的成像能力和意象的象征性。如果人类没有创造出这些象征性意象的能力，也就不可能发展出抽象理智、科学、数学、逻辑推理，甚至连语言都不可能产生。

除了想象在美育中的重要性外，更重要的是，想象与未来学习者素养内容核心及框架的开放灵动、自由包容特征相契合，同样具有开放灵动的特性。想象能够冲破时空限制，是沟通有限个体和无限永恒之间的桥梁，为审美带来无穷的乐趣。

CMYK美育理论

基于“想象”在CMYK和美育理论间的联结意义，CMYK美育理论以“想象”为核心主题，凸显自由灵动、无限开放精神。

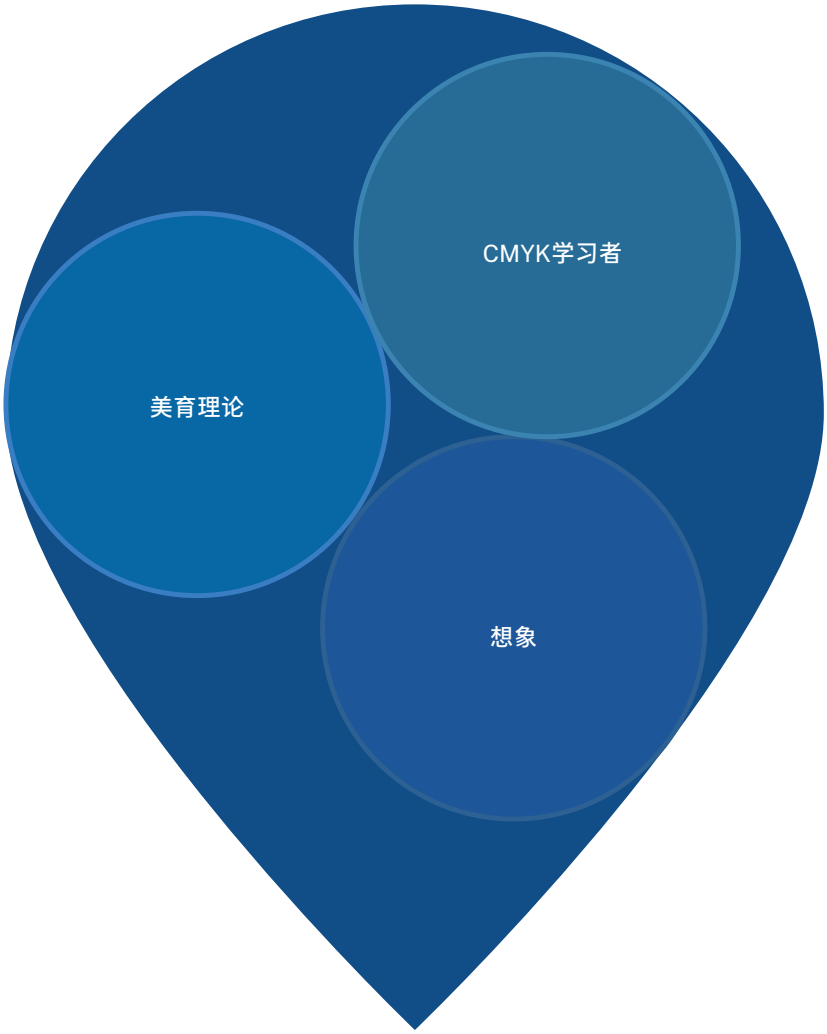


图15 CMYK美育理论

未来学习者素养框架引导了以“想象”为核心美育理论的构建，反之，后者又助力于前者的丰富多样性和无限生长性。二者相互依托，共同生长。

CMYK美育理念的产生和释义紧扣想象主题，融合已有的素养者框架以及美育本身的逻辑。按照从最初的艺术接触到表现性成果产出这一基本逻辑，包括体验、知觉、沉浸、创作四大阶段，相应的具体内容有观察、感受、思考；组织、识别、隐喻；包容、共情、反思评估；技术、行动、意义。在具体内容产生的过程中，以未来学习者素养框架为依凭。按照五项一级指标审查美育元素的全面性，以二级指标为参照对CMYK美育四个核心元素的内容进行释义。由于增益美育活动本身的特色，未来素养者框架又得以灵动生长。

体验

艺术体验是艺术创作的准备阶段，可以是一个长期过程。艺术体验首先需要艺术家观察生活、感受生活、思考生活，同时，更需要全身心拥抱生活。

知觉

知觉指一种发现或把握艺术的能力。艺术知觉是一种直觉，一种洞察力或顿悟能力。并非推理性的思辨，但仍是一种基本的理性活动。

沉浸

沉浸是一个无限的创造过程，是一种在理解艺术作品基础上的再创造性活动。沉浸式体验、艺术鉴赏、 艺术批评、艺术研究均是艺术沉浸的表现。围绕有利于想象的放飞，沉浸的内容包括包容、共情以及反思评估（鉴赏）。

创作

创作是美育活动的最终指向，以个性化的表达和“形式”的产出为目标。相对而言，创作是一种独立的、纯粹的、高级形态的审美创造活动。

想象（力）	内涵	说明	相对应的未来学习者素养	
1 体验	观察	通过与艺术作品或其他艺术对象的持续互动，识别和阐明其深层次的细节。	探究	好奇心
	感受	通过感官、情感等接触，来体验艺术作品或其他艺术对象。	探究	专注
	思考（假设）	在体验过程中提出假设以促进学习，“如果……会怎样?	探究	发现问题
2 知觉	组织	将看到的内容和发现的形式与已有的知识、经验，他人的知识、经验以及各种文本、多媒体资源等联系起来。	批判	求异
	识别（简化）	觉知细节之间的差异性及相关性，将它们分组、整合并加以辨别。	批判	系统
	隐喻	形成初步的图像或形式。	创造	整合
3 沉浸	包容：与不确定共存	意识到问题有不只一种解释，并非所有问题都有立即或明确的解决方案，并在解决方案逐步清晰时保持耐心。	协作	宽容
	共情	尊重其他人的不同观点，在情感上和思想上理解他人的经历。	协作	同理心
	反思评估	回顾体验与知觉过程，评估所学内容，确定仍然存在的挑战，确定需要进一步了解的内容。	批判	反思、系统
4 创作	技术	艺术创作的手段、工具、技巧。	协作	分享、实施
	行动	综合在探索中学到的知识，以合适的方式尝试新的想法、行为或情境。	创造	实施、突破定式
	意义	创建自己的解释，从其他人的角度观察，并以自己的声音去综合表达。	关怀	社会历史意识

表16 CMYK审美力培养核心要素表

需要说明的是，以上元素和内容间看似具有联系性和层级性，但这种线性关系仅为满足文本的结构性呈现。在CMYK美育项目的实践中，恰恰要求突破“层级性”，与想象力培养的复杂性、非线性契合，并考虑到与不同学习模式的可能关系。

在体验阶段，前三种能力，即观察、感受、思考（提出假设），是其他几种能力的先导，是想象力之门，但并没有任何特定顺序。有些人在有效观察之前可能必须由问题引领；有些人必须在某种具体的感觉指引下才能注意到更深层次的细节；有些人则可能直接看或听即可，这三种能力以循环和递归的方式整合起来。随着时间推移，这三种能力似乎都可以得到加强，同时也伴随着其他美育能力的提升。动觉、听觉和视觉学习者在该阶段均可以凭借各自学习优势顺利进入美育过程，而且，无论从哪个角度切入，所有这些能力都以不同的方式参与到心理图像形成中。

知觉阶段包括组织、识别和隐喻。知觉阶段能力的培养受到体验阶段能力的影响，但需要在心理画面中找到理性部分，挖掘更多东西。这些理性关系源于具体的想象。

沉浸包括包容（与不确定性共存）、共情和反思评估。这些同样以非线性的方式与其他元素相互作用。想象力之所以重要的一个因素在于共情。想象力是认知能力，允许我们相信另一种现实的可能性，实现另一个世界的可能性。进而，共情中产生了一种特殊的想象力，即社会想象。社会想象是一种创造社会新愿景的能力。这意味着想象力、共情、以及重新想象组成了理想社会的想象回环。反思评估能力事实上存在于整个想象力过程中。在体验环节中，人们观察、提出问题并表达出来，然后再次经历这个过程。在沉浸中也是如此，不断进行着回顾、诘问和调适的理性分析活动。并且，为了创造意义并采取适当的行动，人们必须反思、评估，并重复，以确保适当的行动。在这个层面上，反思和评估是非正式的，是想象和学习持续过程的一部分。

创作包括在技术支持下采取行动以及创建意义。学生可以采取的行动是多种多样的：可以是个人的、社会的、政治的，也可以是创造一个新的物体或想法。创作中也存在着迭代和重复。为了采取行动，必须创造一种意义。而为了创造意义，必须发生一种想象性的行为。

因此，CMYK美育元素在实施过程中并不是想象力学习的整个动态过程，可能只是从某个角度选择了动态过程中的一些横切片断，它们是想象力学习的关键部分，在帮助学生发展方面具有一定的启示性。

3.2 未来教育语法与审美力培育：开发思路与培育策略

CMYK美育项目元的展开

未来学习者素养框架下的美育活动按照核心素养、教学方法、年龄阶层、以及知识体系的CMYK逻辑展开。

核心素养同时参考未来学习者素养框架以及“想象力”美育素养。在教学活动设计与实施中，素养框架既发挥了目标的作用，同时也是反思教学活动的工具。

“想象”美育项目元教学方法以PBL为基础，融合独特的想象力教学方法，灵活应用。除虚拟仿真练习、活动课程、虚拟实验室、翻转课堂、实验性学习等教学方法外，相匹配的教学策略亦充满趣味性和人文性。例如，破除“预设”、脑图、鱼骨图、反向头脑风暴法、概念绘制、问题扩大、角色扮演、SCAMPER、“贴起来”、故事板等等，在此不予展开说明。

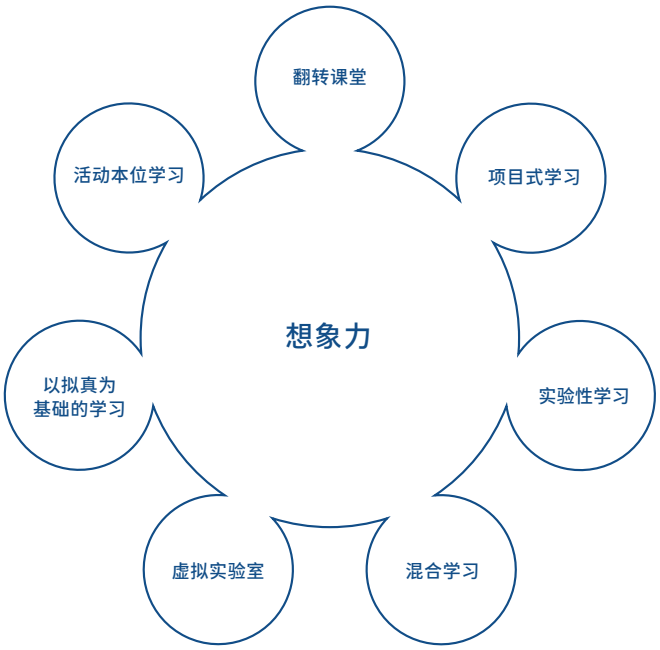


图16 审美力培养教学方法

作为未来学习者社会实践领域内的教育项目探索，美育项目元所面临的教学对象应跨度最大，从最早的幼儿教育到18+教育，是终身学习的重要领地。基于此，以上美育元素和教学方法可以按照学生的年龄进行灵活组合调整。按照美育内容和教学方法的差异，学生年龄总体可以粗略分为2-4、4-12、12-18、18+四个阶段。该四个阶段划分的另一参考因素在于儿童视觉成长发展中对应的涂鸦、形象、构成以及表现四个阶段。这四个阶段也与整个西方美术史演进潮流的总体趋势相契合。

美育不局限于艺术，但艺术确实是实施美育的重要手段。因此，美育项目元的知识模块参考艺术的分类，以确保知识的完整性。“想象力”美育以时间类、空间类、时空类艺术分类形式为参考，涵盖以上分类下的所有艺术形式，即音乐、文学、诗歌、绘画、建筑、雕塑、戏剧、影视、舞蹈等。

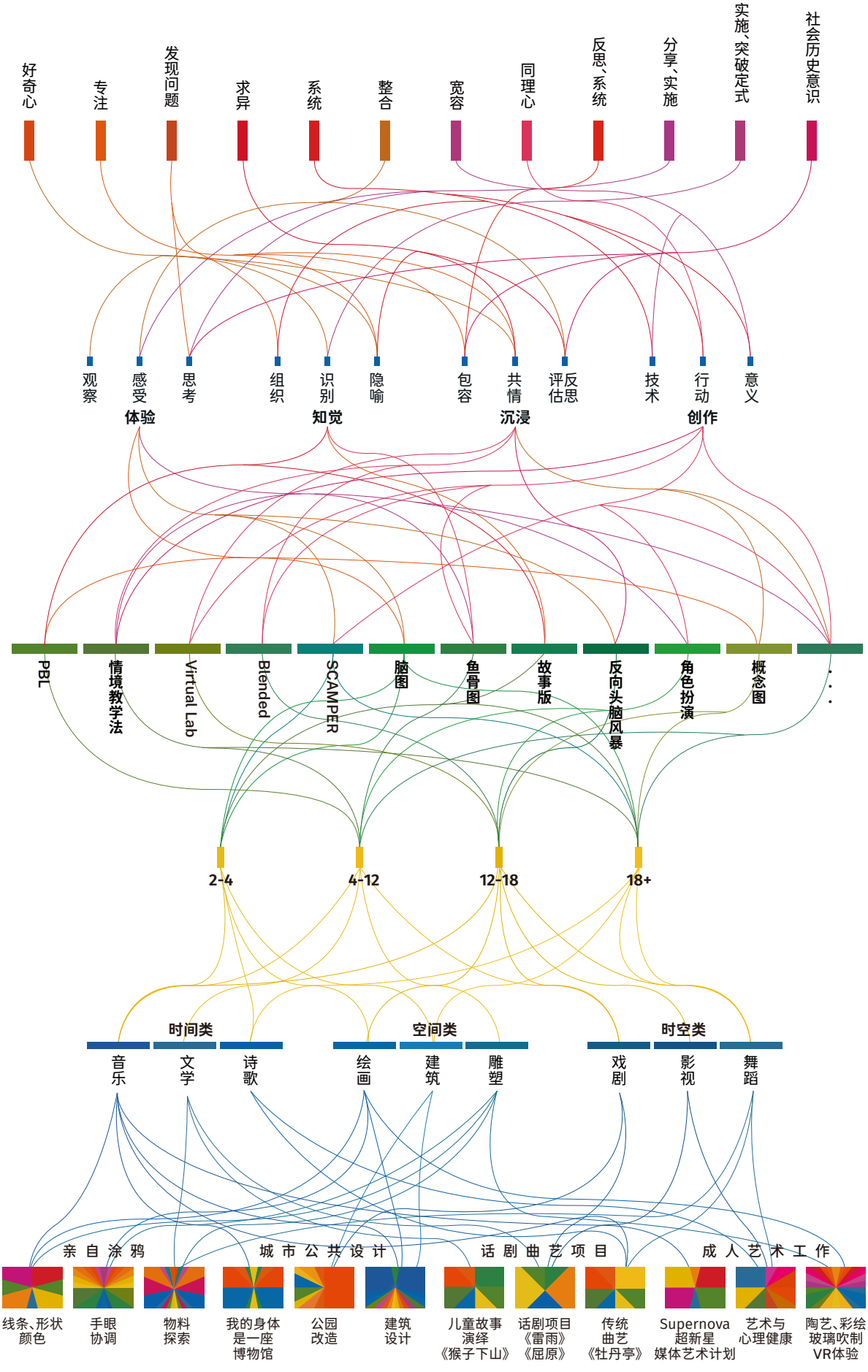


表17 美育项目元生成机制

美育PU课程模块

美育课程模块以及每一个具体PU的生成均结合C+M+Y+K的各项要求：按照美育四大核心元素的要求，即体验、知觉、沉浸、创作的要领，关注观察、表达、关怀、形式创造四个维度；结合年龄跨度，考虑幼儿、中小学生、成年人的不同要求以及艺术知识分类，美育课程板块分为亲子涂鸦、城市公共设计、话剧曲艺、成人艺术工作坊四个课程模块。

在具体的课程形式上，每个课程模块下均设置长期性的常规课程以及短期体验课程。这意味着给予学生较大选择空间，学生可以选择长期跟课，学习一项专门化的技艺；也可以随时加入或随时退出课程，获得短期但专业的艺术体验。由于艺术形式的丰富多样性，PU案例集可根据实际教学不断丰富充实。每个PU的形成均考虑C+M+Y+K 各个因素的排列组合。以下PU仅为示例：

（1）亲子涂鸦

幼儿是活跃的学习者。孩子进入涂鸦期，喜欢涂抹线条来表达个人的欢愉之感。课程重视学生作品中出现的形状及其象征意义，纪录学生个人初探视觉艺术的快乐和认识世界的过程，帮助孩子开启进入艺术世界的大门，踏出关键的第一步。

课程鼓励学生不断尝试，在尝试中获得初步的自我认同感。围绕各种刺激感官的创作主题，专业艺术家和指导教师共同带领学生进行自我和群体探索、认识世界、表达自己，与外部世界间展开初步互动。课堂中，学生将接触不同的视觉元素、组织概念与创作媒介。对于低龄幼儿，可适度要求家长陪伴。

（2）城市公共设计

儿童是城市生活的重要参与者，但儿童在城市生活中的发言权往往容易被忽视。

*城市印象

学生将享受以艺术为主题的城市绘画之旅。在专业艺术家指导下，学生将穿行在城市中，抵达一些绘画地点。可以为学生提供素描本、铅笔、钢笔和水彩画等工具，学生也可以根据自己的意愿尽可能多地利用艺术家的指导。

通过这种特殊的体验，学生可以寻觅绘画地点的过程中，以不同视角发现城市。在专业艺术家的指导下，学生最终以不同的形式与城市日常风景“合影”。

*公园改造

公园改造融入了深度观察、技术练习以及方案设计等综合能力。技术练习注重绘画技巧训练，协助学生更自如地把想法视觉化。 课程设计讲求理解、观察、手眼协调以及各类视觉元素的组织，引导学生领悟视觉构图所承载的意义，提升学生表达力。年龄较大的学生注重对细节、结构、解剖、比例和透视（一点，两点和航拍）的训练，从而加强绘画技巧。

另外，课程备有丰富多样的物料与媒介形式，如石墨、炭枝、木颜色、水彩、塑胶彩及混合媒介，提供各色其式的创作体验，达至纯熟技巧。

对于现代儿童来说，电脑绘画从未如此简单易懂。学习使用数码媒体作为工具，可以有效地帮助学生创作。该课程将帮助学生学习一些领先的数码绘画软件，例如Clip Studio P-aint、Procreate 等。透过学习数码绘图的概念和工具，让孩子们更容易掌握和使用其他类似的绘图软件。

学生在真实的城市公园环境中运用设计思维来解决问题。通过现场观察和视觉研究，用他们的感官——视觉、听觉、嗅觉和触觉来探索研究地点，作为公共设施和空间的研究者和设计师参与其中。学生通过参与式设计学会了批判性思维。在自然和设计思维的启发下，学生在参与公共设计的过程中体验到了建设性的创造力。

（3）话剧曲艺

戏剧课程以阅读剧本和戏剧表演为主。每个参与的学生都将品读莎士比亚戏剧、《牡丹亭》《茶馆》等适合自己年龄的中外名剧，并且在艺术家的指导下共同合作，进行表演。学生将亲手制作或采买服装道具；学习戏剧技巧，包括舞台精神或如何作为一个行动整体；将技巧纳入自己的戏剧活动中。

通过戏剧课，学生们想到戏剧将不再只是文字，而是融入生活、刻入脑海的人类文化集成。

(4) 成人艺术工作坊

*词曲创作

在词曲创作课上，学生将体验严格专业的创作过程。在专业作词家和作曲家的指导下，围绕一个主题或者从一个角度出发，学生结合自己的感悟，创作出属于自己的歌。约10个课时后，学生能够向他人分享自己的作品。对于所创作的代表性歌曲，可以由专业乐团或专门艺术家在年度音乐会上表演。

词曲创作课是一个了解学生经历的窗口。更为重要的是，词曲创作课能够通过标准化的教学丰富写作经验，通过学习歌曲所需词汇、角色成长故事、合作技巧和音乐流派知识等综合提升学生艺术素养。

*艺术心理与健康

在现代快节奏和高压的社会中，人们面临着越来越多的心理健康问题。焦虑、抑郁、压力等成为生活中的常态，影响着幸福感和生活质量。然而，艺术治疗是一个强大的疗愈工具，能够利用创造力的力量，为心理健康带来积极的影响。

通过绘画、音乐、舞蹈、写作等艺术媒介，帮助个体表达内心感受、释放情绪，并促进自我认知和成长。这种疗法的核心理念是：通过艺术创作，人们可以找到自己内在的力量和智慧，从而应对生活中的挑战。在艺术治疗的过程中，艺术家与学生紧密合作，共同探索和理解艺术作品背后所隐藏的情感和意义。

*“一日艺术家”

一日艺术家强调短期艺术项目的体验活动。这一课程内容可根据实际资源进行无限扩充。以下仅为一些示例：

VR沉浸式光影体验：

基于全息投影技术打造的视觉空间，将艺术品与墙面投影、地面投影融合，结合裸眼3d视觉技术和动作捕捉系统，用户仿若穿越时空般，感受身临其境的视觉观感。

陶器课：

与粘土接触，用自己的双手改变材料并创作形状。陶器课的目标在于使学生了解最古老的技术之一，使自己沉浸在古老陶瓷传统中。

时装改造：

采取创造性行动，通过探索重新定位，二次利用或时尚升级的方式来减少碳化。课程将采购或回收二手服装，然后通过添加或减少元素进行二次创作。学生利用服装和纺织品设计方法，将普通服装改装得有纹理感，层次感，立体感和时尚感。探索的技术包括织物缝纫和手工操作技术，如打褶，采集，抽褶和折叠；表面装饰技术，如贴花，串珠，绗缝和刺绣；和纺织品设计技术，如染料去除，基本块印刷和织物涂装。无需缝纫技能或纺织经验。

儿童书籍插图：

探索儿童书籍中文字背后的图像，从概念到人物的发展，从绘图到设计，从媒体应用到完成执行。本课程的参与者将发展自身的绘画和设计技巧，通过图像来解释和交流想法。

油画基础：

油画课程为学生提供了探索和理解这种挑战性媒介的机会。参与者通过完成以颜色、空间和体积的组合为核心的作品来熟悉油画。学生探索一系列静物和风景等主题油画，并现场了解绘制模型和人物的过程。配合插图讲座、博物馆参观和多次学生讨论项目补充课程内容，从而帮助学生掌握各种绘画应用技巧。

建筑设计概论：

使学生能够通过一系列的项目来探索建筑相关概念和作品内涵。课程讨论的重点是普通经验、日常应用、文化、审美是如何影响建筑设计，而学生则通过绘画、模型制作和鉴赏，获得具有创造性和严谨性的设计体验。

家具设计简介（焊接+金属制品）：

金属和金属加工比以往任何时候都更加成为当代家具设计的内在组成部分。从感性的、精致的现代线条到粗糙的工业框架，这种灵活的媒介可以提供创造性的解决方案，同时兼顾审美和实用价值。本课程通过焊接和金属制造的基本技术向学生介绍家具设计。学生接触氧乙炔和钨惰性气体（TIG）焊接，主要关注TIG。

美育PU教学工具表

课程介绍

姓名：

艺术品：

辅助材料：

年级：

课程日期：

思考

1 课程中的每项活动以及每一个探究性问题与所要研究的艺术品之间是什么关系？

2 课程是否包含CMYK美育元素？课程设计是发现性课程吗？

它是否包含未来学习者核心素养（探究、批判、协作、创造、关怀）？

3 在活动进程中，你准备了哪些与主题相关的开放性问题以促进学生反思？

核心问题

课程说明

详细描述将要开展的课程。描述课程中的每个活动，这些活动如何构建了完整的课程体验。

作为说明的一部分，请思考并写下每项活动的预计时间，以及活动中的引导性问题。

表18 课程介绍工具表

艺术品名称
艺术品 你在该艺术作品中注意到了什么？你看到了什么？听到了什么？
问题 你接触到该艺术作品后产生了什么问题？你好奇什么？
背景信息 这件艺术作品产生的社会、文化及历史条件是什么？
个人/课程联系 这件艺术作品与个人或课程间的联系是什么？
活动 你设想的体验活动是什么？请记录你的想法以备后续参考。
可能的探究线索 你想到的可能的探索线索是什么？请记录下来，注意最终的调查路线尚未确定。
核心观点 反思收集到的所有资料，确定核心观点。
探究线索 提炼核心观点要点，形成列表。

表19 美育课程设计指导表

实践
应用篇

让教育创新真实持续发生，
—πYiPai创新教育社区空间

1

一πYiPai源起

教育是一门实践的科学与艺术。一个对未来教育理念和未来教育语法的大胆想象，没有什么比落地实践、持续迭代更为重要的了。

2022年，一πYiPai在深圳创立，致力探寻教育在学校、家庭之外的更多可能性。一πYiPai以未来学习者素养（LFCF）培育为目标，以未来教育语法（CMYK）为方法指引，面向不同年龄段（甚至不局限于儿童青少年），进行了一系列素养教育项目和学习体验活动的设计与落地。

透过一πYiPai在过去一年多的探索和实践，CMYK教育研究团队看到了这一教育语法在社会化教育场景下的应用及作用。CMYK未来教育语法为项目设计落地提供了灵活空间，有助于打破学习边界，连结更广泛的社会资源，触达更广阔的知识范畴，让学习与真实生活、真实问题相互关联、相互启发。

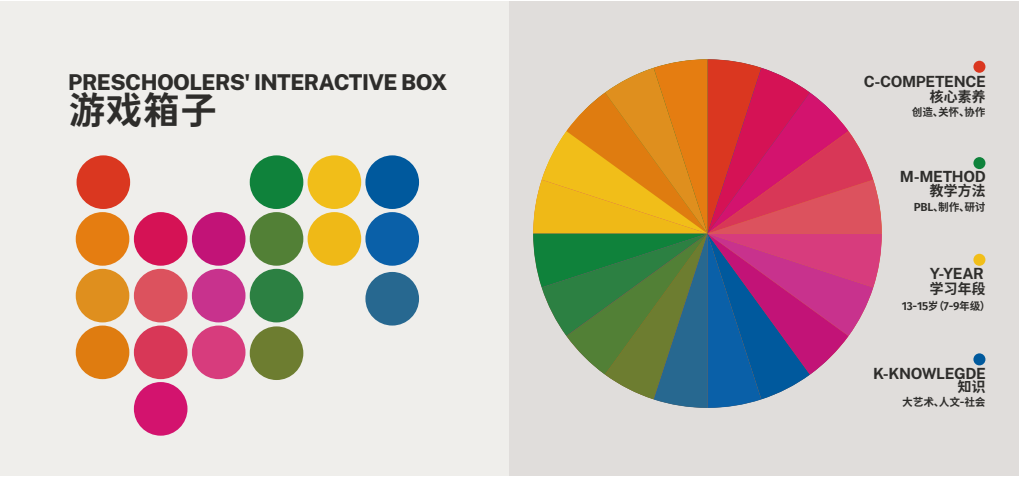
教育在未来，可以有更多想象与可能。

2

一πYiPai案例

在一πYiPai，我们以CMYK未来教育语法为方法指引，设计和开展了一系列教育项目元，培育未来学习者。下文将展示我们的部分教育案例。

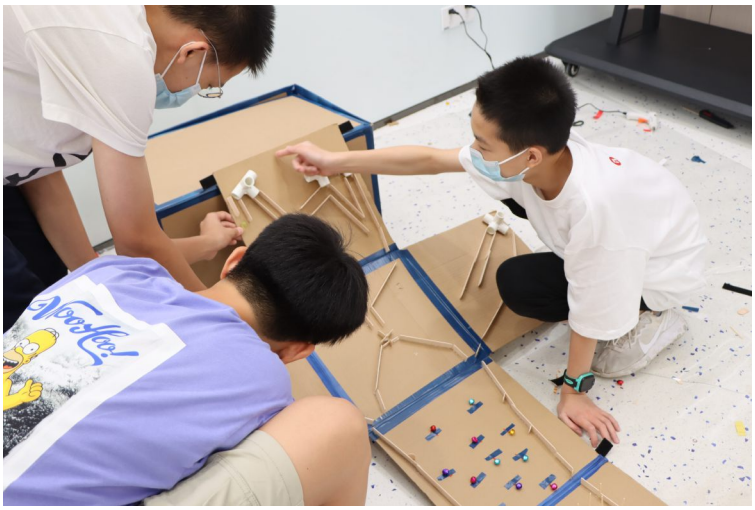
游戏箱子　　让大孩子看见小孩子，用小设计创造大改变



游戏玩具是孩子们成长中必不可少的物件，玩具带来的游戏互动在个人成长中往往扮演重要作用。对大多数孩子来说，买玩具、做游戏早已是习以为常的事。但如果将玩具和游戏的设计权交予他们自己呢?

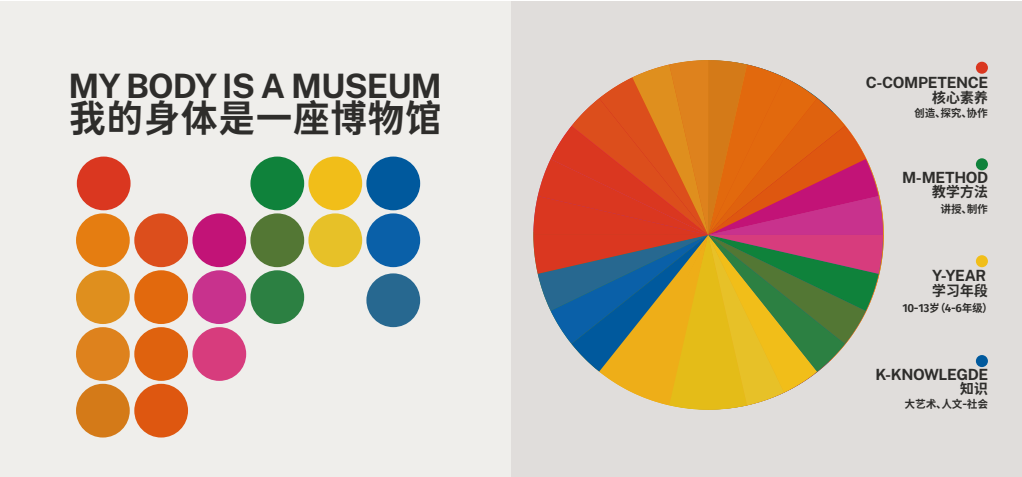
“游戏箱子”是一个融合了“设计+建筑+人文”多维学习体验的创新项目。一群13-15岁的大孩子，在专业导师们带领下，为3-6岁的孩童设计和制作一款能被收纳到指定尺寸箱子内的、安全且好玩的玩具。借此，学习者既深刻体验了产品从设计到落地的全链路工作，亦在与更年幼群体接触中习得同理心，理解设计与人的关系。

在项目导师的指导和陪伴下，“产品设计师”从零开始，学习产品设计思维、观察用户行为、研究材料、画图设计、产品打样与制作、讲演推广……历经一个完整的产品设计与制作流程，完成了从纸上创意到落地的实现。




客户体验：

我的身体是一座博物馆　　用诗与画，带领孩子感知自我、认识自我



诗是有声的画，画是无声的诗。

一πYiPai与插画艺术家、诗人木城合作开设诗歌与绘画儿童艺术工作坊，将诗歌与绘画融合，通过对内容创作方法的学习与训练，培养学习者在生活中主动观察和积累的习惯，学会发现美，提升绘画的审美与创作力，提升对诗歌的理解、欣赏与联想力。

该儿童艺术工作坊合共6期，每期紧扣一个学习主题，包括创意拼贴画、自然主题诗画、叙事诗与画、超现实视觉创作、自画像以及手工书制作，让孩童在写写画画以及动手制作中，体验创作的乐趣，开启对自我的探索与感知。

邓晗钥

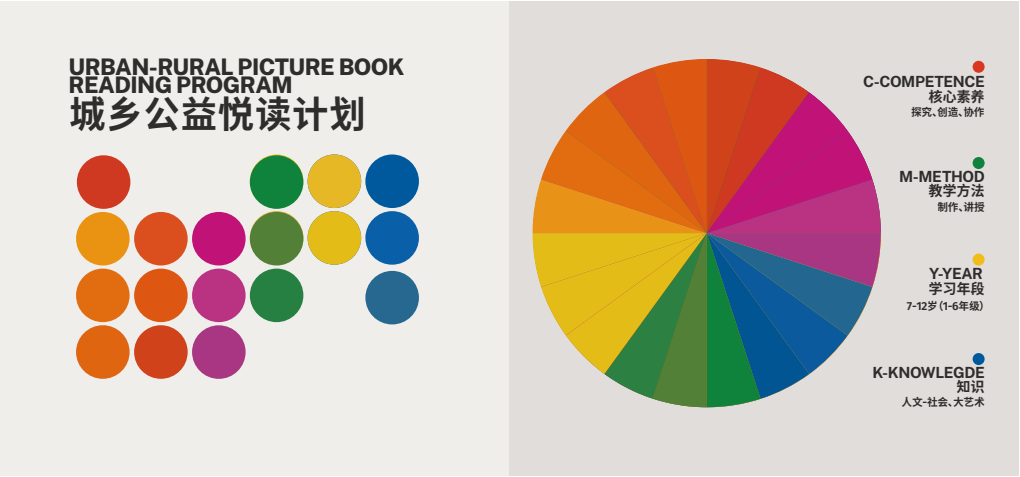
“地球很小，只不过和眼睛一样大。”

王安典

“百香果是雨林里常见的客人，它和芒果是一对好伙伴，可芒果又甜又软，百香果却又酸又硬，但百香果并不比芒果差，换一种方法，就甜了。”

城乡公益悦读计划

在绘本里，看见更大的世界



除了图画和故事，绘本里还藏有什么？

无论人工智能或数字技术如何深度改变教育，阅读作为一种学习方法或是一种思维方式，抑或一种生活习惯，依然具有不可替代的重要性，甚至比以往更为重要。

一πYiPai 与公益阅读机构联合开展“城乡公益悦读计划”，为不同年段的孩子们提供互动式阅读项目，带去不一样的绘本选择和阅读体验。在阅读绘本中的图文内容之外，导师们结合绘本内容拓展和衍生有趣知识和活动，先让孩子们走入绘本的小小世界，又指引他们大胆跳出来，去学习和理解绘本之外的世界，从而让阅读变得更加生动和立体。

例如，该项目依托绘本《漏》，面向1、2年级的孩子，创造一次又写又画的忙碌学习，让孩子们借助绘本的故事脉络撰写舞台剧《漏》的解说词，了解毛笔和水墨画的相关知识，以及想象一下“漏”可能会长成什么样。

而《敲完这一杆》则从绘本与孩子们延伸到社会人文议题的对话，比如普法战争的历史，当时各方的军事模型；台球的历史和玩法，即兴来一场台球比赛，等等。

绘本《漏》
阅读项目

绘本《敲完这一杆》
阅读项目

1㎡可移动城市　　像工程师一样思考，让深圳“动”起来

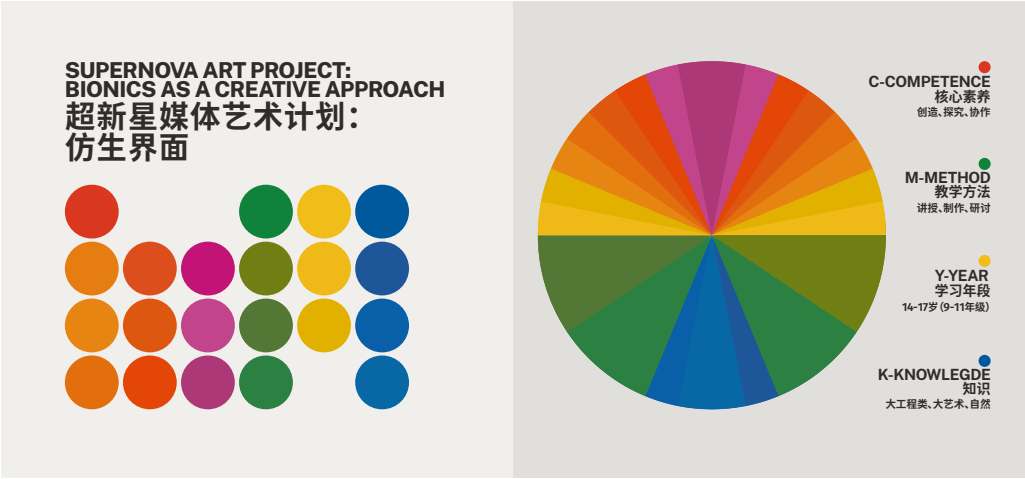
你是否想过，随着全球气温变暖导致海平面上升，在未来某天，深圳这座沿海城市也许会完全被海水淹没，那到时生活在这里的城市居民怎么办？全球气候、环境治理、人类生存发展……这些看起来有点遥远的问题，其实也可以转化到一个学习项目之中去。比如提出一个大胆的解决思路，让深圳动起来，《1㎡可移动城市》诞生！

该项目由一πYiPai专业导师联合建筑设计师共同开发和落地，他们带领着学习者实地探访深圳建筑特色和城市规划方案，学习工程师工作方法，大胆想象把城市浓缩到一平米的可移动空间上，打造一座“移动深圳”。

项目为学习者提供了综合知识与技能学习之外，还鼓励他们走进身边的社区，实地调研，帮助其收获多元视角，体验真实解决问题的方法。借助具体的学习项目，开启学习者对宏观社会命题的思考，以及力所能及的行动，感受学习的成就感。

Supernova超新星媒体艺术计划

以自然为灵感，
和艺术家一起共创媒体艺术装置



随着技术的日新月异发展，媒体艺术越来越普遍地存在于我们的日常生活之中，其创作灵感很大程度来源于人们对自然和社会生活的观察。而来自于生活的观察和创作，对于培养学习者的洞察力、批判力，强化思考和创作的内驱力是一个重要的机会。

“Supernova超新星媒体艺术计划：仿生界面”是一个将仿生学与媒体艺术进行跨学科组合的创新实践，由长期处在艺术创作前沿的艺术家们组成专业导师团，带领14-17岁青少年从自然中找寻灵感，用仿生学思维共创媒体艺术装置，去体会艺术与科技的共生关系，培育和养成创造、探究、协作等核心素养能力。

在这个项目中，仿生思维、结构制作、互动机械、造型纸艺……艺术家们为项目带来了前沿专业的视角与创作拆解，学习者也将通过这次独特的学习和创作经历，完整体验从一个媒体艺术作品从创意到制作，再到落地发表的历程。


To
Think

3

一πYiPai故事
设计师变身教育者的一次跨界尝试:“行动π”社会化导师赋能计划项目实录

3.1

一个假设:
各行各业都有人
愿意当“导师”

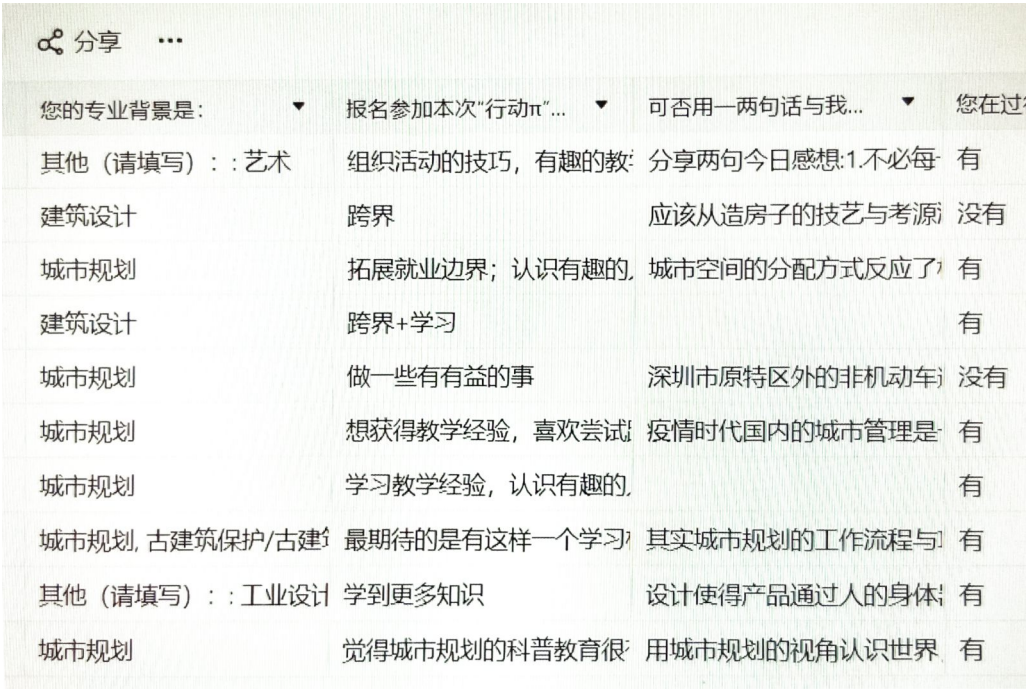
“赋能计划”项目的发起者翊人在成为一πYiPai的“内部导师”之前，原本是一名“典型”的建筑师——毕业于世界知名大学的建筑专业，后就职于建筑设计公司，并承担从方案设计到落地的各阶段任务。她在自己的空间设计领域里是“舒适安全”的，为什么会想要改行做“导师”？

翊人设计教育类空间时，经常需要与形形色色的合作方协作。好的设计可以改善人的生活，但她逐渐感到空间设计并不是最直接的影响人的方式：“有一间好教室不如有一位好老师”。假如我们只允许设计师把设计理念融入教室空间设计，但不允许设计师直接把设计相关的知识和观点分享给使用教室的儿童，我们不是失去了许多教育的可能性吗？她有一个假设：不同行业的专业人士如果都能有机会像她一样获得一套方法论去把自己的行业知识转化为有趣的活动，那么这些行业人士也会乐于把自己的知识与少年儿童分享，也会愿意成为一个跨领域的“导师”。

最初翊人也面临过来自内部的质疑，例如“如何准确地找到那些既有行业技能又对教育和活动组织有兴趣的参与者”以及“报名者是免费参加，如果参加了一半就中途离开怎么办”。

在“赋能计划”之前，翊人与艺术家、建筑师等“外部导师”多次共同合作组织过面向儿童的活动。这次她亦是与两位跨行业的“外部导师”（一位具有社区营造和规划研究经验，另一位具有历史研究和即兴戏剧经验）一同设计和执行了“赋能计划”。

针对第一个挑战，最终导师们通过非公开的方式从本地规划院等设计相关的工作单位定向招募到了11名符合条件的报名者，年龄从22到40岁不等，大多从事城市规划和建筑设计工作。参加“赋能计划”的报名者需要填写一个简短的电子报名表单，从回收到的报名表里，导师们第一次了解到他们的动机，动机高频词有“跨界”“学习”和“有趣”，可看出报名者多具有开放的心态。而大家“想要用一两句话分享的观点”则比较多元，有建筑师认为“应从造房子的技艺去认识建筑学本身”，有规划师提到“深圳原特区外的机动车道有非常大的改善空间”，而插画家的感想是“不必每一刻都文质彬彬”。



分享 ···

您的专业背景是：	报名参加本次"行动π"...	可否用一两句话与我...	您在过
其他（请填写）：：艺术	组织活动的技巧，有趣的教	分享两句今日感想:1.不必每	有
建筑设计	跨界	应该从造房子的技艺与考源	没有
城市规划	拓展就业边界；认识有趣的	城市空间的分配方式反应了	有
建筑设计	跨界+学习		有
城市规划	做一些有有益的事	深圳市原特区外的非机动车	没有
城市规划	想获得教学经验，喜欢尝试	疫情时代国内的城市管理是	有
城市规划	学习教学经验，认识有趣的		有
城市规划, 古建筑保护/古建	最期待的是有这样一个学习	其实城市规划的工作流程与	有
其他（请填写）：：工业设计	学到更多知识	设计使得产品通过人的身体	有
城市规划	觉得城市规划的科普教育很	用城市规划的视角认识世界	有

图：回收到的报名表

至于“报名者是免费参加，如果参加了一半就中途离开怎么办”的问题，导师们把“赋能计划”分成两部分，并做好了两手准备。第一部分活动尽量紧密有趣，占用一个周末共13个小时，参加者全程参与后可获得“社会化导师”的身份；第二部分则是由“社会化导师”们自愿参与，需由他们以小组为单位、利用业余时间与导师们共同筹备和落地一场面向儿童的公益活动。如果说第一部分是一个关于活动设计的小型PBL，那么第一部分加第二部分就是完成了从理论到实践的大型学习闭环。

第一阶段招募到了足够的报名者这个事实消除了大家的一部分疑虑，但外部导师看见报名表上“认识有趣的人”这类动机的时候，也半开玩笑地在共同备课会议上表达过担忧：是不是一部分人报名的主要动机是“交友”？他们会愿意进入第二阶段吗？翊人从对于“各行各业都有人愿意通过开展有趣的活动向未成年人分享自己的知识和观点”的积极预设依然有待被后续活动落地验证。第二阶段需要参加者主动投入，如确实无人响应，项目亦可以止步于第一阶段。

3.2

从台前走到幕后：为设计师搭建规划活动的“脚手架”

当一个人没有吃过面条的时候，他很难学会如何去做出好吃的面条。当一个人没有作为学员参与体验过PBL活动的时候，他也很难想象要怎么设计这样的活动。

当张美在周六早上进入一πYiPai的活动室参加“赋能计划”第一阶段为期两天的工作坊时，她其实并不知道什么是PBL，只是从同事那里听说有这个公益性质的项目，自己也“想做一些有益的事情”，于是报了名。当她发现活动一开始所有人需要在空教室站成一个圈一起玩即兴戏剧游戏时，肢体显得有些紧张僵硬。到了第二天早上，她已然放松了很多，还尝试在游戏中成为“发起者”——根据游戏规则，所有人要在空地持续绕圈走，但一旦有人突然止步所有人就也要立刻原地站定，这个首先改变行为模式的人就是“发起者”。张美首先停了下来，随即发现所有人都停下来了，她喜欢这种“带头做事”的感觉。

后来张美在导师发放的资料包里找到了两页“辅助工具-游戏使用说明”，里面介绍了多个即兴戏剧小游戏的玩法，更重要的是介绍了每个游戏分别可以达到的目的，例如“让受众更专注”或者“通过游戏计量受众某方面的认知”。经过导师的介绍，张美明白了带领学员做小游戏也可以是教学活动的重要环节，而了解游戏有哪些，以及分别有什么功能对于帮助她未来做活动设计是很好的参考。

图：发给每个学员的资料包

图：导师带领大家围成一个圈
冥想和做即兴戏剧游戏

张美需要先作为学员切身感受到即兴戏剧小游戏的助益，然后再站在活动设计者的角度、在工具包的帮助下考虑如何能在自己设计的活动中用好小游戏，这是“体验先行”这一原则的体现。在筹备“赋能计划”的时候，“体验先行”是活动环节设计的主要原则之一，而这个原则被运用在“赋能计划”第一部分活动的方方面面。

第一天上午参与者需要先完成一次微型PBL，即分组快速考察周围街道环境并就一πYi-Pai周边某牛肉粿条店的可达性问题提出解决方案。参与者们在这个微型PBL活动中突然与陌生人分到了同个小组——借此机会导师给大家提供和讲解了可用于梳理小组内部资源的思维工具。参与者们拿到一个让人有些摸不着头脑的待解决问题，自然会开始思考自己在为谁解决问题——借此机会导师给大家提供了梳理受众画像的思维工具。

在有了方案之后，参与者们需要互相分享和反馈——借此机会导师给大家介绍了冷热反馈规则（一种适用于互相展示环节的活动组织规则）。在这个看似和活动设计无关的微型PBL环节之后，导师们通过剖析这个微型PBL向大家介绍了活动设计初期要考虑的几个内容——参与者们理解了原来这个环节具备了“活动目的”“驱动问题”“所需资源”和“分享展示方法”这几个要素，而如果未来他们想要设计一个活动，也可以先从这几个方面入手去构思活动的内容。

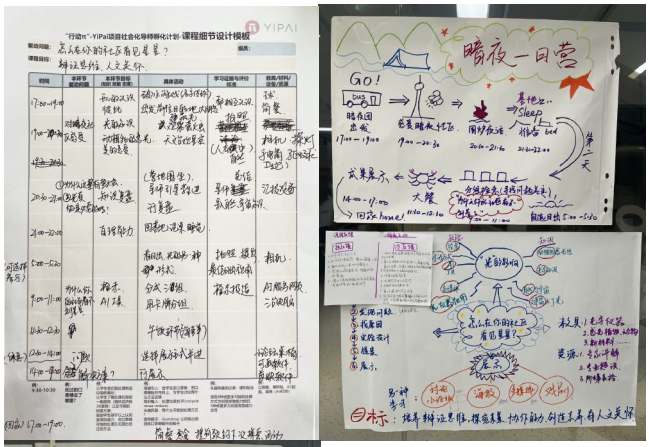
图：
第一天上午学员们
外出观察某粿条店
周边的环境

除了“体验先行”之外，“赋能计划”的另一个重要原则就是“以参与者为本”。这一原则也指导了“赋能计划”各个环节的设计和执行。

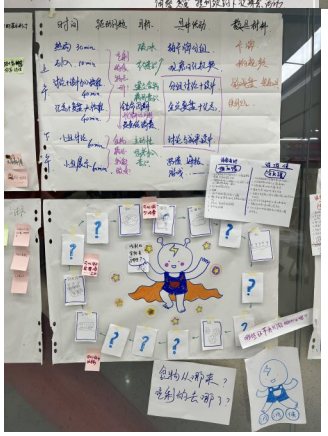
在筹备“赋能计划”的时候，导师们会根据参与者的职业背景和报名表填写情况来考虑环节设置如何能更加适配参与者本身的技能。例如导师推断“本职工作是设计师的参与者通常已经具备设计思维”，于是可能只需要向大家展示一张流程图，参与者就能大致对活动设计的步骤有所领悟。但想让大家了解“教练”和“最近发展区”等教学领域的概念，可能需要由导师提供详细的讲解和示范。在活动期间，导师也会时刻观察参与者在活动中的状态。例如当参与者疲惫的时候要及时带大家冥想休息，在小组讨论热火朝天的时候可以适当延长讨论时间让大家充分交流。

此外，导师虽然会抓住机会多鼓励参与者，但从不将自己的观点强加于参与者身上。每天下午，导师带着参与者一同进行反思复盘，参与者在导师引导下关注自己的状态、找寻自己心目中对PBL的定义。

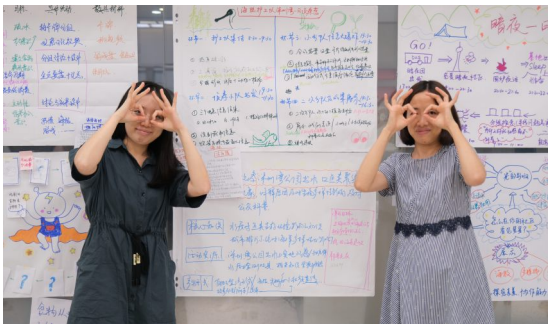
参与者们意识到原来组织落地一场PBL活动有点像是“在舞台上自导自演”，如果想为“观众”创造流畅有趣的体验，背后需要付出比想象中更多的努力去谋划每一个细节。第二天下午参与者们以小组为单位做出了三个初步的活动设计。从一开始的“不知道自己不知道什么”到两天后的“打开视角后还想要学到更多”，参与者们发现“组织和落地活动”对他们来说已经从复杂抽象的任务变成了“跳起来就能够到”的挑战。



图：参与者初步设计的活动“暗夜一日营”



图：参与者初步设计的活动“食物从哪来”



图：参与者在作品前合影留念

图：参与者与导师合影留念

3.3

进入到教育语境: CMYK帮助把“项目”转化为“项目式学习”

每个人各自独特的经历和观点往往被局限在职业场景里，直到他们进入“赋能计划”第二阶段的共同备课会议。一些观点在备课会议上突然被提出来，自此“破圈”，进入了教育语境里。

翊人的工具给了导师们规划活动的“脚手架”，然而，这些项目还需要一个关于教育和学习的“脚手架”，把项目真正转化为一种学习。CMYK发挥了这种教学脚手架的作用，让设计师们的项目得以真正面向孩子、影响孩子。比如，运用素养C和知识K来为项目规划一个学习主题和学习目标。“社会化导师”李婷将 在“赋能计划”第一阶段认识的朋友蔡抒拉进一个微信群并将微信群改名叫做“旅行组”。 她有一儿一女，每次带孩子们旅游归来都发现孩子们其实对于刚结束的行程路线没有概念。作为规划师的她想要策划一个活动用于帮助孩子们决策明年暑假的目的地，规划自己的行程。她认为规划一个城市和规划一次行程的底层逻辑都是“要学会做选择，做取舍”。事实证明，这个主题对家长们很有吸引力，一πYiPai的运营同事将活动介绍发到 家长群后才不到半小时，12个学员名额就已经满员了。

经历了“赋能计划”第一部分的参与者们都获得了“社会化导师”的称号，但包括李婷在内的很多人并没有止步于此。“赋能计划”的三位导师在第一部分落地后通过线上会议向大家介绍了第二阶段的计划——请“社会化导师”策划并落地公益活动，期间由一πYiPai 提供运营、招生的支持，由第一阶段的三位导师陪同备课、落地和复盘，为大家“托底”，确保大家在这期间有所收获。

图:“社会化导师们”在第二阶段自发拉微信群讨论筹备活动的事宜

图：发给学生的“旅行手册”

又比如，运用CMYK工具理解和把握不同年龄、不同发展阶段孩子的学习特点，有针对性地规划项目，也有针对性地观察孩子。李婷和蔡抒把筹备旅行时要考虑的方方面面梳理成8到10岁儿童可以理解的活动环节，一同落地了时长两个半小时的“小小旅行家”活动。翊人和外部导师们坐在教室后排，用观察表记录每个学员在每个环节的行为，活动结束后也采访了学员对活动的感想。

在场的大人都能感受到“使用手机地图软件选择交通工具”环节显然是让孩子们最兴奋的环节，而观察表和采访记录也证实了这一感受。在这个环节里大部分学员都被记录到“显露积极情绪”“认真聆听”，至于被问到喜欢这个环节的原因时有学员回答“感觉很有用”“之前没玩过这个”。相比之下，挑选旅行目的地的环节是最“冷场”的——在后面的复盘会议上，导师们反思原因，意识到学员心中不熟悉国内旅行的常见目的地，尚未对这些地方产生“向往之心”，所以改善方法是让学员在挑选目的地前先花些时间展现不同目的地的魅力引发学生前去的兴趣，激发参与者挑选的主动性。

图：李婷和蔡抒带着学员们从地图上选择出游目的地

平均分（已去掉一个最高和一个最低值）	0=从不做到，1=偶尔做到，2=经常做到，3=总是做到						备注
	显露积极情绪（如专注和愉悦）	显露消极情绪（如走神、不耐烦）	与导师/同学主动沟通、认真聆听	不恰当的语言/冲突、消极回避沟通	认真、及时完成任务	缺乏紧迫感/难以理解任务	
示例：小组讨论	2	1	2	1	3	0	在同伴发言很长时表情不耐烦
暑假出游地回顾分享	2.22	0.38	2.56	0.13	2.20	0.33	表达非常清晰/认真听讲/(个别)家长没有上传照片导致没有参与
决策明年目的地+分享	1.67	1.00	2.00	0.38	1.90	0.78	想不出目的地/不愿意当众分享/分神/(个别)表达清楚
了解和选择交通方式	2.11	0.78	2.56	0.00	2.10	0.11	积极参与/感兴趣/(个别)坐不住
准备出行装备	1.78	0.67	2.56	0.13	2.20	0.44	能按要求完成贴图/不是特别有兴趣/完成后有些无聊/受同伴影响大
预算表填写	2.00	0.56	2.44	0.25	2.50	0.22	可以完成/不太专注/不完全理解
制定旅行公约与分享关键词	N/A	N/A	N/A	N/A	2.50	N/A	公约部分感到无聊/坐不住

图：活动各个环节的观察记录表

张美加入的小组落地了另一场活动“洪湖广场变变变”。这场活动是针对深圳罗湖区一处公共广场的设计改造方案举行的一场儿童议事会。参与这场活动的学员全都住在广场周边社区的儿童，由当地社区工作站招募。最终到场学员人数比预想更多，学员们针对广场的设计提出意见时也很踊跃。该小组的三名“社会化导师”加上第一阶段的两名外部导师共五人一齐上阵，方才引导着儿童议事会的议事员们把所有活动环节按计划完成。张美带领的小组有个别学员不断地发言，她不忍心打断发言的成员，然后发觉小组任务的节奏也稍微被打乱了。

张美在朋友圈里写道：“每一个小朋友都有自己独特的性格……维持想法五花八门的孩子们的纪律也很不容易。”另一位同组“社会化导师”陈琪也写下自己的感想：“由于时间被压缩所以节奏一直过于紧凑，常无法同时兼顾听课和组内讨论……但对于自己熟悉的（设计）领域的改造还是很有代入感的。”在后续的复盘会议上，“社会化导师”们总结道：“活动的环节其实可以优化顺序，避免学员需要频繁地在整体听讲和小组讨论之间切换。”

第二阶段活动的复盘会也给“赋能计划”第一阶段的三名导师提供了很多针对“赋能计划”项目本身的迭代灵感，例如“未来应当在第一阶段培训内容中增加控场的技巧和引导小组内发言规则的技巧”。

从“项目”到“学习”，从规划到落地，导师们也渐渐熟悉和熟练调动和运用CMYK语法工具，有意识地关注自己活动对象的年龄（Y）、活动所涉及的知识（K）和能够提升什么方面的素养（C）。CMYK的脚手架功能，帮助设计师变身“导师”、把“项目”转化为

“项目式学习”。

至此，翊人最初对于不同行业的专业人士会乐于把自己的知识与少年儿童分享的假设初步得到了证实。

图:学员就广场改造设计方案踊跃提出建议

图:活动落地后“社会化导师“们的感想

3.4

从一个人到一群人:“导师赋能” 永远在路上

即便各行各业里都有一些人愿意把自己的行业思维以创新型教学活动的形式分享给更多人，找到这些潜在的“导师”，让他们行动起来，理解活动组织者如何激发他人的兴趣，然后促成活动落地也不是一件容易的事情。

第一期“行动π”社会化导师赋能计划第二阶段在本文成文的时候仍在继续推进，第二期也正在被酝酿。发生在一πYiPai的每次活动可以有不同的主题、不同的学员年龄、不同的知识领域和不同的教学法，但不变的是持续的积累和反思。我们的愿景是在未来有更多的人因为“赋能计划”而聚集起来，形成一个人人都是学习者、人人都是内容产出者的可持续社群。当更多人愿意成为“导师”的时候，更多的行业边界和学习机会可以被打开。我们期待到那时，每个参与者都会收获更丰富的体验、也看见更美丽的风景。

注:张美、李婷、蔡抒、陈琪均为化名

展望篇

本研究是由陈一丹基金会领衔的未来教育项目最新研究成果。通过与北京师范大学的研究团队合作，我们在前期未来教育理论研究基础上，进一步推进了未来教育的实践研究。

未来学习者素养的培育需要“家-校-社”不同教育主体的共同合作，未来学习者螺旋成长态的形成也需要长期性教育投入，因而培育未来学习者的最好形式之一是在时间维度上贯穿其从儿童到成人的过程，在场域维度上贯穿家庭教育、学校教育和社会教育。这要求我们以家庭中的阅读力培育为学习者的早期成长奠定基础，以学校中的探究力培育给学习者的未来以真正的准备，以社会中的审美力培育持续激发学习者的想象力和审美力使之拥有人工智能时代不可替代性的人类品质。这些都是未来学习者的基本品格，也是我们未来教育理念的旨归。

概言之，亲子阅读是易得性高、实践性强，且受益终生的家庭教育方式，具有跨越阶层障碍实现普适性应用的特点。我们通过将基于阅读、家庭教育及心理学等相关理论，与CMYK的项目生成机制相匹配以开发亲子阅读项目元，从而为家庭教育提供尝试路径。

探究性综合实践是一门具有重要教育价值的课程，符合中学生的学习过程需求和认知发展要求，能够有效培育学生的探究力，使其具有解决真实生活的真实问题的能力。综合实践的特色是学生的经验性活动，在自主探究过程中学习知识的同时，能够将所学知识应用于现实生活情境之中，与传统的课堂学科知识传授形成有效合力。

在社会教育当中，艺术与美育因其普遍性、形象性、自由性等特性显现出了形式多样且受众广泛的优势。想象是艺术创作和美育的重要起点之一，同时，一定程度上又是终点，即艺术的一个关键价值是提高想象力和审美力，而不仅仅是为了训练专门技能。想象具有超越时空限制，给审美带来无穷快乐的特性。而未来学习者的核心特点正是无限生长可能性，尤其是在人工智能化的未来社会中，人类想象力具有不可替代性。

未来教育不止于想象，更在于行动。自2022年以来，我们已经开始在一πYiPai创新教育社区空间持续落地和迭代CMYK未来教育语法。阅读项目、探究项目和美育项目的实践与迭代，也将由一πYiPai开始实践，并持续辐射到更多教育场域之中。我们的主要形式是通过社会化导师赋能营项目，以CMYK未来教育语法为支持系统，为专业人士提供教学脚手架并开展相应的教学培训，从而有效指导他们运用脚手架面向学生展开项目教学，以期共同培育我们的未来学习者。我们相信，通过赋能营培养未来学习者的教师，能够使未来教育语法发挥更大作用，从而在更大的空间，面向更多元的人群，培育我们一代又一代的未来学习者，培育更多胜任不确定性未来的新人。

尽管未来充满了未知性，但是未来的不确定性，也意味着更多的可能性。易言之，不确定性使未来向各种可能性敞开大门：它对人类的创造力开放、对整个自然界的创造力开放，因此也向一个更美好的世界开放。然而，只有当我们准备好为实现这一目标而投入足够精力时，我们才有可能实现它（Immanuel Wallerstein，2001，p.4）。这也是陈一丹基金会持之以恒专注未来教育研究的动力所在，我们希望为探索和创建一个更加美好的世界而贡献一份力量，也期盼着与更多教育者一起行动，创造美好的未来。

TABLE OF CONTENTS

PREFACE

Future education is a significant educational issue, which is also a long-term concern of the Chen Yidan Foundation (CYDF). Since 2020, CYDF has carried out a series of research projects on future education and learners, establishing joint res earch teams to collaboratively propose the Learner for the Future Competence Frame (LFCF) and the Future Education Syntax (CMYK) to address the needs of future social development. To further arouse the concern of domestic and international organizations and scholars to future education, CYDF continues to promote the research on the application of CMYK, resulting in the creation of the report *How CMYK Shapes the Future: Action for Nurturing the Learner for the Future.*

1

Future education: the common concern of pedagogy and futurology

Human imagination about the future and the construction of responses to it have a long historical lineage. Future education, as an important aspect of this, has always been deeply concerned by the international community. Alvin Toffler, the founder of futurology, stirred strong reactions with his book *"Future Shock"* (1970), which believed individuals and society become victims of the impact of the future due to rapid change. Toffler firmly believed that "a coherent image of the future can also show us with valuable insights into today. We shall find it increasingly difficult to understand our personal and public problems without making use of the future as an intellectual tool"(Toffler, 1970, p.2) . Around the same period, educational science developed a new branch discipline "Futurology of Education", which aims to study the development trend of education, predict the future of educational development and explore the model of future education by using the basic theories of futurology. Nowadays, future education has become a global topic, drawing significant attention from various international organizations. Immanuel Wallerstein, an American sociologist, once remarked on the future of the world, stating that we are currently wandering through dark woods and have insufficient clarity about where we should be heading. He stressed the urgent need for a global discussion on this matter (Wallerstein, 2001, p.ix).

The global attention to future education from societies both domestically and internationally reflects the "globality" of this discussion. The Organization for Economic Cooperation and Development (OECD) launched the OECD Future of Education and Skills 2030 project in 2015, and put forward the *Learning Framework 2030* in 2018 to answer the question of how learners can survive and develop in the future world, and then released the *OECD Learning Compass 2030* in 2019 to develop a new learning framework and describe the abilities needed to shape the future generation. In recent years, the OECD has successively released research outcomes such as *Back*

to the Future of Education: Four OECD Scenarios for Schooling (2020) and *Trends Shaping Education* (2022) indicating the ongoing exploration and significance of future education. Apart from the OECD, UNESCO is also committed to researching future education. In 2019, it established the International Commission on the Futures of Education, aiming to reimagine how knowledge and learning can shape the future of mankind and the planet, and released the research report *Reimagining Our Futures Together: A New Social Contract for Education* in 2022. In China, future education is also an important and continuously evolving educational topic.

Objectively speaking, future education is facing various challenges. From a formal point of view, the rapid development of science and technology constantly impacts the traditional education model and differentiates it into various new forms. For example, the widespread application of online education has significantly transformed face-to-face teaching methods within limited space, time, and for limited groups. Correspondingly, the forms of knowledge organization, teaching methods, and teacher-student interaction have changed. For future education, the innovation of teaching methods is an ongoing issue. From the content point of view, with the rapid progress of human scientific research activities, the constant evolution and differentiation of knowledge present an endless trend, and the goal of preparing students for future careers and social life by learning as many subjects or acquiring as much as possible is challenged by the explosion of knowledge. The emergence of artificial intelligence and its rapid pace of evolution poses a profound challenge to human knowledge acquisition, that is, the important part of human learning has been disintegrated by the significant achievements of machine learning. All kinds of situations indicate the need for continual re-evaluation of the direction of future education to better address the challenges of future human society.

2

Learner for the Future Competence Frame (LFCF) and Future Education Syntax (CMYK)

In 2020, in order to better cope with the problems of future education, CYDF launched the LFCF project and cooperated with research teams from Beijing Normal University and the University of Helsinki in Finland to research future education and the cultivation of the learner for the future. In 2022, at the international education forum "Learning Ecosystem for the Future: Family, School, Society" hosted by CYDF, the team released the research report titled *Competence and Education of the Learner for the Future*. The report emphasizes that "connecting and creating future life" is one of the guiding principles in shaping education. To cope with the uncertainties of future society, education needs to cultivate "learner for the future" with indeterminate growth possibilities. The report further introduces the innovative concept of CMYK, aiming at providing a practical framework for the education of learner for the future.

Upon its release, the report attracted much attention from various sectors of society. In order to further enhance the practicality and applicability of CMYK, CYDF has shifted its focus to the application mode of CMYK. Targeting the educational ecosystem encompassing the realms of family, school, and society, we are working on constructing innovative educational project units, with the ultimate goal of providing resources for future educational practice.

3

Future Education Syntax: the generation mechanism of CMYK

CMYK, namely Future Education Syntax, is a set of interdisciplinary Project Unit (PU) development system guided by the learner for the future competence, providing a methodological foundation for the implementation of education of the learner for the future. This project development system contains rich and sustainably iterative secondary indicators, and the interdisciplinary PU is constructed through the internal elements of CMYK. In this process, the same sequence of PUs are interconnected to form a Project Chain (PC) and become an integrated whole. The PC constructed in different educational scenarios of family, school, and society will effectively generate a widely connected but open ecological education system. The concise formula is as follows:

PU = (Competence, Method, Year, Knowledge)

Competence is the core goal of the CMYK model. In the *Competence and Education of the Learner for the Future* report, we released a competence framework including five "Primary Competences" and thirty-first "Secondary Competences". This framework continues to serve as the basis for applied research in the future education syntax, and it is iterative in itself. Our goal is to continue envisioning and exploring the direction of future education, and prepare to add new core competences at any time to continuously develop the capabilities of learner for the future.

Method refers to the integration and application of various teaching methods based on PBL. PBL facilitates learning and development by engaging students in projects that solve real-world problems through a project-based learning approach that prepares them to tackle challenges in real life.

Year represents the learner for the future at different age stages, including children, teenagers, and adults. Due to their diverse cognitive processes and learning patterns, PU development should be adapted based on the learners' cognitive development stages and teaching demand models, optimizing the implementation effectiveness of CMYK.

Knowledge signifies the knowledge structure covering all disciplines, including major fields: major arts, major engineering, natural science and humanities & social sciences. K, as the practical material of PU, is generated based on specific situations and exhibits high flexibility.

When exploring the application modes of CMYK, we believe that three types of integrated educational actions are most important: reading, exploration, and aesthetics. To this end, we have established three PCs focusing on parent-child reading in the family, comprehensive practice in schools, and aesthetic education in society, which respectively focus on cultivating the reading ability, exploration ability, and aesthetic ability of the learner for the future. The following sections will delve into these three integrated educational actions and the practice modes of PC, applying the CMYK generation mechanism for PU development.

MODEL ECOSYSTEM

Ecosystem-oriented: CMYK in different educational scenarios

At the stage of pedagogical practice, the competences of the learner for the future will undoubtedly penetrate the implementation through crossover and integration, and be embodied in the model of integrated actions. We believe that in the cultivation of learners' key competences, the most important three integrated actions include: first,"reading"; second,"exploration"; and third, "aesthetics". The three are both crucial basic skills and essential educational actions that cultivate core competences. Moreover, they will run through all stages of each individual's life, holding significant value for lifelong development and serving as long-term goals of self-education. Their development entails an educational ecosystem that unites family, school and society, providing us with an educational world characterized by new time and space dimensions.

1

CMYK in family education scenarios: reading ability cultivation project chain

1.1

Cultivation of lifelong readers starts from family education

With the continuous improvement of civic quality and increasing emphasis on family education, how to cultivate future citizens who can adapt to social development through family education has become a hotspot of concern among parents, educators, and education researchers. Reading, as the most familiar, common, and approachable learning scenario in the family, plays a crucial role. CMYK attempts to provide new perspectives, models, and strategies for the transformation of family education and parent-child reading.

Early reading that implies the value orientation of cultivating lifelong readers for the future

Lifelong readers are mainly characterized by the strong interest in reading, excellent reading ability, and positive reading experience. Put differently, they enjoy reading and are good at reading. It is indispensable to cultivate children's early reading habits and develop their reading ability, to turn them into lifelong readers.

Parents are children's first teachers, and parent-child reading is a gift of love and wisdom from parents to their children. Parent-child reading is an interactive approach to early reading in which parents and children read books together by reading as a bond. In the early stages of life, parents support children in becoming interested in reading, developing reading habits, and improving the quality of reading through parent-child reading, which is important for children to gain problem-solving experience and meet future challenges. Specifically, the value of parent-child reading lies in two aspects, improving children's learning ability and enriching their future competences:

Parent-child reading can improve children's learning ability. Reading is an important window for children to learn about the world. In the process of parent-child reading,

parents and children share experiences and construct knowledge, cultivate children's learning qualities of listening attentively, exploring curiously, and speaking out boldly, improve their reading ability, and support children's learning in reading, so that they can talk, engage and interact with the real world.

Parent-child reading can enrich children's future competences. The intimate contact between parents and their children enables children to achieve whole-person development in a loving environment, where children can feel peace and pleasure, and enjoy the sense of meaning and happiness from reading, which helps them foster positive emotional experiences, develop sound personalities, and ultimately realize collaborative development of future core competences.

Important theories, development expectations and behaviors of early reading

Early reading theories involve important theories about when to start reading, the development stages of reading, and behavioral analysis. On the best time to start reading, there are two important theories, namely "the theory of reading readiness" and "the theory of emergent literacy". Educators holding the theory of reading readiness often believe that children are not cognitively, emotionally, or socially mature enough before the age of six and a half to benefit from reading instruction. A study, that examined over 200,000 readers from 32 countries, found that three of the top 4 countries in the world by reading ability do not allow children to receive formal reading education before the age of seven (Trelease et al., 2016).

However, the theory of emergent literacy has gradually replaced the theory of reading readiness since the 1980s. Studies have found that children's literacy begins to emerge in infancy and toddlerhood and continues to improve as they become more cognitively, emotionally and socially mature. Therefore, parents need to create a diverse reading environment, encourage children to actively participate in reading activities, and foster their interest in lifelong reading (Epstein et al., 2018).

To stimulate children's interest in reading and carry out warm parent-child reading activities, parents need to understand and have a good command of the analyses of the development expectations and behaviors of reading among children. By comparing and integrating guidelines on education and teaching at home and abroad, we classify early reading development into willingness to read and interest in reading, reading comprehension skills, and desire for written expression and initial skills.

Goal 1: children show a strong willingness to read and a strong interest in reading

3~4 years old	1. Ask adults to tell stories and read books. 2. Be able to feel the beauty of rhythms, and enjoy reading rhythmic chants and nursery rhymes. 3. Take care of books without tearing them up or throwing them out. 4. Be able to distinguish between two words with similar rhythms or beginning with the same pronunciation with support from adults.
4~5 years old	1. Read their favorite books over and over again. 2. Love to tell the stories they have heard or the books they have read to others. 3. Be interested in common signs and symbols in daily life, and know that they have certain meanings.
5~6 years old	1. Read books intently. 2. Enjoy talking with others about books and stories. 3. Be interested in literal symbols in books and daily life, and know that they have certain meanings.

Goal 2: children show initial reading comprehension skills

Words and print comprehension

3~4 years old	1. Be able to distinguish the similarities and differences between drawings and reading materials, and know that reading materials (books, etc.) have certain meanings.
4~5 years old	1. Begin phonological cognition, and be able to recognize the changes in the tone of words. 2. Understand the rules of reading and be able to demonstrate them in reading.
5~6 years old	1. Have an initial understanding of written language and prints. For example, understand that different prints are used for different purposes. Be able to recognize different parts of a book, such as the title page and the title. 2. Point to monosyllables when reading simple memorized text.

Goal 2: children show initial reading comprehension skills

Reading comprehension

3~4 years old	1. Be able to understand short chants or stories. 2. Be able to read pictures and tell what is and what is happening in a picture, among others. 3. Be able to understand that words in a book correspond to pictures therein and are used to express the meaning of pictures.
4~5 years old	1. Be able to tell the main points of a story heard. 2. Be able to outline the plot of a story based on the information provided by continuous pictures. 3. Be able to give corresponding emotional responses such as joy and worry as works unfold, and feel the emotions and feelings expressed in works.
5~6 years old	1. Be able to tell the main content of a children's literature work they have read. 2. Be able to guess the development of a story tell what will happen next or create a new story based on part of the story or clues in book pictures. 3. Be able to express their views on what they have read or heard。 4. Be able to initially feel the beauty of the literary language.

Goal 3: children have the desire for written expression and the initial skills to do so

3~4 years old	1. Love to express something by doodling.
4~5 years old	1. Be willing to express their desires and ideas through pictures and symbols. 2. Maintain correct postures when writing and drawing after being reminded by adults.
5~6 years old	1. Be willing to show a thing or story with pictures and symbols. 2. Be able to write their names correctly. 3. Maintain correct postures when writing and drawing.

Table 1 Development expectations and behaviors of reading

Based on the development expectations and behaviors of reading, we believe that the CMYK is good for parent-child reading to implement and develop, and has the following three advantages:

CMYK helps children build up reading interest and good reading habits. With the progress of society and the development of artificial intelligence (AI), television and the Internet have gradually become children's companions in their growth. This, coupled with the absence of a good reading environment or atmosphere in most families, has made it difficult for many children to develop an interest in reading or good reading habits. Given this, CMYK allows children to experience the love and wisdom in parent-child reading by developing interesting parent-child reading cases that fit children's life experiences.

CMYK helps parents establish a scientific concept of parent-child reading and foster parent-child reading strategies that take into account children's age and development characteristics. The questions of "when to read", "how to read" and "what to read" have been haunting parents, and the utilitarianism of pursuing quick results and the formalism of reading by fits and starts in the process of parent-child reading often make things worse, greatly reducing the popularity of parent-child reading in the family and affecting the quality of parent-child reading. Hence, CMYK provides parents with a wealth of multidimensional parent-child reading strategies to help them understand the age-specific characteristics of children's development, give timely and appropriate guidance to children, and support the all-round development of children.

CMYK helps create a favorable reading environment. For various reasons, the current objective situation is that parents often have no more channels to learn about reading instruction strategies. Based on this, CMYK creates a favorable environment for parent-child reading by actively advocating a scientific concept of parent-child reading and providing easily accessible guidance on reading strategies, building parent-

child reading places, and stimulating parents' enthusiasm for reading tutoring.

In conclusion, we hope that CMYK can help educators build a parent-child reading ecosphere involving children, parents, kindergartens, and society, cultivate children's reading interest and good reading habits from an early age through scientific parenting concepts and strategies, thus laying a solid foundation for the lifelong development of children.

1.2

CMYK and parent-child reading: development ideas and cultivation strategies

CMYK's parent-child reading methodology

CMYK explores integrative, developmental and flexible parent-child reading methods based on a combination of core ideas of theories such as the reading circle, zone of proximal development and graded reading. On this basis, through the characteristics of children's early development stage, based on the generation mechanism of CMYK, we have built a CMYK cube for parent-child reading.

(1) Basic reading theories

The theory of "the reading circle" was first proposed by Aiden Chambers in 1991 in his book *The Reading Environment*. The theory argues that each reading process is a circle that consists of four elements of activity, namely selection, reading, response and enabling adult readers with the ability to think and guide reading. After each element of activity is completed, the next activity will be introduced in a guided manner, thereby creating a circle.

Selection refers to the provision of a rich stock of books for children's reading, so that children can select the books they are interested in for reading.

Reading refers to in-depth reading, which means the process of reading needs to focus on the improvement of children's reading ability rather than superficial skimming, and should help readers gain something useful from reading comprehension. Response refers to children's emotional experiences with regard to what they read and the process of reading and is a process of reading internalization.

Enabling adults refers to readers with excellent reading ability around children, who can play a role in driving children to enjoy reading and be good at it in the process of reading or interacting with children.

It is worth mentioning that rather than a simple combination or tedious circulation of these elements, “the reading circle” is a process of continuously stimulating interest in reading, developing reading ability, and enhancing reading experience that is spiraling toward the ultimate goal of “creating lifelong readers”.

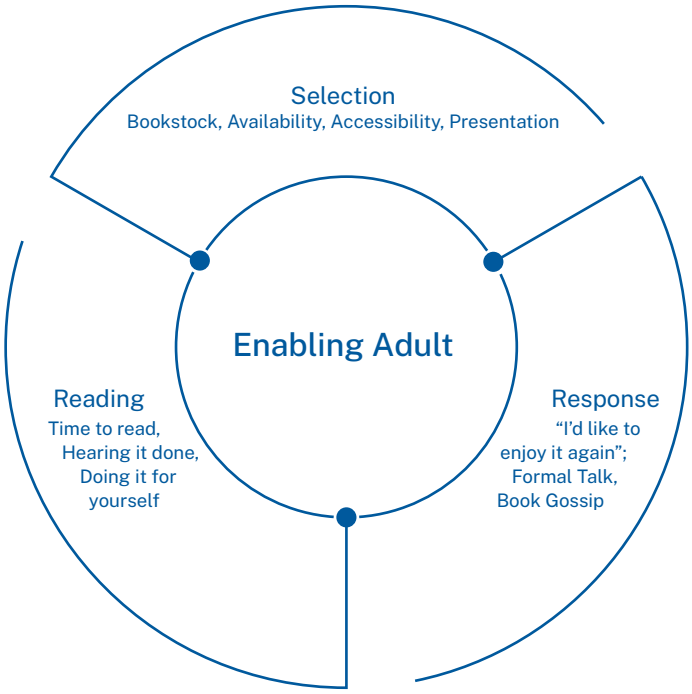


Figure 1 “The Reading Circle”

The theory of the zone of proximal development. Lev Vygotsky defined the zone of proximal development as the zone between “the current level at which a child can solve problems on his/her own” and “the potential level of development attainable with the help of an adult or a more experienced peer” (Vygotsky et al., 2004). According to Vygotsky, educators should focus on unlocking the potential of children, but not children’s specific levels of development. For this reason, parent-child reading should, through parent-child interactions, guide and help children to reach the potential level of development, tap the enormous reading potential of children, and guide children to gradually develop into lifelong readers.

The theory of graded reading. Graded reading refers to matching children with appropriate books and reading instruction based on the rules of the physical and mental development of children at different stages. It is a mature concept for reading promotion worldwide (Wang Yanyan, 2023).

Graded reading education systems have become a systematic and scientific paradigm for language education in many reading-developed countries and regions. For example, the Lexile Measures. By learning from graded reading standards in other countries and taking into account the realities at home, scholars have compiled the *Selection Criteria for Graded Reading Content for Chinese Children and Adolescents* and *Evaluation Criteria for Graded Reading Level of Chinese Children and Adolescents,* developed the *Student Literacy Assessment and Reading Evaluation* (SLARE) system, and introduced a series of graded reading books for children, to explore graded reading systematically. With the emergence of AI, Xu Shengguo et al. (2022) predicted that graded reading would become more and more intelligent and a deeper integration between AI and reading would enable accurate evaluation of reading ability and precise pushing of reading materials.

(2) Y-oriented: overview of children's early reading development stages

A review of the development stages, age characteristics and concrete manifestations of children's early reading at home and abroad reveals five main development stages of children's early reading, each with its typical manifestations. See the table below for details.

Y: Year	Age	Typical manifestations
Preparing Period $Y_{1\text{-}P}$	0-1 year old	1. Infants can distinguish between language and other sounds and have different responses. 2. Infants are born listeners. 3. At around 6 months old, infants bite, grab, pat or tear up books. 4. At around 8 months old, infants become interested in books and turn pages with their hands.
Embryonic Period $Y_{2\text{-}E}$	1-3 years old	1. Children are able to look at pictures and point to objects. 2. Children are able to name what is pictured. 3. At around 2 years old, children become gradually able to express themselves in complete sentences. 4. At 2-3 years old, children communicate with simple sentences.
Spanning Period $Y_{3\text{-}S}$	3-4 years old	1. Children are interested in reading and ask their parents to tell stories or read books. 2. Children listen patiently to their parents' storytelling. 3. Children are able to distinguish the similarities and differences between drawings and reading materials and know that reading materials (books, etc.) have certain meanings. 4. At around 4 years old, children are able to understand short chants or stories. 5. At around 4 years old, children are able to read pictures and tell what is and what is happening in a picture, among others.
Extension Period $Y_{4\text{-}E}$	4-5 years old	1. At around 4-5 years old, children express a desire to read together to their parents and peers. 2. Children are able to create simple statements by imitating those from their parents or books. 3. Children begin to express their willingness to share books they read together with their peers. 4. Children are willing to share and express the books they have read. 5. Children are able to give corresponding emotional responses such as joy and worry as works unfold and feel the emotions and feelings expressed in works.

Y: Year	Age	Typical manifestations
Comprehensive Study Period $Y_{5\text{-}c}$	5 years old and above	1. Children are able to read intently on their own, and also enjoy talking with others about books and stories. 2. When reading, children are able to comprehend simple storylines, guess the development of a storyline or tell what will happen next or create a new story based on part of the storyline or clues in book pictures. 3. Children are interested in literal symbols in books and daily life, and are willing to present things or stories with pictures and symbols. 4. Children are able to tell the main content of a children's literature work they have read. Children are able to express their views on the books they have read or the stories they have heard. 5. Adults are able to write and create literature. 6. Adults are able to gain a profound understanding of literature. Adults are able to develop a deep understanding of the original intention and background of literature and various metaphors and profound connotations therein. 7. Adults are able to develop a personalized understanding of literature by putting themselves into the literature. 8. Adults are willing to discuss their appreciation of a work of literature with others and are able to respect different people's understandings and expressions.

Table 2 Children's early reading development stages and typical manifestations

(3) M- and K-oriented: overview of children's early reading cultivation strategies

According to the purpose of parent-child reading, researchers have put forward a three-point early reading strategy: creating a rich reading environment, engaging in real conversations with young children, and having fun in the use of language.

Firstly, CMYK encourages parents to create an "environment" for children's reading.

CMYK advocates reading as one wishes anytime and anywhere. In the first place, parents need to provide their children with a wide range of suitable books, so that their children can select books they are interested in to read at will. Books should be as all-encompassing as possible and can be divided into five categories by reference to the five areas of development,such as health, language, social skills, science and

arts: books that give children viability; books that cultivate children's reading ability; books that address emotions and feelings; books that address nature and science; and books that enhance aesthetic experience. Books can also be divided by functionality into cloth books, die-cut books, pop-up books, paper books, graphic books, picture books and literature, and books with different functions should be provided to meet the needs of children at different ages. Second, parents may place book baskets at any corner of the house, or createa small study, so that books are within chil dren's reach and children can read at any time. Third, parents can read together with their children during quiet times such as before lunch breaks or after sports, or take opportunities to experience the wonderful time of parent-child reading before bedtime, to realize reading at any time.

Y: Year Recommended books	Year: Y
Y1-P	Cloth books, card books
Y2-E	Origami books, sticker books, die-cut books, point-reading books, picture books
Y3-S	Origami books, sticker books, die-cut books, picture books
Y4-E	Origami books, sticker books, Die-cut books, picture books, graphic books, pop-up books
Y5-C	Picture books, pop-up books, early chapter books, literature

K: Knowledge Recommended books	
K1-H	Books that give children viability
K2-L	Books that cultivate children's reading ability
K3-S	Books that address emotions and feelings
K4-S	Books that address nature and science
K5-A	Books that enhance aesthetic experience

Table 3 CMYK-recommended books for parent-child reading

Secondly, CMYK encourages parents to follow the reading "needs" of their children. Parent-child reading methods are extensive, flexible and situation-based. Common parent-child reading methods include reading aloud, sustained silent reading, interactive reading, playing games and role-playing. Among them, interactive reading covers the chanting of children's songs, point-reading learning and random instruction, playing games includes teaching-practice combination and game experience, while role-playing includes story play and cooperative play. Generally, a reading activity often uses one or more of the methods, so that children can improve their reading ability in reading and enjoy the fun of reading.

Finally, CMYK encourages parents to share the "joy" of children's reading. Yeats once advocated that education is not the filling of a bucket, but the lighting of a fire. In parent-child education, parents should focus on stimulating and cultivating children's interest in reading. On the one hand, parents need to set a good example by developing their own reading habits, guiding children to shift to reading from addictive activities such as watching TV and playing video games, stimulating children's interest in reading and supporting children in feeling a sense of satisfaction and happiness from reading in the process of parent-child interactions. On the other hand, parents can read to their children regularly according to a set reading plan, so that children can develop good reading habits from childhood. When reading, parents should pay attention to their pronunciation and intonation, and interpret the characters and plots in a story with their expressive voices to make the story fuller and more attractive. Last, parents should also actively answer the questions raised by their children.

The generation mechanism and cultivation strategies of parent-child reading PU

(1) The generation mechanism: the CMYK cube for parent-child reading

By integrating psychological, pedagogical and other theories, and in light of the goal of creating lifelong readers and children's early reading development stages and cultivation strategies, we have built the CMYK cube for parent-child reading, which is also the core idea behind the development of parent-child reading PU.

The cube is composed of the development of future student competences as the X axis, the areas of children's development as the Y axis, and activities such as selection, reading and response as the Z axis. In a single parent-child reading activity, one or more elements on the X, Y and Z axes combine to form a small cube. The elements on the X, Y and Z axes spiral upward as children grow older and enter the next development stages. Therefore, the cubes may end up with different volumes and shapes even though they are composed of the same elements in a single parent-child reading activity.

Meanwhile, changes take place both inside and outside a cube with the spiraling of its times. In the time dimension, continuous deconstruction, reorganization, elevation and upgrading will happen between cubes along the upward spiraling trajectory, and ultimately the cubes merge to form a colorful whole.

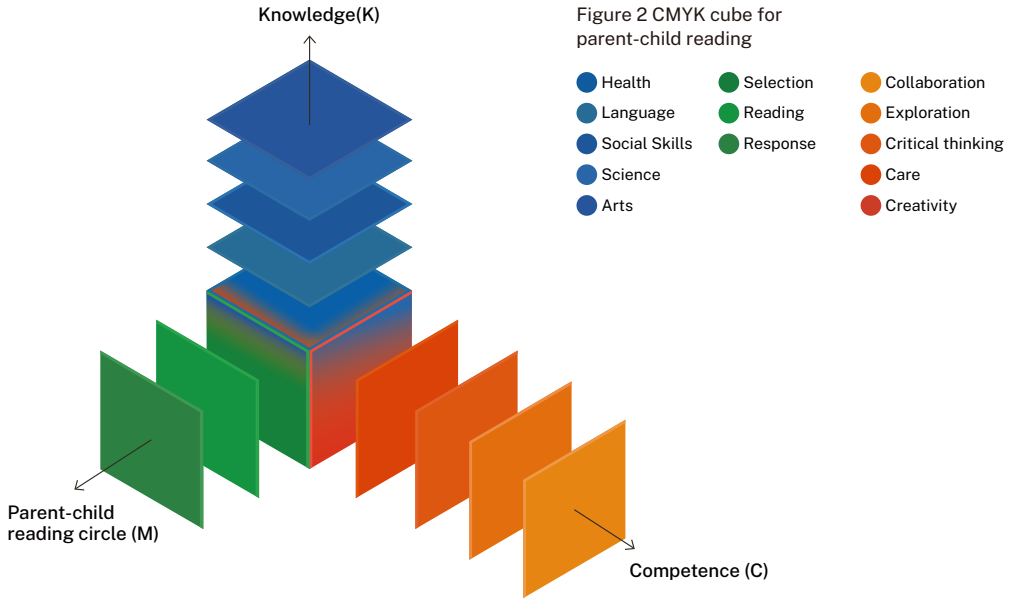


Figure 2 CMYK cube for parent-child reading

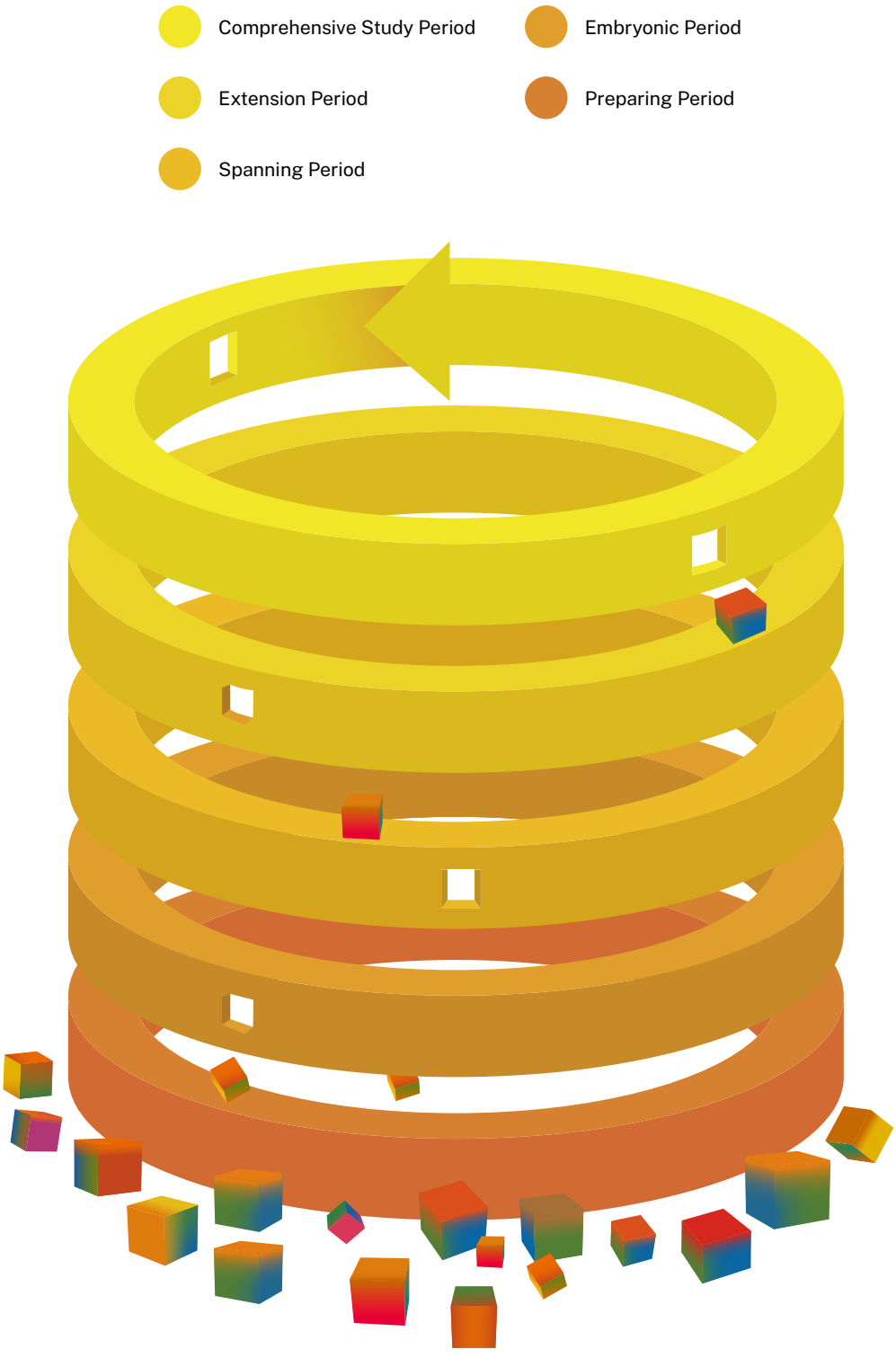


Figure 3 The growth of lifelong reader

By further decoding the CMYK cube for parent-child reading, the concept of CMYK will be more diverse and flexible in its practical application to parent-child reading. In the CMYK cube for parent-child reading, each element has the following connotations:

Competence (C):

$C_{1\text{-}C}$ Collaboration

$C_{2\text{-}C}$ Care

$C_{3\text{-}C}$ Critical Thinking

$C_{4\text{-}E}$ Exploration

$C_{5\text{-}C}$ Creativity

Method (M):

Parent-child reading circle:M_1

$M_{1\text{-}1\text{-}S}$ Selection

$M_{1\text{-}2\text{-}R}$ Reading

$M_{1\text{-}3\text{-}R}$ Response

Common reading methods:M_2

$M_{2\text{-}1\text{-}R}$ Reading Aloud

$M_{2\text{-}2\text{-}S}$ Sustained Silent Reading

$M_{2\text{-}3\text{-}I}$ Interactive Reading

$M_{2\text{-}4\text{-}P}$ Playing Games

$M_{2\text{-}5\text{-}R}$ Role Playing

Year (Y):

$Y_{1\text{-}P}$ Preparing Period

$Y_{2\text{-}E}$ Embryonic Period

$Y_{3\text{-}S}$ Spanning Period

$Y_{4\text{-}E}$ Extension Period

$Y_{5\text{-}C}$ Comprehensive Study Period

Knowledge (K):

K1-H Health

K2-L Language

K3-S Social Skills

K4-S Science

K5-A Arts

Further, we can present the CMYK cube for parent-child reading in a table according to the generation mechanism of CMYK:

C COMPETENCE	M METHOD		Y YEAR	K KNOWLEDGE
Competence: C	Parent-child reading circle: M_1	Common reading methods: M_2	Year: Y	Knowledge: K
$C_{1\text{-}C}$	$M_{1\text{-}1\text{-}S}$	$M_{2\text{-}1\text{-}R}$	$Y_{1\text{-}P}$	$K_{1\text{-}H}$
$C_{2\text{-}C}$		$M_{2\text{-}2\text{-}S}$	$Y_{2\text{-}E}$	$K_{2\text{-}L}$
$C_{3\text{-}C}$	$M_{1\text{-}2\text{-}R}$	$M_{2\text{-}3\text{-}I}$	$Y_{3\text{-}S}$	$K_{3\text{-}S}$
$C_{4\text{-}C}$		$M_{2\text{-}4\text{-}P}$	$Y_{4\text{-}E}$	$K_{4\text{-}S}$
$C_{5\text{-}C}$	$M_{1\text{-}3\text{-}R}$	$M_{2\text{-}5\text{-}R}$	$Y_{5\text{-}C}$	$K_{5\text{-}A}$

Table 4 Model of key competences in parent-child reading under CMYK

By focusing on the development stages and typical characteristics of parent-child reading for children, coupled with future student competences in CMYK, we have obtained the formula for the development of key competences in parent-child reading under CMYK:

$$N_1C+N_2M+N_3Y+N_4K=(N_1+N_2+N_3+N_4)CMYK$$

Where, $M=N_1M_1+N_2M_2$

The formula above implies that in parent-child reading activities, competence, method, year and knowledge can be freely combined. As children's reading ability and language development level continue to improve, their reading potential also becomes enriched, resulting in different feelings of gain and accomplishment from the comprehension and reading of books. In this sense, reading is a combination of the flexibility of the LFCF and the spiraling development of the reading circle, and is, therefore, a progressive and spiraling process.

(2) Cultivation strategy: parent-child reading project unit

Our reading activities pay attention to both progressive development and the integrity of the development. To further propel the practical guidance and utilization of CMYK in the field of parent-child reading, and cultivate lifelong readers, we focus on three goals: stimulating reading interest, cultivating reading ability, and enhancing reading experience. We flexibly assemble the CMYK elements based on the characteristics of different children's development stages to develop parent-child reading cases. According to the different development areas involved in parent-child reading activities, the reading activities can be divided into three levels: single area entering, dual areas combination, and multi areas integration.

Mode	Instruction	Cases
Single area entering	Parent-child reading activities are only started and unfolded through major experience in a single development area.	Develop cases of “Happy Reading”, starting from the area of language.
Dual areas combination	Combine major experiences of two development areas during the parent-child reading series activities.	Combine the area of science with the area of arts, and develop cases of “Color Changes”.
Multi areas integration	Major experiences from multiple areas are integrated into the parent-child reading series activities based on a certain topic.	While integrating the areas of language, science, arts, social skills, and health, we developed sample cases,like “King of Blowing Puffed out his Cheeks" and "Urban-Rural Picture Book Reading Program”.

Table 5 description of the development of CMYK parent-child reading project unit

Finally, based on the CMYK cube for parent-child reading and the three levels of parent-child reading generation, we can autonomously and freely generate highly practical parent-child reading project units from single area, dual areas, and multi areas perspectives. The three basic project units listed below are effective cultivating strategies for parent-child reading in practice.

Name of Cases		Happy Reading	
Reading Phase	Preparing Period and Above Age	Duration	5-30 minutes a day
Key Competence			
Collaboration: Listening **Exploration:** Curiosity; Concentration			
Learning Objectives			
Knowledge Objectives:	Enable children to feel the rhythm of sound and begin with initial exploration.		
Ability Objectives:	Cultivate a habit of listening, develop children's sensory perception, and gradually cultivate children's ability to read independently for children who are in the Spanning Period and above.		
Emotional Objectives:	Cultivate children's interest in reading, link positive emotional experiences with their reading, and enrich their early reading experience.		

Table 6 Single area entering

Name of Cases		Color Changes	
Reading Phase	Age Group of Embryonic Period and Spanning Period	Duration	1-2 weeks
Key Competence			
Collaboration: Listening to others; Effective communication; Sharing **Exploration:** Curiosity; Recognition of problems; Courageous and resolute; Concentration; Trial and error **Critical Thinking:** Reasoning; Clinging to difference; Reflection **Creativity:** Divergent thinking			
Learning Objectives			
Knowledge Objectives:	Enable children to distinguish different colors, get to know the three primary colors, and understand the changes in colors, as well as rainbows as a natural phenomenon.		
Ability Objectives:	Enable children to recognize different colors and explore different colors through combinations of colors.		
Emotional Objectives:	Cultivate children's interest in reading and stimulate their passion for beauty appreciation.		

Table 7 Dual areas combination

Name of Cases		King of Blowing Puffed out his Cheeks	
Reading Phase	Spanning Period and Above Age	Duration	3-4 weeks
Key Competence			
Collaboration: Listening to others; Effective communication; Positivity; Sharing **Exploration:** Curiosity; Recognition of problems; Courageous and resolute; Concentration; Planning; Trial and error **Critical Thinking:** Reasoning; Cling to difference; Refection **Creativity:** Divergent thinking; Traceability; Crossover; Integration; Break through the stereotype **Care:** Consciousness of duty			
Learning Objectives			
Knowledge Objectives:	Comprehend the characteristics and functions of wind.		
Ability Objectives:	Cultivate children's reading ability, enable them to share the stories they read with others, and enhance their ability of active exploration.		
Emotional Objectives:	Cultivate children's interest in reading, stimulate their curiosity in active exploration, and make them willing to share the joy of reading with others.		

Table 8 Multi fields integration

2

CMYK in school education scenarios: exploration ability cultivation project chain

Although there has been a call for innovative education and reform in teaching for a long time, ordinary school education, especially middle school education as the critical stage before university enrollment, mainly focuses on single-subject teaching of subject knowledge, emphasizing the static teaching and absorption of knowledge; Using exam tests and scores as the evaluation criteria for teaching outcomes, focusing on the goal of higher education, neglecting the potential and prospects of students' practical learning in specific experiential contexts, thus missing many valuable opportunities to cultivate exploration ability. Different from the traditional classroom model, "Comprehensive Practical Activities" can promote the development of students' exploration ability more effectively. Therefore, based on CMYK, we generate a "Comprehensive Practical Education" project unit made up of basic elements interdisciplinary integration, hands-on activities, and experience learning for the cultivation of exploration ability.

2.1

Preparing for the real future: an organic integration of exploration ability cultivation

The value and purpose of exploration-based comprehensive practice in school education

How to stimulate students' intrinsic and spontaneous learning motivation, and lead them onto the way of self-growth and self-development, to help them achieve better learning outcomes, is a core issue in school education.

Abundant research indicates that task-oriented goals focused on self-improvement in skills and knowledge are more beneficial for students' learning and growth than the use of "ability goal" evaluation. This is mainly because students oriented toward "task goals" can mobilize better learning patterns, including effective cognitive strategies, willingness to seek help when needed, more likely to engage in challenging tasks, and having a more positive perception of both the school and themselves as learners(Anderman & Maehr,1994; Ryan et al.,1997).

Besides, students also need "self-determination", but such needs are hardly met in established classroom teaching. The self-determination theory holds that students have three types of needs: the feeling of being capable; the feeling of being connected; and the feeling of being independent(Deci & Ryan,1985). Among these, the feel of being capable includes understanding and believing that one can achieve various results; The feeling of being connected involves establishing satisfying connections with individuals and social groups; the feeling of being independent involves initiating and regulating one's behavior. In traditional classroom teaching, it is difficult for students to obtain such a feeling of being independent.

"Comprehensive practical education" adheres to the rules of experience and is connected to real-life situations, which is more in line with the "task goal" learning orientation needs, making it conducive for students to gain a feeling of being capable,

connected and independent, further meeting the learners' needs of "self-determination", and result in comprehensively promoting the development of students' exploration ability, which is a highly effective and indispensable form of school education.

CMYK comprehensive practice theory

(1) The essence of comprehensive practice and its cognitive development process

Exploration-based comprehensive practice is a form of “new education” distinct from traditional school education. According to Dewey, this “new education” requires increasing individual expression and cultivation, freedom of activity, experiential learning, treating skills and techniques as means to achieve practical needs, and enabling students to understand the constantly changing world(Dewey,2015,p.6). Therefore, the essence of comprehensive practical education is a Dewey-style “activeoccupation”, which starts from the generation of “impulses” to “observing” various situations around, and obtaining “knowledge” of past events that happened in similar situations through recollection or advice and warnings from experienced individuals, and eventually infer their meanings by combining observation and recollection to make their “judgments”(Dewey,2015,pp.33-35).

Figure 4 Dewey’s experience learning model

The essence of comprehensive practical education also involves a Piagetian constructivism cognitive development perspective. In the process of carrying out comprehensive practical activities, individuals undergo the development from observing concrete phenomena in the world to a constructivist view of abstraction, which is also a development process from an egotistical self-centered view to a reflective internal cognitive model. This process is an interactive cycle between individuals and the environment, and the key to learning lies in the interaction between the adaptation process of a concept itself to world experiences, and the process of assimilating world events and experiences into existing concepts and patterns. On this basis, Kolb made out the basic learning process of experiencing activities, namely "experience, conceptualization, reflection, and action" as four steps in the basic continuous process of learners' thinking development(Kolb,2014,pp.34-35), and based on that, Kolb proposed the classic "experiential learning circle" theory, which believes that experiential learning activities include four stages:"concrete experience, reflective observation, abstract conceptualization, and active experiment"(see Figure 5).

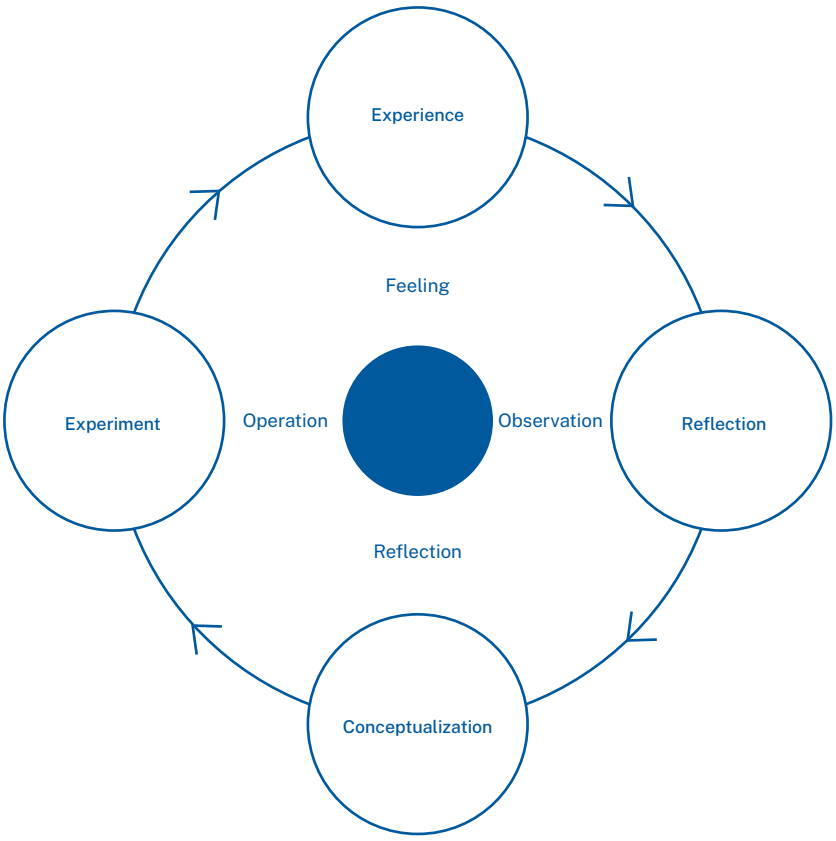


Figure 5 Kolb's experiential learning circle

The above theoretical analysis indicates that exploration-based practical education has four basic cognitive development processes, namely Experience, Observation, Conceptualization, and Experiment, which we call the EOCE horizontal theory for short. This theory shows that learners will go through four basic processes in the comprehensive practical education project unit to achieve the accumulation of exploration-based knowledge and the iterative development of cognition.

I. Experience stage (E)	In this stage, learners learn from special experiences, develop a strong feeling about people, matters and objects they come into contact with, and are willing to learn and motivated by the experience.
II. Observation stage (O)	During the activity, learners observe different behaviors of themselves and the team, actively record the problems encountered during the activity, learn to view problems from different perspectives, and begin to reflect on the problems preliminarily.
III. Conceptualization stage (C)	Learners need to break away from concrete experience and observation & reflection, jump into abstract thinking, carefully dig into the previously accumulated experience and observation materials, attempt to conceptualize the people, matters, and objects, as well as the knowledge and theories behind them they have experienced and observed, and structure their experience activities into systematic concepts, laying a foundation for their next actions.
IV. Experiment stage (E)	Learners review the project based on the results of the Conceptualization stage and reflect on a basic question:“How can we do better if we started over?” to discuss and experiment with various better ways to complete the project with the team and try to apply the findings to real-life situations.

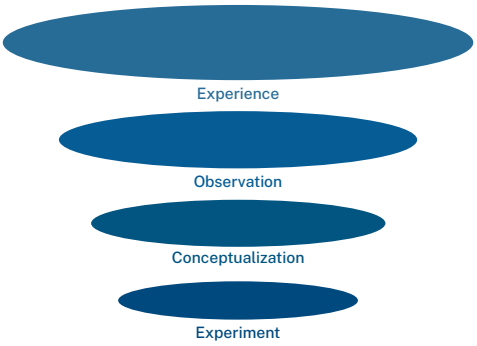


Figure 6 EOCE theory

According to the EOCE Theory, students will be able to conceptualize knowledge from concrete practical activities, experiment with their hypotheses, deepen their understanding of knowledge, build connections between subject knowledge and practical activities, and eventually learn to solve problems and apply knowledge in real life. The most important connection between EOCE Theory and CMYK lies in the bond between EOCE and the competences of the learner for the future.

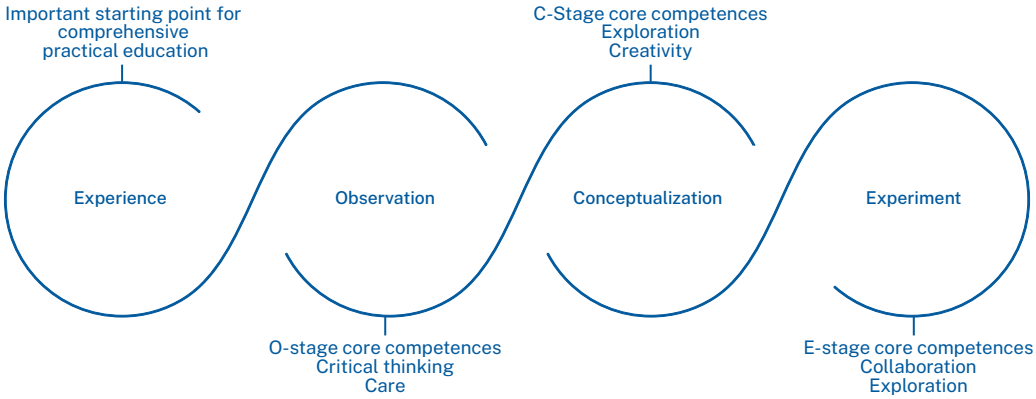


Figure 7 The relationship between competences of the learner for the future and EOCE theory

As shown in Figure 7, learners have wrapped up certain competences in each growth stage of comprehensive practical activities. Competence C and EOCE are complementary and interdependent. In the first stage - Experience, enabling students to obtain sufficient and concrete practical experience is an important starting point for project unit education. In the second stage - Observation, students should have

sufficient care for the real situation, be able to see and even be aware of the experience as a whole, and be able to tell right from wrong, and distinguish truth from opinions, which requires critical thinking on real experience. The third stage - Conceptualization is the abstraction of concrete experiences, students need not only to be able to review and explore the process of experience, but also have the creativity to conceptualize experiential facts. The fourth stage requires students to verify their hypotheses and promptly correct any biases and errors in their cognition. This stage also requires a high level of teamwork and continuous exploration during the experimental process to rediscover and solve problems.

(2) The spiraling generation state of CMYK comprehensive practice

The concept of the learner for the future believes that in the future education ecosystem, “spiraling” is the overall trend of the learning process. In other words, learners enter the system relying on their existing knowledge background, and promote the updating of intermediate states through various learning project units to achieve self-enrichment and growth in the ecosystem, while the “spiraling” of intermediate states has become the development pattern of the learner for the future.

“Spiraling” will also happen in comprehensive practical education. Kolb pointed out that experiential learning is a “spiraling process”(Kolb, 2012). In the Experiential Learning Circle, the end of a project cycle is the beginning of the next project cycle, which means that the cognitive development of the next cycle starts from the level of cognitive development in the previous cycle, as shown in the figure below for the cycling mechanism.

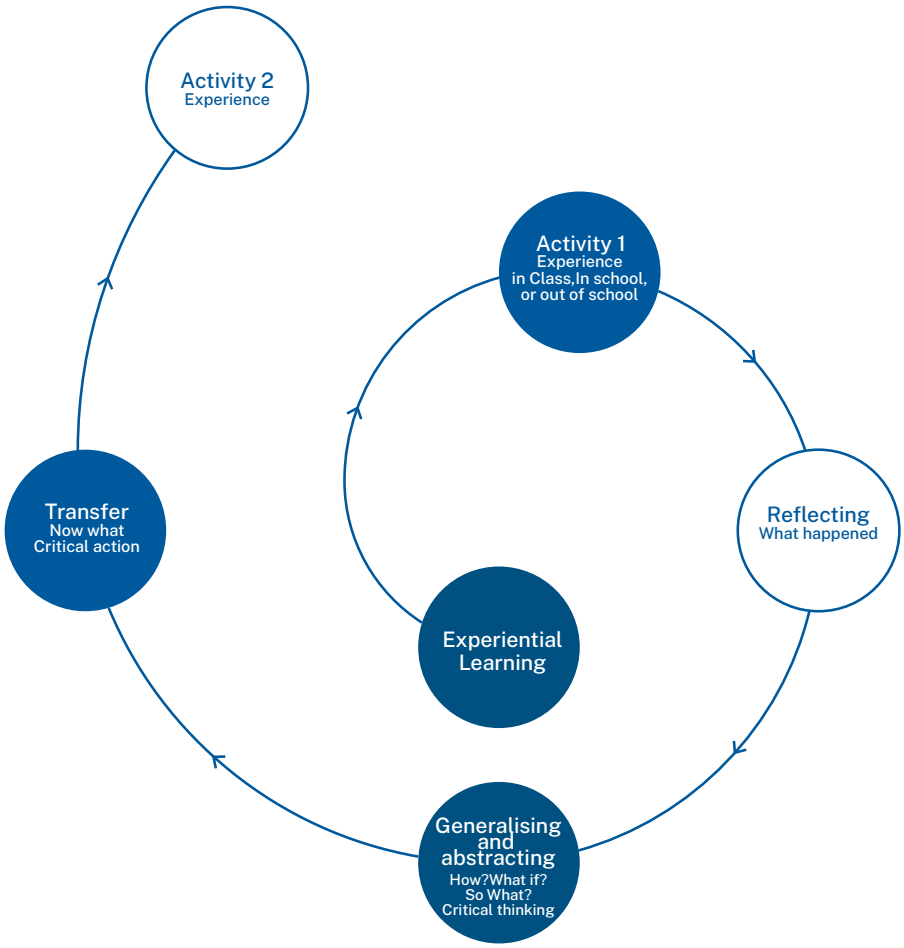


Figure 8 Cycling principle of empirical learning cycle

Therefore, the educational process of comprehensive practical education projects is not a fragmented single-project teaching, but a series of “up-spiraling” processes generated by cognitive logic. The richer the project levels there are, the faster the iteration of students’ thinking development will be. We encourage learners to think deeply, develop critical thinking skills, and continuously translate their learning into action through a series of periodic activities of project units. Ultimately, the comprehensive practical project unit keeps stimulating the spiral growth of learners’ exploration ability, as shown in the figure below.

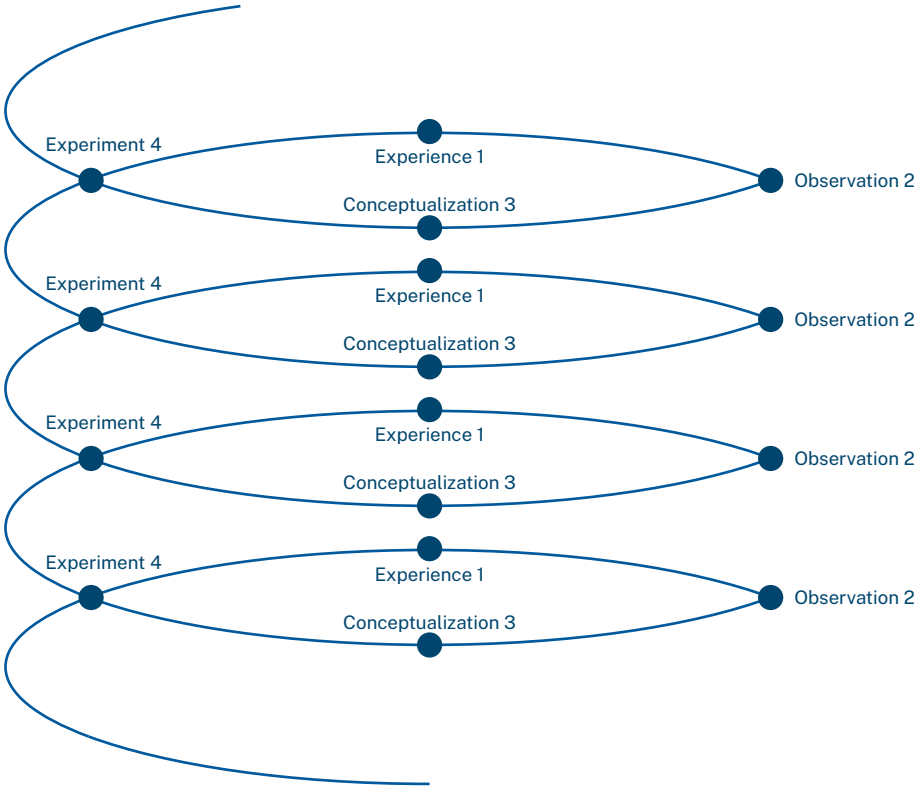


Figure 9 EOCE spiraling diagram

Through the above analysis, the CMYK comprehensive practice theory has the form of a horizontal-vertical theory, which takes EOCE as the growth base for learners’ cognitive development, and “spiraling” as the progress ladder, continuously cultivates and facilitates the development of learners’ exploration ability.

(3) Targeting K:STHEM knowledge model of comprehensive practice

In the context of school education,what disciplinary knowledge should be encompassed by comprehensive practical education? This problem cannot be solved through an encyclopedia list, but should rather consider the characteristics of comprehensive practical education for adaptive transformation. Project-based STEM courses which have both interdisciplinary and practical courses, can serve as one of the important ways to design comprehensive practical education projects. Meanwhile, STEAM education - the innovative form of STEM, incorporates Art into STEM education, emphasizing the importance of humanistic and cultural values, which gives us a way to organize teaching materials in dimensions such as subject synthesis, subject classification, and specific courses.

However, there are currently some problems with the education practical activities of STEM and its derivative concepts - STEAM courses in China, including a limited scale of professional STEAM teachers and weak curriculum integration ability. Other challenges include the lack of a support system for interdisciplinary STEAM courses and the formalization of STEAM course integration, leading to the narrow or generalized themes of projects(Li Xueshu,2019). In addition, the A course mainly focuses on humanities and arts subjects, lacking humanities and social sciences. But objectively speaking, STEAM education indicates the possibility of infinite extension of STEM education, which can integrate different disciplines according to social development needs to form educational reform forms such as STEM+ and develop more inclusive interdisciplinary comprehensive competency education (Li Xueshu,2019,p.62).

Based on the above background, we propose to replace “Art” with “Humanity” and creatively construct the STHEM model as the object of K to avoid the lack of humanities. The specific knowledge particles are shown in the figure below.

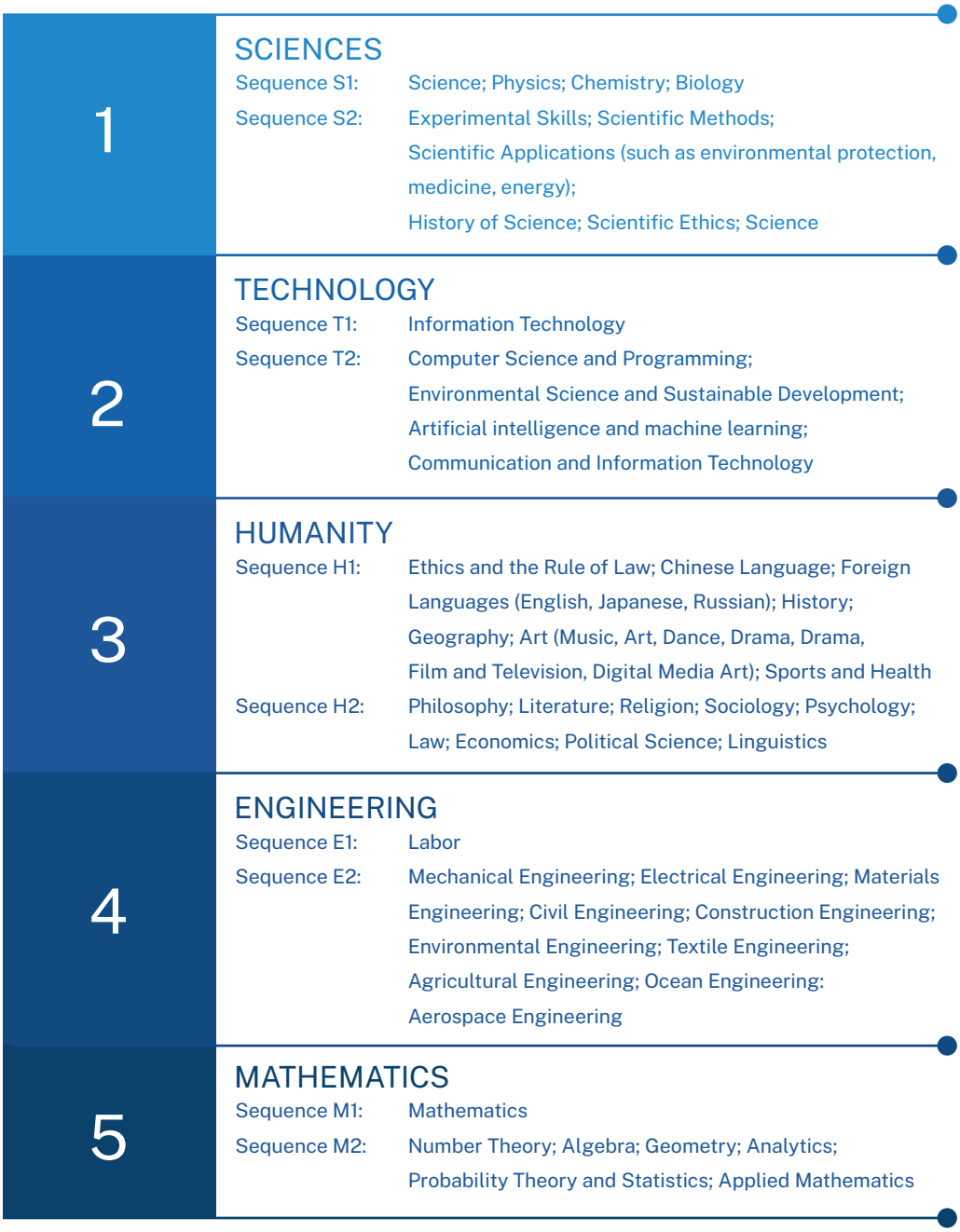


Figure 10 The STHEM knowledge model for comprehensive practice

More importantly, CMYK provides effective support for the design and implementation of STHEM interdisciplinary courses, while figuring out the lack of a support system for the practical activities of the existing STEAM education.

2.2

CMYK and exploration ability cultivation: development ideas and cultivation strategies

Development of CMYK comprehensive practice project unit

The development of the CMYK comprehensive practice project unit first should determine the theme of the comprehensive practice, and then develop the project unit based on the generation mechanism of CMYK. Next, we're going to interpret the development ideas of the project unit, taking the theme "life" as an example.

(1) The comprehensive value of the theme of "Life"

Choose "life" as the theme of the exploration project unit is because of the importance and educational value of the "life" theme. From the primitive life age between approximately 4.5 billion to 3.5 billion years ago to the current post-human age, the concept of "life" has always been inseparable from us. A learner for the future with indeterminate growth possibilities must be someone familiar with, comprehensive with, and even envisioning the past, present, and future of life and its forms of existence. Life is full-featured from microorganisms to the entire universe, requiring interdisciplinary knowledge to truly understand. Life is not a knowledge, nor a theory, but an ongoing practice, you can say that the meaning of life lies in the experience itself, while the interdisciplinary and experiential nature rooted in the comprehensive practical education is closely related to the theme of "life".

In addition, compared to the content organizational relationship of traditional school comprehensive practical activity courses, namely "Human & Self, Human &Nature, and Human & Society", the organizational relationship of the "life" theme will have higher dimensions and richer levels, which mainly comes from a new understanding of the forms of existence of life. In the post-human "Cyborg" stage featured in rapid development in technologies such as big data, artificial intelligence, digital ec onomy, digital governance, social media, bioengineering, genetic technology, 3D

printing, etc., the concept of "life" not only refers to humans and the living organisms in the nature, but also includes the new cognitive concept of life after the boundary between humans and technology, organic matter and inorganic matter disappears. For the human, artificial intelligence may surpass human intelligence to form overwhelming control over humans; the fusion of carbon-based life and silicon-based life may create new forms of "human" or semi-human and semi-mechanical life, which forces us to contemplate the issue of life forms in the post-human age.

According to the biophilia hypothesis, humans are born with a desire to connect with nature and other forms of life. Therefore, we break down the theme of "life" into three new sub-themes: Human & Society (understanding human life forms); Human & Nature (understanding the living organisms in nature); Human & Cyborg (understanding post-human life forms). As shown in the figure below.

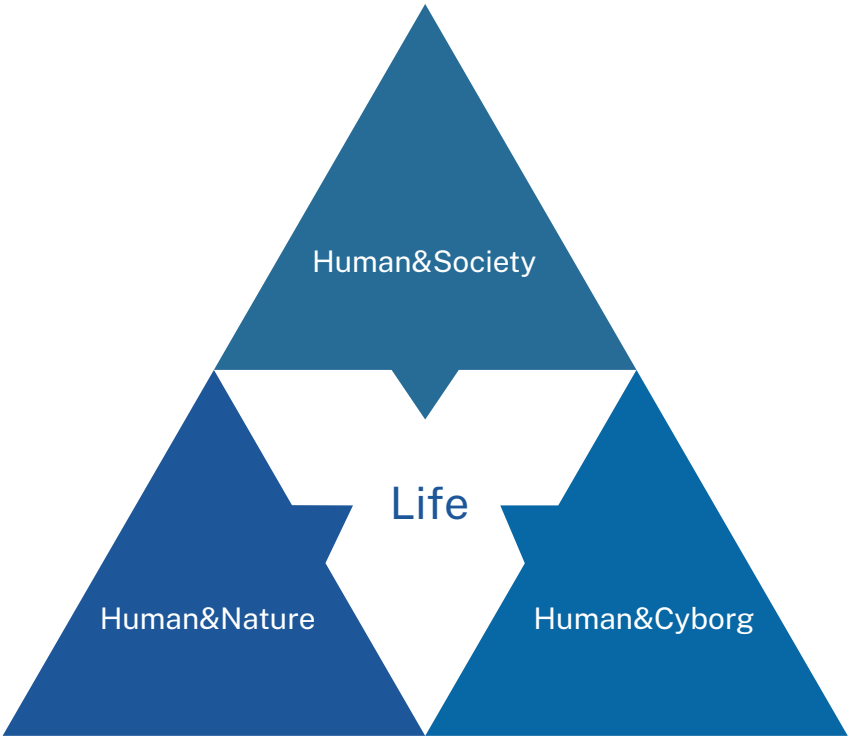


Figure 11 Structure of the relationship between human and life

Human & Society

Understanding human life forms is an important starting point for the theme of life. Human life not only exists as an organism, but also includes multiple parts such as physical, psychological, social, and spiritual aspects. Human life is not just an individual existence, but also includes the overall human society. Many famous philosophers and educators in history have been keen on analyzing the fundamental proposition of Human & Society from various dimensions. Besides, the proposition of Human & Society is anthropocentric. Here, anthropocentrism is not a derogatory term, but a choice that involves issues closely related to this life form of humanity, like the origin and evolution of human life, the formation and social establishment of human communities, and the possible fate of humanity in the future, etc. Therefore, understanding human life forms requires a thorough understanding of the essence of humans and human society.

Human & Nature

Human beings are a part of nature, and our survival and development depend on natural resources and the environment, meanwhile, human activities also have an impact on the natural environment. The interaction between human beings and nature has a value beyond “anthropocentrism”, making us aware of the power of life in nature far beyond human life, which is undoubtedly conducive to cultivating environmental protection awareness and promoting the concept of sustainable development. At the same time, the relationship between human beings and nature is mutually beneficial. A recent survey conducted in 18 countries showed that people living in green areas or coastal areas have a higher overall positive sense of happiness, and those who frequently go to grassy areas or blue spaces (coastal or inland) for entertainment activities also experience less psychological distress. Another study (White et al.,2021) suggests that natural smells, scenes, and sounds can effectively soothe our sense organs and help us achieve complete “presence”(Hasbach, 2022).

Human & Cyborg

According to Donna Haraway's definition, Cyborg is a post-human mechanically synthesized organism featured in combining mechanical, digital, integrated circuit operations with organic, biochemical, and genetic life experiences to give birth to a new type of organism (Haraway,1991,p.1). Although most people see "Cyborg" as a distant concept that occurs only in science fiction and literature, however, as new technologies such as mobile internet, virtual reality, and artificial intelligence gradually step into man's daily life in the early 21st century, we have already become a primitive Cyborg. Children who grow up surrounded by digital artifacts are no longer traditional, but "cyberkids", which is not only a practical problem to be faced in future education, but also an important practical exploration that must be faced by our comprehensive practical education.

(2) The CMYK education form and style of the “Life” comprehensive practice PU

The three sub-themes derived from life, namely human, nature, and Cyborg, are the basic thematic units for developing comprehensive practical education projects for life. According to the CMYK, converting these three thematic units into educational project units first needs to confirm the Methods, which are “Theatre in Education” for Human & Society, “Learning by Travel” for Human & Nature, and “Cyborg Education” for Human & Cyborg.

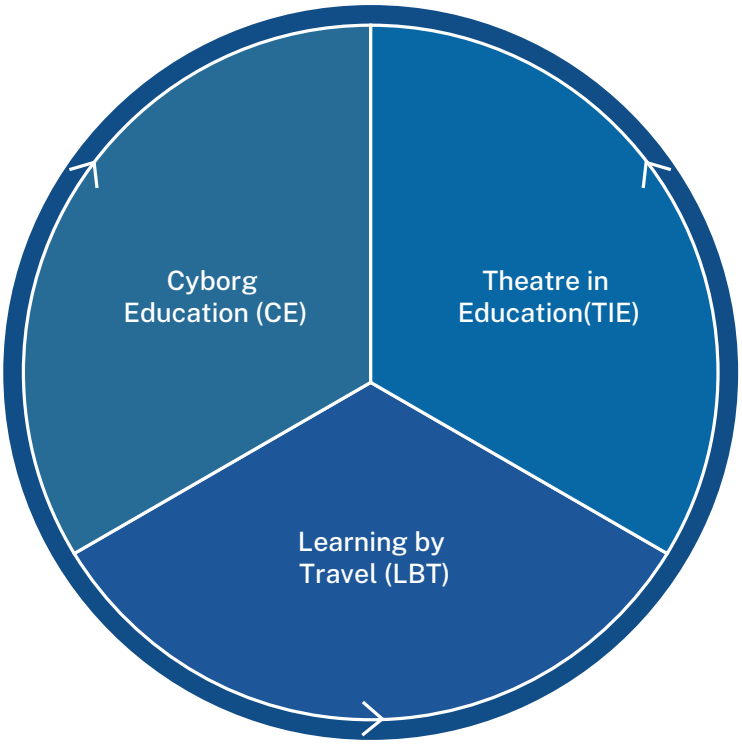


Figure 12 “Life” comprehensive practice education form

The Theatre in Education, TIE

TIE is a project-based form of education that utilizes dramatic elements and dramatic methods to educate people by roles. Its advantage is that we can choose all kinds of scripts that fully demonstrate the vividness of “Human & Society”, and make students learn the pleasure, anger, sorrow and joy of human society in the comprehensive practical activities of comedy performances through in-depth interpretation and play of works.

The unique teaching forms of educational drama include “drama freeze frame”, also known as still image or frozen moment, which asks performers to present the content they want to express in the form of freeze frames, and experience the function of body movements in scene creation, role-playing, clarifying relationships, emotion expression, and information transmission, which can help students settle into the situation, play roles, develop stories, and inspire original ideas. In a whole drama rehearsal, freeze frames usually include single-person freeze frames, double-person freeze frames, and multi-person freeze frames. After completing the freeze frames of each plot, conducting “continuous freeze frames” can present a coherent story outline.

Learning by Travel, LBT

The best way to understand the various forms of life in the natural world is to immerse oneself in nature, engage with it, feel its presence, and gain an understanding of it. Therefore, the LBT comprehensive practice project aims to enable students to embark on outdoor explorations in natural ecosystems such as forests, islands, deserts, grasslands, and other environments. Through on-site investigations and research, students learn and gain insights into the interplay between human beings and the diverse forms of life in nature.

Cyborg Education, CE

As “Cyborg” becomes popular, the field of education has witnessed the emergence of related educational theories and practical methods known as “cyborg pedagogy”. It aims to incorporate the fusion of humans and machines into the educational process. This is an effective way to learn about Cyborg’s life form. Through conducting Cyborg PBL education and using “human-computer interaction” as the basic teaching method, we assist students in understanding cyborgs and comprehending the relationship between humans and cyborgs.

The three aforementioned educational approaches also take into consideration the classification and management of learning styles. It is well known that not all students have the same learning preferences, and there exist various theories on learning styles in academia. Therefore, based on the most basic classification, we design the elements of comprehensive practical education projects as three categories of “study styles (SS)”, namely,humanity, adventure, and technology.

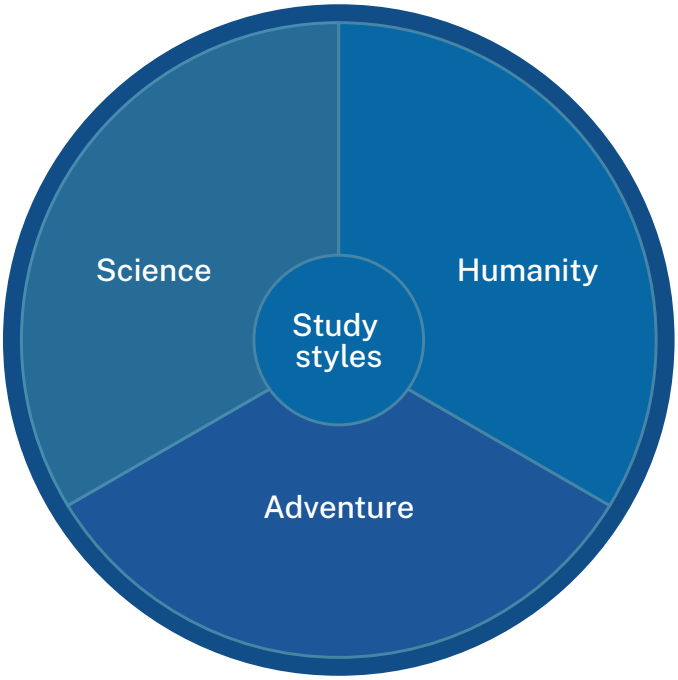


Figure 13 Study styles

Theatre in Education (TIE) features the “Indoor-Humanity” style.

This knowledge module mainly includes humanities and social sciences, and it mainly happens in theaters, belonging to the indoor comprehensive practical activity section, and is suitable for learners who like humanity activities or hope to experience and explore humanities.

Learning by Travel (LBT) features the “Outdoor-Adventure” style.

This module mainly explores nature, such as mountains, lakes, rainforests, and other places, learns about human & natural knowledge, and is full of adventure and excitement, suitable for learners who like outdoor activities or wish to experience adventurous natural exploration.

Cyborg Education (CE) features the “Boundaryless-Technology” style.

This knowledge module will focus on the science and engineering disciplines, where students will learn a large amount of technology-related knowledge, and develop and build “Cyborg” devices, suitable for technology enthusiasts and learners who wish to experience highly technological projects.

Generation mechanism of CMYK comprehensive practice project unit

The characteristic of CMYK lies in the function of a coding system, that we can auto matically form a clear, sustainable, and iterative project unit generation mechanism through encoding each element. The coding system for the “Life” comprehensive practical education project unit is mainly made up of three parts, as shown in Table 9.

Code Type	Code	Content
Life,L	Ls	Human & Society
	Ln	Human & Nature
	Lc	Human & Cyborg
Competence,C	$C_{1\text{-}E}$	Exploration
	$C_{2\text{-}C}$	Critical thinking
	$C_{3\text{-}C}$	Collaboration
	$C_{4\text{-}C}$	Creativity
	$C_{5\text{-}C}$	Care
Study Style,SS	$SS_{1\text{-}Hum.}$	Humanity
	$SS_{2\text{-}Adv.}$	Adventure
	$SS_{3\text{-}Tec.}$	Science

Table 9 CMYK comprehensive practice codes

We can obtain the CMYK-life comprehensive practical education project unit by in tegrating life's exploration-based comprehensive practice coding system into the generation mechanism of CMYK, as shown in Figure 14.

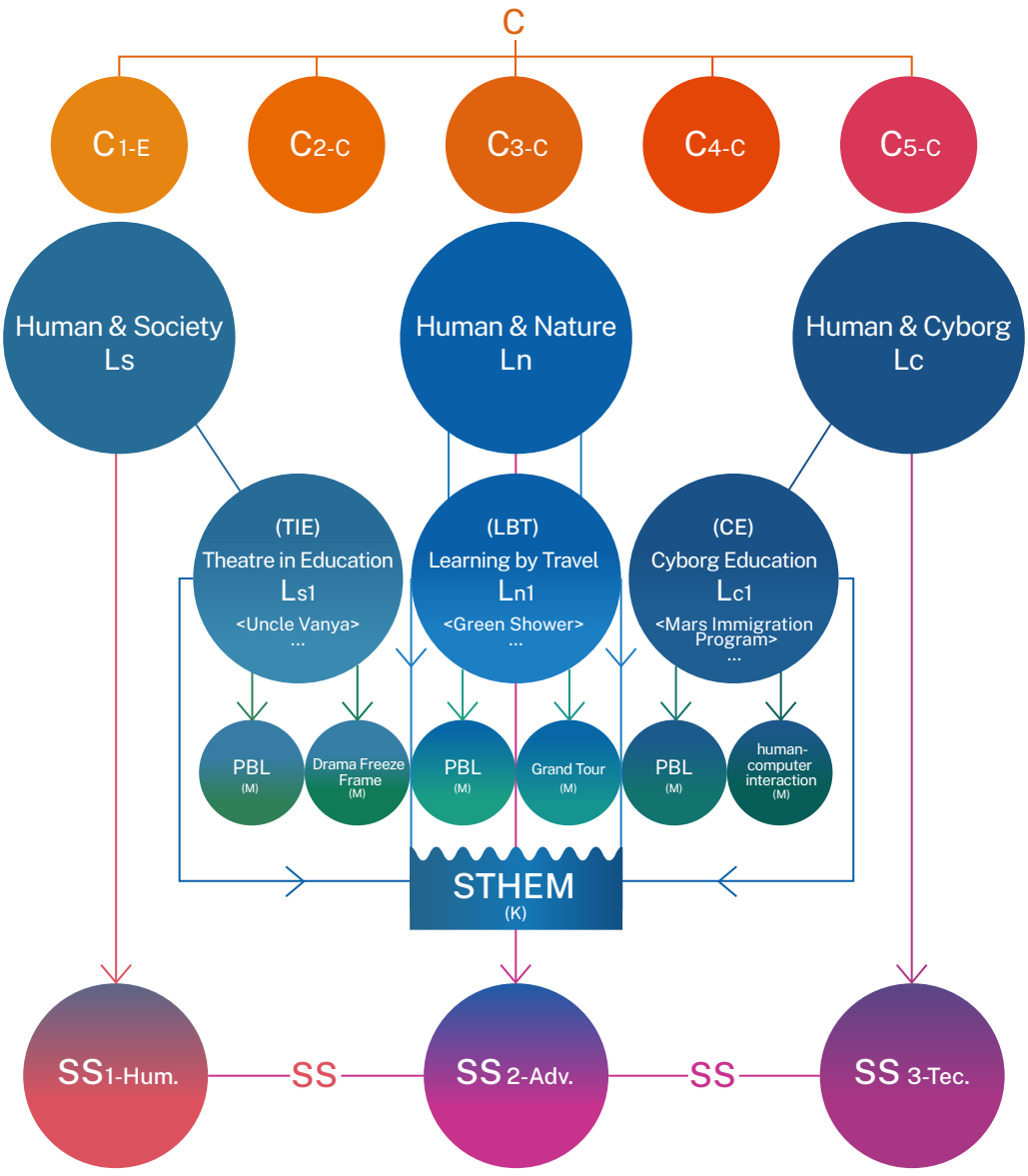


Figure 14 Generation mechanism of CMYK comprehensive practice unit

From the above figure, it can be observed that the development paths of the PU_{life} matrix mainly consist of three routes. Each route can generate n+1 project units. Therefore, the total number of project elements is 3 * (n+1). This implies that the established generation mechanism can produce corresponding project elements based on real-world needs, possessing permanent iterability. It is an efficient and convenient system for the development of comprehensive practical education projects. The basic formula is as follows:

$$PU_{life}=C*L(L_s/L_n/L_c)*M(PBL+M_s/M_n/M_c)*STHEM*SS(Hum./Adv./Tec.)$$

Tool tables for comprehensive practice PU

To better guide practice and promote the implementation of comprehensive practical education projects, the following sections will generate four cases from the three development paths of PU_{life}. This will form a case set consisting of a total of 12 PU as an example. Moreover, we made out a series of practice tool tables for project implementation and management.

PU_{life}				
TIE				
No.	L_{S1}	L_{S2}	L_{S3}	L_{S4}
Theme	Teahouse	Thunderstorm	A Midsummer Night's Dream	Uncle Vanya
LBT				
No.	L_{N1}	L_{N2}	L_{N3}	L_{N4}
Theme	Green Shower	$1m^2$ Wandering City	Walking in South Gannan	Returning to the Renaissance
CE				
No.	L_{C1}	L_{C2}	L_{C3}	L_{C4}
Theme	Mars Immigration Program	3D Future World	24h Reverse Cyborg World	Brain-computer Interface

Table 10 "Life" comprehensive practice PU case set

In the PU practice section, we provide 5 vital tool tables, that is, the overall guidelines for comprehensive practical education projects (Table 11); The growth record table during the implementation process of PU (Table 12); A practice guide for three types of PUs: Theatre in Education (TIE), Learning by Travel (LBT), and Cyborg Education (CE) (Tables 13, 14, 15).

Four-Step Guide		
Steps	**Students' Tasks**	**Tutors' Tasks**
1 Early stage of the project	Develop a guide to action	Assist
2 Mid stage of project	Take action following the guide	With guidance
3 Achievement display	Display project-related achievements	Tutor comments
4 Project review	EOCE roundtable	Intervention and evaluation

Table 11 Guidelines for comprehensive practical education projects

As described above, we established the EOCE theoretical model as a monitoring system to ensure that the implementation of comprehensive practical activities conforms to the cognitive development process of students and fully demonstrates the value of education. Therefore, during the project operation, we recommend students use the EOCE record form to perceive and monitor their cognitive development process.

EOCE Record Form		
PU		
Student Information		
No.	Instructive Questions	Record Content
1 Experience	Are you aware of this?	Early Stage
		Medium Stage
		Later Stage
2 Observation	Why is this happening?	Early Stage
		Medium Stage
		Later Stage
3 Conceptualization	Will this happen in real life?	Early Stage
		Medium Stage
		Later Stage
4 Experiment	What are you going to do now?	Early Stage
		Medium Stage
		Later Stage

Table 12 EOCE growth record form

TIE Guid		
Early stage of the project	1 Prepare a script 2 Recruit drama tutors 3 Select the venue 4 Division of labor among team members	
Mid stage of the project	Stage management	Clothing and makeup Props and stage Music and lighting Poster design and promotion
	Rehearse	Line and plot Action freeze frame Line practice
	Rehearsal performance	The grinding of stage experience for all members
Later stage of the project	Achievement display	Formal performance
	Project review	EOCE roundtable

Table 13 Practice guide for theatre in education

Early stage of the project	Select location Planning the trip Recruit team leader Prepare materials Knowledge think tank	
Mid stage of the projectt	Team leader Instructor Record	
Later stage of the project	Achievement display	Natural Ecology Investigation Report
	Project review	EOCE roundtable

Table 14 Practice guide for learning by travel (LBT)

CE Guide		
Early stage of the project	Hold a planning meeting Knowledge lectures	
Mid stage of the project	Data organization stage Cyborg imagination stage Cyborg construction stage	
Later stage of the project	Achievement display	Exhibition of cyborg works
	Project review	EOCE roundtable

Table 15 Practice guide for cyborg education (CE)

3

CMYK in social education scenarios: aesthetic ability cultivation project chain

Aesthetic education is one of the main paths to improving human nature. The fundamental difference between humans and other animals lies in their spiritual traits. One of the fundamental tasks of education activities is to stimulate human spiritual motivation and cultivate a complete and mature personality. Whether in the history of Western or Chinese education, the edification of beauty in personality education has been highly valued. In an era of increasing diversity in education, aesthetic education in social education scenes has been more in line with people's associations due to being more life oriented and more in line with the meaning of free exploration.

3.1

The educational value of aesthetic education activities and CMYK aesthetic education theory

Aesthetic education cultivates the all-round development of the learner for the future

Schiller, the father of modern aesthetic education, uses the term aesthetic education to refer to the harmonious unity of emotional and rational impulses that promote human humanization, and the process of obtaining the happiest existence and independent freedom. The unity of emotional and rational impulses means having diverse forms and ample content, combining the incisiveness of rational thinking with the romance of emotional imagination. In China, there is an old saying “Prosper in poetry, Succeed in music”. Under the modern educational discourse system, personality education methods such as “imperceptible influence”, “temperamental refinement” and “internalizing” are in the name of the “aesthetic education” sometimes. It can be seen that aesthetic education has rich connotations and undeniable educational value.

Around the three fundamental issues of the essence of beauty and art, the educational significance of “aesthetics”, and how to implement aesthetic education, there are mainly four types of education philosophy for aesthetic education: pragmatism, expressionism, formalism, and existentialism, and their core principles are experiential experience, self-expression, form creation, and self-awareness. A common characteristic of these four mainstream aesthetic education thoughts is that they all regard imagination as one of the core ideas or the main point of their discourse. In other words, “imagination” is a core concept that runs through the history of Western thought and aesthetics, and plays an important role in aesthetic education.

The role of imagination in artistic creation is widely recognized. Imagination is to some extent a manifestation of an artist’s creativity, endowing art with an attribute that is based on while transcending the real world. In addition, the poetry, literature, sculpture, painting, and the practical operation of all religions and philosophies of human

beings all rely on the imaging ability of imagination and the symbolism of imagery. If humans do not have the ability to create these symbolic images, it is impossible for them to develop abstract reason, science, mathematics, logical reasoning, and even language.

In addition to the importance of imagination in aesthetic education, what's more important is that imagination aligns with the characteristics of being open, flexible, free and inclusive of the core content and frame of Learner for the Future Competence, and is also featured in openness and flexibility. Imagination can break through the limitations of time and space, serving as a bridge between limited individuals and infinite eternity, bringing endless pleasure to aesthetics.

CMYK aesthetic education theory

Based on the jointing significance of "imagination" between CMYK and aesthetic education theory, the CMYK aesthetic education theory takes "imagination" as its core theme, highlighting the spirit of freedom, flexibility, and infinite openness.

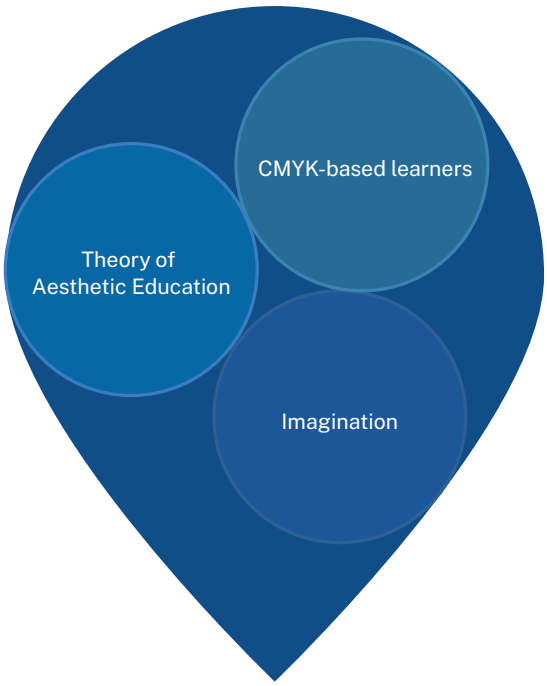


Figure 15 CMYK-based aesthetic education

LFCF leads the construction of aesthetic education theories centered around “imagination”, while the latter in turn contributes to the rich variety and indeterminate growth of the former, they rely on each other and grow together.

The emergence and interpretation of CMYK Aesthetic Education concept closely follow the theme of imagination, and integrate the existing framework of competence and the logic of aesthetic education itself. According to the basic logic from initial artistic contact to the production of expressive achievements, including four stages like experience, perception, immersion, and creation, the corresponding specific content includes observation, feeling, reflection; organization, identification, metaphor; Inclusion, empathy, reflective evaluation; technology, action, meaning. In the process of generating specific content, based on LFCF the comprehensiveness of aesthetic education elements is reviewed based on five primary indicators, and the content of the four core elements of CMYK aesthetic education is interpreted using secondary indicators as a reference. Due to the enhancement of the characteristics of aesthetic education activities, LFCF has been able to grow flexibly.

Experience

Artistic experience is the preparatory stage of artistic creation and can be a long-term process. Artistic experience first requires artists to observe, feel, and reflect on life, and at the same time, they also need to embrace life wholeheartedly.

Perception

Perception refers to the ability to discover or understand art. Artistic perception is rather an intuition, an insight or enlightenment ability than speculative reasoning, but is still a fundamental rational activity.

Immersion

Immersion is an infinite creative process, a recreative activity based on the understanding of artistic works. Immersive experience, artistic appreciation, artistic criticism, and artistic research are all manifestations of artistic immersion. Around the release of imagination, the content of immersion includes inclusion, empathy, and reflective evaluation (appreciation).

Creation

Creation is the ultimate direction of aesthetic education activities, with the goal of personalized expression and the output of “form”. Relatively speaking, creation is an independent, pure, and senior form of aesthetic activity.

Imagination	Connotation	Instruction	Corresponding Learner for the Future Competence (LFCF)	
1 Experience	Observation	Identify and elucidate deeper details through continuous interaction with aesthetic works or other artistic objects.	Exploration	Curiosity
	Feeling	Experience artistic works or other artistic objects through sensory, emotional contact and so on.	Exploration	Concentration
	Thinking (assumption)	Proposing hypotheses during the experience process to promote learning, “What if...?”	Exploration	Recognition of problem
2 Perception	Organization	Connect the content and form discovered with existing knowledge and experience, and the knowledge and experience of others, as well as all kinds of text and multimedia resources.	Critical thinking	Cling to difference
	Identification (simplification)	Recognize the differences and relevance between details, and groups, integrate and distinguish them.	Critical thinking	Systems thinking
	Metaphor	Form a preliminary image or form	Creativity	Integration
3 Immersion	Inclusion: coexist with uncertainty	Realize that there is more than one explanation for a problem, not all problems have immediate or clear solutions and maintain patience while the solutions are becoming clear gradually.	Collaboration	Tolerance
	Empathy	Respect the different perspectives of others and understand their experiences emotionally and ideologically.	Collaboration	Compassion
	Reflection and evaluation	Retrospect the process of experience and perception, evaluate the content learned, identify the remaining challenges, and work out areas for further understanding.	Critical thinking	Reflection, system thinking
4 Creation	Technology	The means, tools, and techniques of artistic creation.	Collaboration	Sharing, implementation
	Action	Summarize the knowledge learned through exploration and try new ideas, behaviors, or situations in appropriate ways.	Creativity	Implement, breakthrough stereotype
	Meaning	Create your explanation, observe from the perspective of others, and use your voice to express comprehensively.	Care	Consciousness of history and society

Table 16 Core elements of CMYK aesthetic ability

For instruction, the above elements and content may appear to have connections and hierarchy, but this linear relationship is only intended to meet the requirements of the structural presentation of the text. In the practice of the CMYK aesthetic education project, it is precisely required to break through the “hierarchy”, fit in with the complexity and nonlinearity of imagination cultivation, and take into account the possible relationship with different learning modes.

In the experiencing stage, the first three abilities, namely observation, feeling, and thinking (making assumptions), are the precursors of the other abilities and the gates of imagination, but not in any particular order. Some people may have to be guided by questions before making effective observations; some people have to be guided by a specific feeling to notice deeper details; Some people may simply watch or listen, and these three abilities are integrated cyclically and recursively. These three abilities seem to be strengthened over time, along with the improvement of other aesthetic education abilities. Kinesthetic, auditory, and visual learners can all smoothly enter the aesthetic education process at this stage based on their respective learning advantages, and no matter entering from which one, all of these abilities are involved in mental image formation in different ways.

The perceptual stage includes organization, recognition, and metaphor. The cultivation of perceptual stage abilities is influenced by experiencing stage abilities, but it needs to find the rational part in the mental picture and dig into more things. These rational relationships stem from concrete imagination.

Immersion includes inclusiveness (coexisting with uncertainty), empathy, and reflective evaluation, these also interact with other elements in a non-linear manner. One factor that makes imagination important is empathy. Imagination is a cognitive ability that allows us to believe in the possibility of another reality and realize the possibility of another world. Furthermore, a special kind of imagination derives from empathy, namely social imagination. Social imagination is the ability to create new social visions. This means that imagination, empathy, and reimagination form the imaginative loop of an ideal society. The ability to reflect and evaluate exists throughout the entire process of imagination. In the experiencing session, people observe, ask questions, express themselves, and then go through this process again. The same is true in immersion, people constantly carry out rational analysis activities such as review, interrogation and adjustment. In order to create meaning and take appropriate action, people must reflect, evaluate, and repeat to ensure appropriate action. At this level, reflection and evaluation are informal and a part of the continuous process of imagination and learning.

Creation includes taking action with technical support and creating meaning. The actions that students can take are diverse: personal, social, political, or they can create a new object or idea. There is also iteration and repetition in creation. In order to take action, a meaning must be created. And to create meaning, an imaginative behavior must occur.

Therefore, the implementation process of CMYK aesthetic education elements is not the entire dynamic process of imaginative learning, but may only select some cross-cutting fragments in the dynamic process from a certain perspective, they are key parts of imaginative learning and are instructive to a certain degree in assisting students' development.

3.2

CMYK and aesthetic ability cultivation: development ideas and cultivation strategies

Development of CMYK aesthetic education PU

The LFCF-based aesthetic education activities are carried out according to the logic of CMYK, which is characterized by core competences, teaching methods, age groups, and knowledge systems.

Also, core competences are informed by the LFCF and "imaginative" aesthetic education competence. In designing and implementing teaching activities, the LFCF not only serves as a goal, but also as a tool for reflecting on teaching activities.

The teaching methods for "imaginative" aesthetic education PU are based on PBL and integrated with unique imaginative teaching methods, thus being flexible in application. In addition to such teaching methods as simulation, activity-based learning, virtual labs, flipped classes, and experimentation learning, the teaching strategies that go with them are also fun and humanistic. Cases in point include breaking the "preset", mind map, fishbone diagram, reverse brainstorming, concept mapping, problem expansion, role-playing, SCAMPER, "stick it up", and storyboards, which will not be explained here.

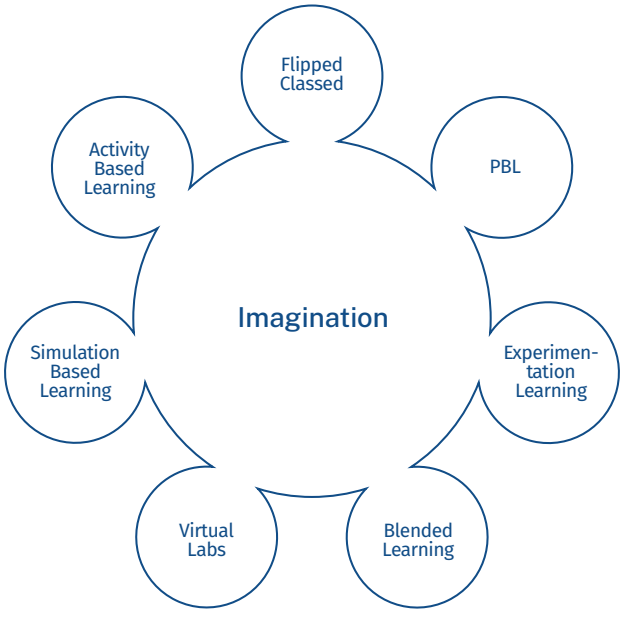
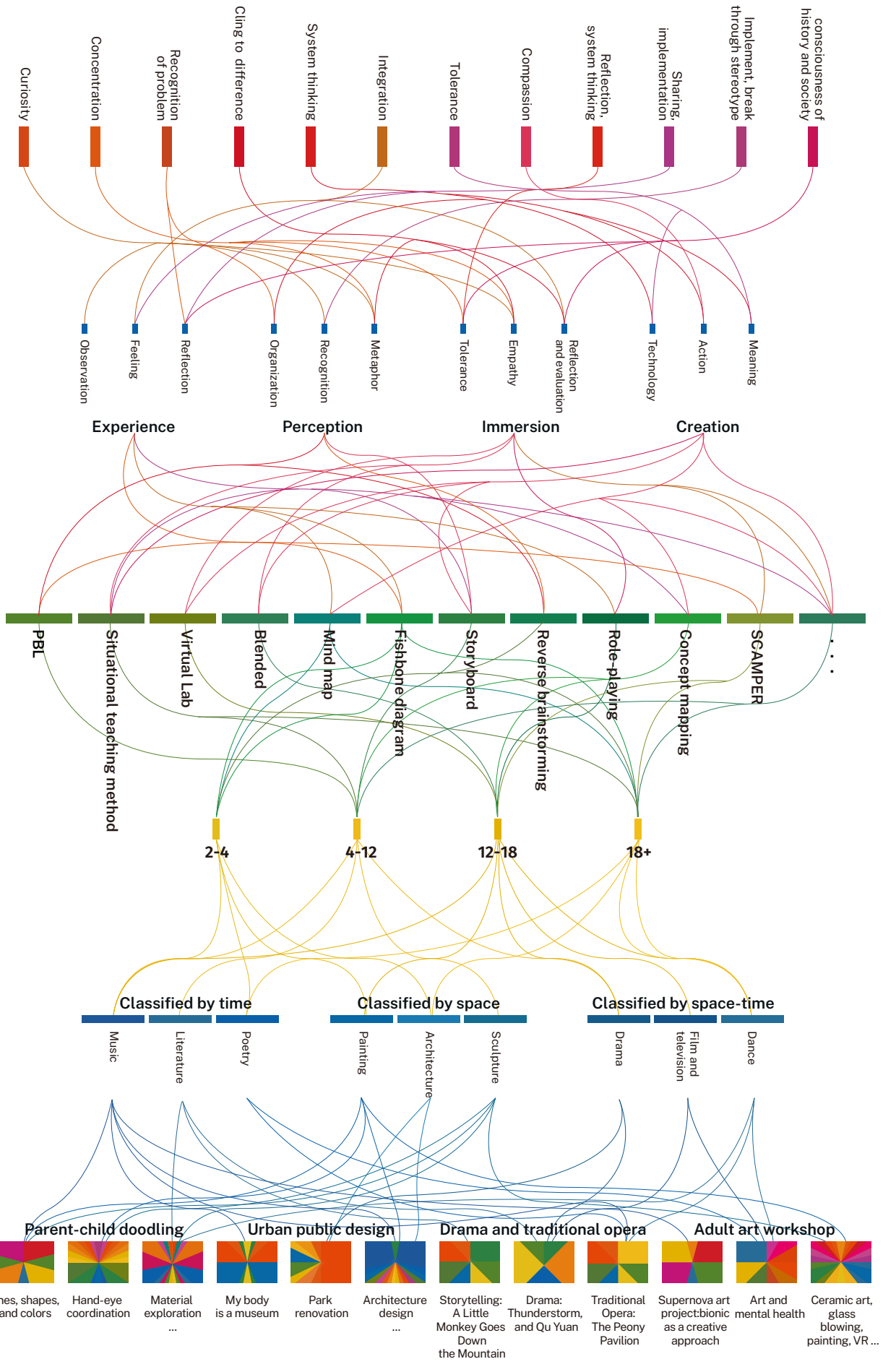


Figure 16 Teaching methods for aesthetic education

As an exploration in the field of social practices for the learner for the future, the teaching objects in the aesthetic education PU feature the biggest age span from young children to those aged 18 and above, which makes the aesthetic education PU become a major field for lifelong learning. Given this, the above elements and teaching methods can be flexibly combined in accordance with the age of students. In light of the differences in aesthetic education content and teaching methods, students can be roughly divided into four age groups, namely, those aged 2-4, 4-12, 12-18, and those aged 18 and above. Another reference factor for the division of the four age groups is the corresponding stages of doodling, image, composition and expression in children's visual growth and development. Moreover, the four age groups also align with the general trend of the evolution of Western art history.

Aesthetic education is not limited to art. However, art is indeed an important means of promoting aesthetic education. Therefore, the knowledge modules of aesthetic education PU are set up concerning the classification of art for the sake of the completeness of knowledge. With reference to the way that art is categorized by time, space and space-time, the "imaginative" aesthetic education covers all art forms under the above categorization, including music, literature, poetry, painting, architecture, sculpture, drama, film, television and dance, among others.


Curiosity
Concentration
Recognition of problem
Cling to difference
System thinking
Integration
Tolerance
Compassion
Reflection, system thinking
Sharing, implementation
Implement, break through stereotype
consciousness of history and society
Observation
Feeling
Reflection
Organization
Recognition
Metaphor
Tolerance
Empathy
Reflection and evaluation
Technology
Action
Meaning
Experience
Perception
Immersion
Creation
PBL
Situational teaching method
Virtual Lab
Blended
Mind map
Fishbone diagram
Storyboard
Reverse brainstorming
Role-playing
Concept mapping
SCAMPER
. . .
2-4
4-12
12-18
18+
Classified by time
Classified by space
Classified by space-time
Music
Literature
Poetry
Painting
Architecture
Sculpture
Drama
Film and television
Dance
Parent-child doodling
Urban public design
Drama and traditional opera
Adult art workshop
Lines, shapes, and colors
Hand-eye coordination
Material exploration ...
My body is a museum
Park renovation
Architecture design ...
Storytelling: A Little Monkey Goes Down the Mountain
Drama: Thunderstorm, and Qu Yuan
Traditional Opera: The Peony Pavilion
Supernova art project:bionic as a creative approach
Art and mental health
Ceramic art, glass blowing, painting, VR ...

Curriculum modules for aesthetic education PU

The development of aesthetic education curriculum modules and each specific PU take into account the requirements of C+M+Y+K factors. Based on the four core elements of aesthetic education, including experience, perception, immersion, and essentials of creation, the aesthetic education curriculum modules focus on the four dimensions: observation, expression, care, and form creation; in light of the age span, different requirements of young children, primary and secondary school students, and adults, as well as the classification of art knowledge, the aesthetic curriculums are divided into four modules, including parent-child doodling, urban public design, drama and folk art, and adult art workshops.

As to the specific curriculum forms, each module offers both long-term regular curriculums and short-term experiential courses. In this way, students have a wider range of choices available. On the one hand, they can choose a long-term regular curriculum to learn a specialized skill; on the other hand, they can also join short-term courses or drop out at any time for a short but professional art experience. As the artistic forms are abundant and diversified, the PU casebook will be enriched from time to time according to actual teaching practices. Each PU is formed by fully considering the results of various combinations of C+M+Y+K factors. The following PUs are examples only:

(1) Parent-child doodling

Young children are active learners. When children enter the scribbling stage, they enjoy scribbling lines to express joy. The curriculum values the shapes and symbolic meanings that appear in students' works and records their joy in exploring the visual arts and their process of understanding the world, helping them to take the first crucial step into the world of art.

The curriculum encourages students to experiment and gain an initial sense of self-identity through experimentation. Focusing on creative themes that stimulate the

senses, professional artists and tutors work together to lead students in self- and group exploration, understanding of the world, self-expression, and initial interaction with the outside world. Students are exposed to a variety of visual elements, organizational concepts, and creative media. Parental accompaniment may be moderately required for toddler.

(2) Urban public design

Children are important participants in urban life, but their voices are often overlooked.

*City impressions

Students will enjoy an art-themed city painting tour. Accompanied by professional artists, they travel through the city to reach some places where they are provided with such tools as sketchbooks, pencils, pens, and watercolors to paint, and of course, they can utilize as much of artists' guidance as they wish.

Through this special experience, students will gain a different perspective on the city when searching for a place to paint. Accompanied by a professional artist, they will eventually take a "group photo" of the city's everyday landscapes in a different way than usual.

*Park renovation

Park renovation requires integrative competences such as in-depth observation, technical practice, and scheme design.

Technical practice here refers to the training of drawing skills to help students easily visualize their ideas. The curriculum design, emphasizes understanding, observation, and hand-eye coordination, and organizes various visual elements, including lines, shapes, tones and texture to give them meaning and create appropriate expressive composition training. For older students, training in details, structure, anatomy, proportion and perspective (one-point, two-point and aerial) will be emphasized to

strengthen their drawing skills.

In addition, with a variety of materials and media such as graphite, charcoal sticks, colored pencils, watercolors, acrylic paint, and mixed media, the curriculum will offer students a variety of creative experiences and help them to secure proficient skills.

For modern children, drawing on the computer has never been so easy to understand. Learning to use digital media is an effective way to help students create. The curriculum will teach how to learn cutting-edge digital painting software, including Clip Studio Paint, and Procreate. By learning the concepts and tools of digital drawing, children are more likely to master and use other similar drawing software.

Students will use design thinking to solve problems in real urban parks. Through on-site observation and visual research, they mobilize the senses of sight, sound, smell and touch to explore the study site. In this process, they are engaged as researchers and designers of public facilities and spaces. Participatory design will help them to think critically. Inspired by nature and design thinking, students will experience constructive creativity as a designer of public facilities.

(3) Dramas and folk art

Drama courses focus on reading and performing. Each student is required to read famous Chinese and foreign dramas and operas, including Shakespeare's plays, The Peony Pavilion, and Teahouse, based on their age. Guided by professional artists, they also need to bring the dramas and operas they have read to the stage for performance.

They will have to make or pick up costumes and props by themselves; learn the techniques of theater, including the stage spirit or how to act as a whole; and incorporate techniques into their theater activities.

When the curriculum is over, drama and folk art will no longer be just words in books

for students, but human cultures that integrate into their lives.

(4) Adult art workshop

*Songwriting

The songwriting course will provide students with a rigorous and professional songwriting experience. With the guidance of professional lyricists and composers, students write songs around a theme or from a perspective to express their feelings and thoughts. After ten class hours, they will be able to share their work with others. Those representative songs they write can be performed by professional orchestras or artists at the annual concert.

The songwriting course is like a window through which we can have a glimpse into a student's life. More importantly, it can enrich students' writing experience and comprehensively enhance their artistic competences by learning the vocabulary needed for songs, stories on character growth, cooperation skills and knowledge of musical genres.

*Artistic psychology and health

In today's society, people live and work in a fast-paced and stressful environment. More and more people are suffering from mental health problems. Anxiety, depression and stress have become something very common in daily life, affecting people's well-being and quality of life. However, art has a strong psychological healing effect, and it can harness the power of creativity to bring about a positive impact on mental health.

The artistic medium, including painting, music, dance and writing, can help individuals express their inner feelings, release their emotions, and promote their self-cognition and growth. The core concept of art therapy is that through art creation, people can find their inner strength and wisdom to cope with the challenges in life. In the process of art therapy, artists and students work closely together to explore and unders-

tand the emotions and meanings hidden in the artwork.

“Artist for a day”

This is a short-term program mainly to provide artistic experience. The content of the program can be indefinitely increased depending on available resources. The following are just a few examples:

VR experience:

Based on holographic projection technology, the visual space integrates artworks with wall and ground projections while combining the naked-eye 3D visual technology and motion capture systems. In the visual space, the user is traveling through time and space to get an immersive visual experience.

Ceramic crafts:

Engage with clay, use your hands to alter the material and create a shape for it. The goal of the ceramic crafts program is to help students learn something about this time-honored technique and get an opportunity to immerse themselves in the ancient ceramic tradition.

Fashion makeovers:

Take creative actions to reduce carbonization by exploring repositioning, secondary uses or fashion upgrades. The program will source or recycle second-hand garments for re-creation by adding or subtracting some elements. Students can use apparel and textile design methods to modify ordinary garments to make them textured, layered, three-dimensional, and fashionable. Necessary skills include fabric sewing and manual operation techniques, such as pleating, gathering, shirring and folding; surface decoration techniques, such as appliqué, beading, quilting, and embroidery; and textile design techniques, such as dye removal, basic block printing, and fabric coating. No sewing skills or knitting experience is required.

Illustrating children's books:

Explore the images behind the words in children's books, from concepts to character development, from drawing to design, and from media application to execution. Participants in the program will improve their ability to draw and design and be able to explain and communicate their ideas through images.

Fundamental basics of oil painting:

This program provides students with the opportunity to explore and understand this challenging medium. Participants will gain an understanding of oil painting by completing works that feature combinations of colors, space and volume. Students will explore a range of thematic oil paintings such as still life and landscapes and learn about the process of painting models and figures on site. In addition, the program also contains illustrated lectures, museum visits, and student discussions to help participants master various painting application techniques.

Introduction to architectural design:

This program will take students on an exploration of concepts related to architecture and the meaning of architectural works by a series of activities. Class discussions will focus on how ordinary experiences, daily use, culture and aesthetics influence architectural design. Students can gain creative and rigorous design experiences by drawing, modeling and appreciation.

Introduction to furniture design (welding + metalworking):

More than ever, metal and metalworking have become a more integral part of contemporary furniture design. From perceptual and exquisite modern lines to rough industrial frames, this flexible medium can not only provide creative solutions, but also strike a balance between aesthetics and practical utility. This program will give students a good idea of furniture design by introducing the basic techniques of weld ing and metalworking. Students will be exposed to oxygen fuel gas welding (OFW) and tungsten inert gas welding (TIG), especially the latter.

Teaching tools for aesthetic education PU

Curriculum Introduction

Name:

Artwork:

Auxiliary materials:

Year:

Course date:

Please think about the following questions:

1 What is the relationship between each activity and inquiry-based question in the curriculum and the artwork to be studied?
2 Does the curriculum contain the aesthetic elements of CMYK? Is the curriculum designed as an exploratory program? Does it contain the core competences of the Learner for the Future (exploration, critical thinking, collaboration, creativity, care)?
3 What open-ended questions related to the theme have you prepared for the activity to promote students' reflection?

Core issues:

Course description:

Describe in detail the course that will be conducted, including each activity in the course and how these activities will construct a complete course experience. Moreover, please think about and write down the expected duration of each activity, as well as guiding questions for the activity.

Table 18 Tools for Curriculum Introduction

Artwork Title:
Artwork What do you notice in the artwork? What do you see? What do you hear?
Questions What questions do you have after seeing that artwork? What are you curious about?
Background information What is the social, cultural and historical context in which this work of art was created?
Connection between the artwork and individuals/ the curriculum What is the connection between this artwork and individuals or the curriculum?
Activity What do you envision as an experiential activity? Please record your ideas for follow-up reference.
Possible clues for exploration What are the possible exploration clues that come to your mind? Write them. Please note that the final investigation route has not been determined yet.
Core viewpoints Reflect on all the information collected and identify the core viewpoints.
Clues for exploration Extract the key points of core viewpoints and form a list.

Table 19 Guide for aesthetic education curriculum design

EDUCATIONAL PRACTICES

Continuously promoting educational innovation, YiPai social learning experience space

1

The origin of YiPai

Education, as both a science and an art, is highly relevant to practice. For philosophies and models of future education, nothing is more important than putting them into practice and continuously producing iterations.

Established in Shenzhen in 2022, YiPai is committed to exploring more possibilities of education beyond school and family. To promote the Learner for the Future Competence Framework (LFCF), YiPai has designed and launched a series of essential-qualities-oriented education programs and experiential learning activities based on CMYK for learners in different age groups (not limited to children and teenagers).

The explorations and practices that YiPai has done in the past year have allowed its education research team to well understand how CMYK works in social scenarios. CMYK, an future education syntax that provides a flexible space for designing and implementing projects, can help us to break down the boundaries of learning, and gain access to a wider range of social resources and knowledge. In this way, it enables learning to be interrelated and mutually inspiring with real-life and real-world problems.

In the future, education will be full of imagination and possibilities!

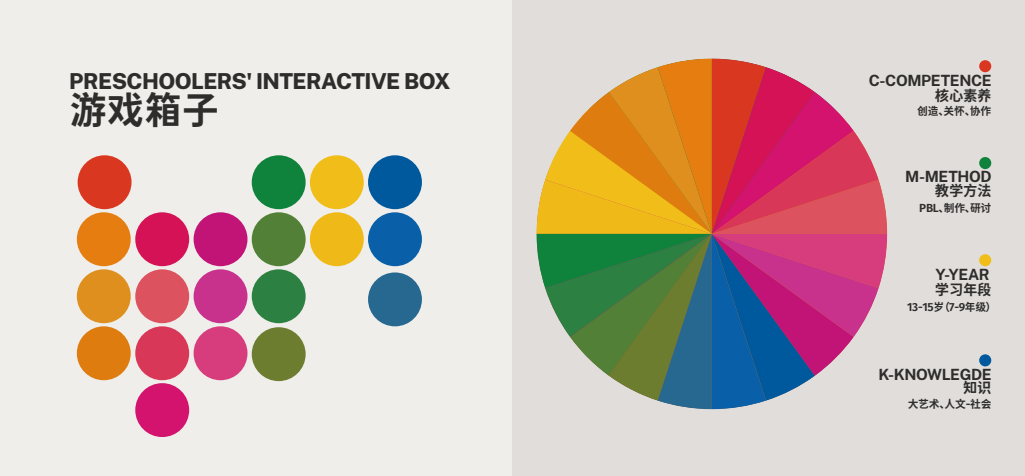
2

Learning cases at YiPai

At YiPai, we have designed and carried out a series of learning programs based on CMYK to nurture the learner for the future. Some of our learning cases are shown below.

Preschoolers' Interactive Box:

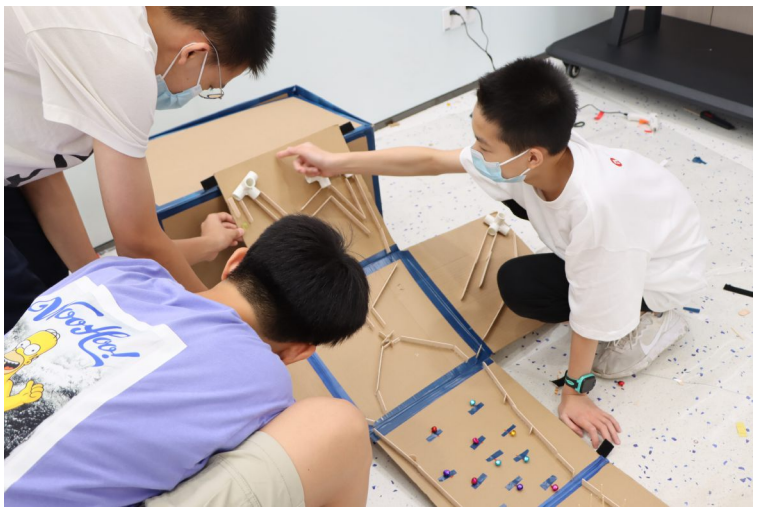
Let big kids better understand little kids, and create big changes with small designs



Toys are absolutely essential for children to grow up. The playful interaction that comes with joy often plays an important role in personal growth. For most children, buying toys and playing games is something they take for granted. But what if they were asked to design toys and games?

"Preschoolers' Interactive Box" is an innovative program that combines the multi-dimensional learning experiences featuring "design and architecture and humanities". Led by professional tutors, a group of 13-15 year olds need to design and make a safe and fun toy for 3-6 year olds that can be stored in a box of a specified size. In this activity, learners experienced the whole process from product design to making and at the same time, they developed their empathy and better understood the relationship between design and human beings when they came into contact with younger kids.

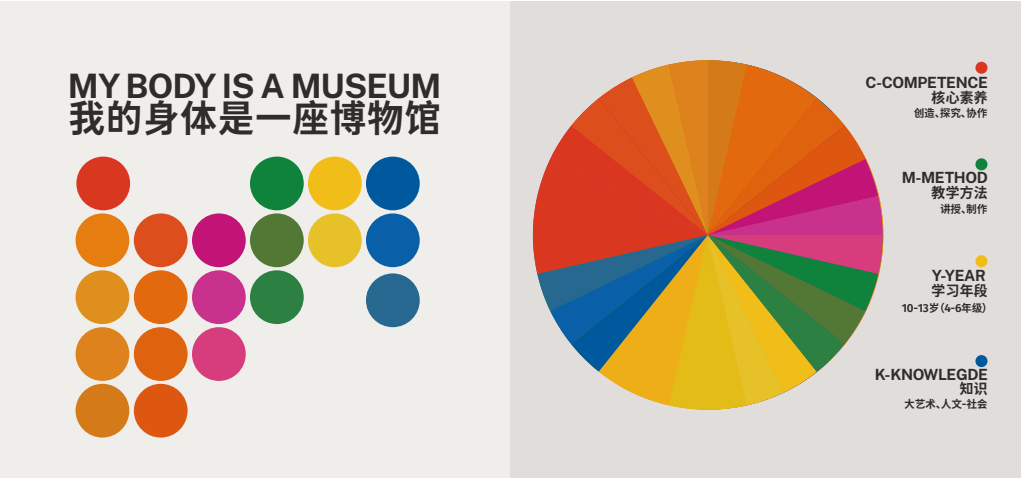
Guided and accompanied by program instructors, these "product designers" began to learn how to design products. By observing user behavior, doing materiality studies, drawing and sketching, prototyping and conducting promotional presentations, they went through a complete process from designing to making, and experienced the process from ideas to practice.




客户体验：

My Body is a Museum:

Children perceive and recognize themselves through poetry and painting



Poetry is painting that speaks, and painting is silent poetry.

In collaboration with Mucheng, an illustrator and poet, YiPai set up a children's art workshop that integrates poetry and painting. At the workshop, through learning and training in the methods for content creation, learners will gradually develop the habit of active observation in life, learn to discover beauty, and therefore improving their aesthetic and creative skills in painting and their abilities to understand and appreciate poetry.

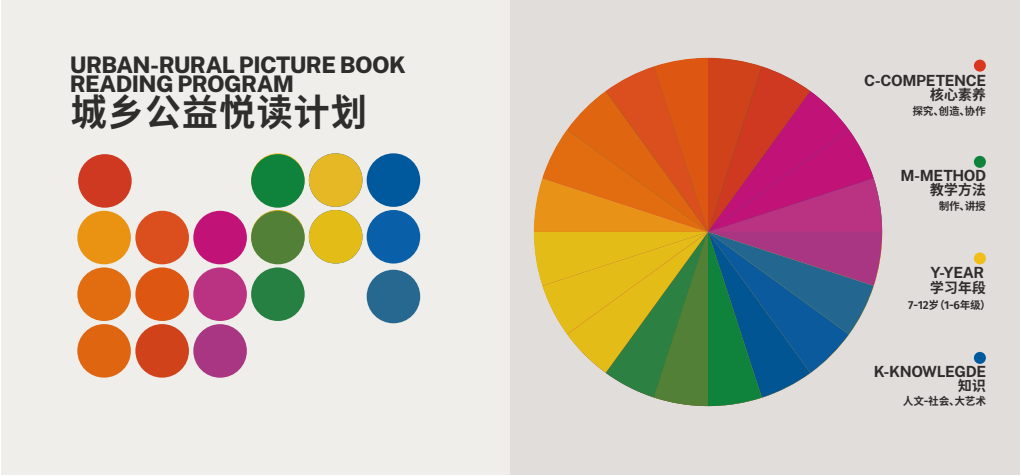
The workshop consists of six sessions, each with a learning theme, including creative collage, nature-themed poetry and painting, narrative poetry and painting, surreal visual creation, self-portrait, and handmade bookmaking. Children can experience the fun of creation through writing, drawing and hands-on crafting, there by beginning to explore and perceive themselves.

"The Earth is small, no bigger than an eye," said Deng Hanyue.

"Passion fruit is a common guest in the rainforest. It is good friends with mango. Mango is sweet and soft while passion fruit is sour and hard. Passion fruit is not worse than mango. If you taste it differently, you'll find that it is sweet too," said Wang Andian.

Urban-rural Picture Book Reading Program:

The big world in picture books



What else can you see in picture books besides pictures and stories? Regardless of the impact of AI or digital technology on education, reading, as a learning method, a way of thinking, or a lifestyle, is still irreplaceable and even more important than ever.

YiPai joins hands with NGOs to launch reading programs, which provide interactive reading activities for children in different age groups, bringing them different picture books and reading experiences. When reading picture books, teachers will expand the content of the book with interesting knowledge and plays. They lead children into the small world of picture books and then guide them to venture out to learn and understand the world beyond picture books, thus making reading livelier and more interesting.

For example, relying on the picture book *Leaking*, the program created a busy learning experience for children in Grades 1 and 2. Children were asked to write the narration for the stage play Leaking based on the storyline in the picture book. In this process, they knew more about brushes and ink drawings, and even tried to

imagine what Leaking might look like.

When reading *The Game of Billiards*, our teachers engaged children in a conversation about society and humanities, with topics related to the history of the Franco-Prussian War, military models of all sides at that time, the history of billiards and how to play billiards. A billiard match was improvised on the sport as a result!

Reading project of *Leaking*

Reading project of *The Game of Billiards*

1m² Wandering City:

Think like an engineer, and make Shenzhen "move"

As global warming pushes up sea levels, at some point in the future, the coastal city of Shenzhen will be completely submerged by seawater, what would happen to the residents then? Climate change, environmental governance, human survival and development...these issues seem a little bit distant from us. But they can be brought into learning programs. For instance, we came up with a bold idea to solve the problem, that is, to make Shenzhen move. The “Wandering City” project was thus created.

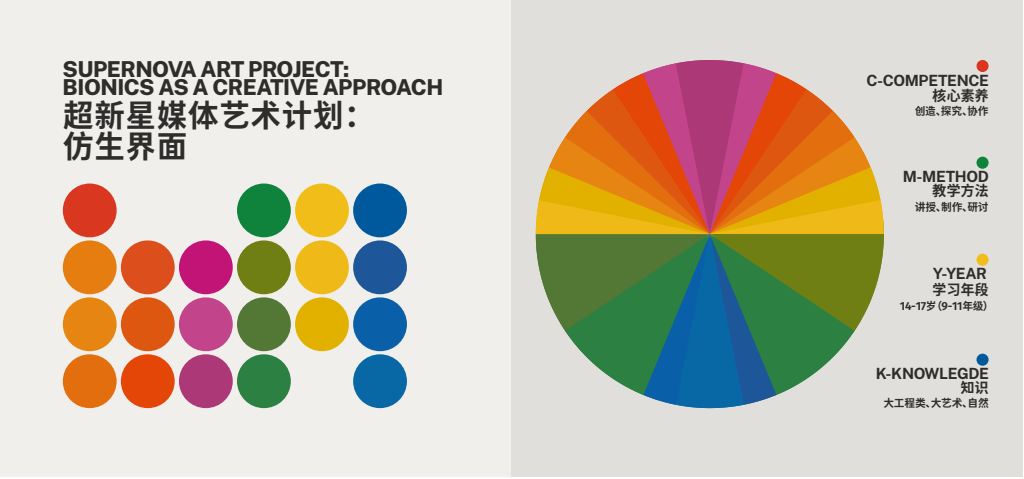
The project was developed and implemented by YiPai’s professional tutors in collaboration with architects. They took learners on field trips to understand Shenzhen’s architecture and urban planning, and helped them to work like an engineer. Finally, they proposed to create a “Shenzhen that moves” by condensing the city into a one-square-meter movable space.

The project not only provides learners with the necessary knowledge and skills, but also encourages them to go into neighborhoods and conduct field research to gain different perspectives and experience how problems are solved in real life.

With the help of specific learning projects, YiPai works hard to inspire learners to think about those big social issues, do what they can, and feel a sense of fulfillment through learning.

Supernova Art Project: Bionics As A Creative Approach:

Inspired by nature, work with artists to create media art installations



As technologies develop apace, media art is becoming increasingly prevalent in our daily lives. Much of artists' creative inspiration stems from people's observation of nature and social life. Making observations and creating from real-life experience provides an important opportunity for learners to develop their insight and critical thinking skills, and bolsters their internal drive to create.

"Supernova Art Project: Bionics as a Creative Approach" features innovative practices that combine bionics and media art. A group of professional tutors comprised of artists who have long been engaged in art creation lead a group of 14-17 year olds to seek inspiration from nature and create media art installations with a bionic mindset. This process can help learners understand the symbiotic relationship between art and technology and nurture their core competence for creation, inquiry and collaboration.

In this project, by introducing the bionic way of thinking, structure building, interactive coding and hardware, paper crafting, etc., artists provide learners with a glimpse into the frontier science, as well as into a breakdown of the creation process.

For learners, they experienced the journey of a media artwork from ideation to making and then to publication.

3

Stories at YiPai

“Action π” Tutor Empowerment Program, an endeavor to turn designers into educators

3.1

An assumption: there are people from all walks of life who are willing to be “tutors”

Yiren, the initiator of “Action π” Tutor Empowerment Program, was an architect before joining YiPai as a tutor. After graduating from a worldrenowned university with a degree in architecture, she worked for an architectural design firm and followed all phases of architectural projects, from schematic design to construction. In the field of the built environment, she had her “comfort zone”. Yet why would she choose to become a PBL tutor?

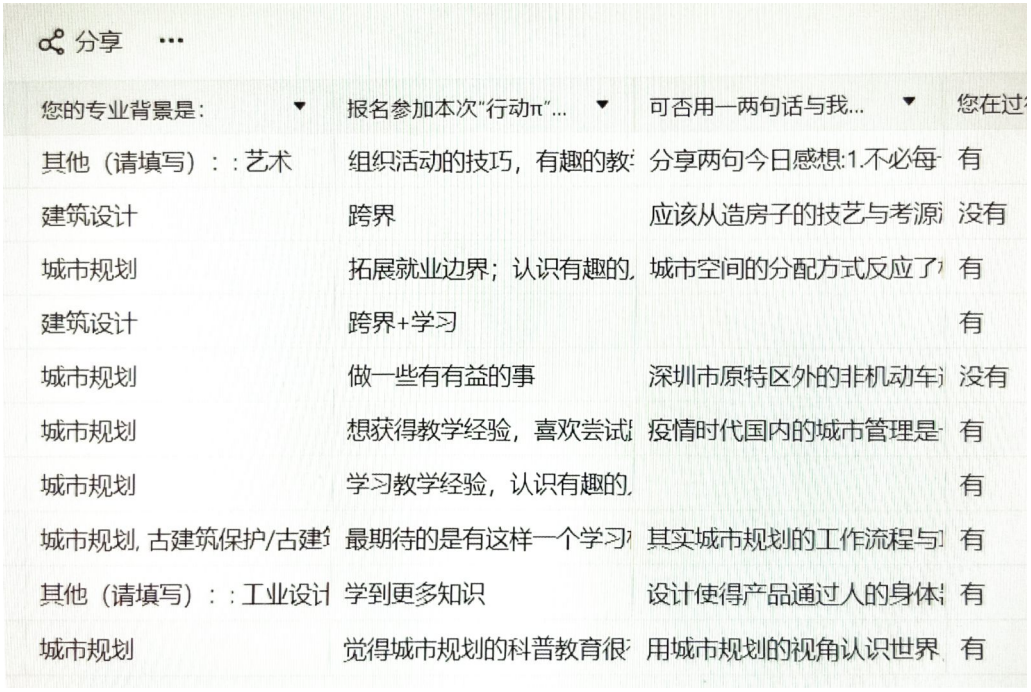
When designing educational spaces, Yiren needed to collaborate with all kinds of people. Without a doubt, good spatial design can improve people’s lives. However, she came to feel that the design of a space is not the most direct way to influence people. “A good teacher is far more influential than a good classroom”. If designers are allowed to put their thoughts into the design of a classroom, why shouldn’t they be given a chance to directly share their professional skills with the children who use this classroom? Not allowing the latter option will deprive us of many educational possibilities. Yiren came up with an assumption: if those professionals from different sectors could have access to a methodology to translate their expertise into fun activities just like she did, some of them would be willing to share their knowledge with children and become “cross-disciplinary tutors”.

At the outset, Yiren was met with skepticism from her coworkers, such as how to find the right participants who have both professional skills and an interest in education and organizing educational programs? Tutor Empowerment Program is a free event, what if they quit halfway through?

Prior to the launch of the “Tutor Empowerment Program”, Yiren had worked with some “external tutors”, including artists and architects, to organize activities for children.

This time, she also designed and organized the “Tutor Empowerment Program” together with two external tutors from different sectors (one is experienced in community building and planning, and the other is a folklorist and improviser).

For the first challenge, we recruited 11 qualified applicants from local planning institutes and other design-related companies. Most of them are urban planners or architects, aged between 22 and 40. To participate in the “Tutor Empowerment Program”, applicants were asked to fill out an e-registration form. Retrieved registration forms revealed their motivation for enrolling in the program. Frequent words used by applicants include “crossover”, “learning”, and “interesting”, suggesting that most applicants are open-minded. They were asked to share “an insight with one sentence”, and responses were fairly diversified. An architect wrote, “Architecture itself should be understood through building skills”. A planner mentioned, “There is much room for improvement of the motorway outside the original Shenzhen Special Economic Zone”. An illustrator wrote that “it is not necessary to be mild-mannered all the time”.



分享 ···

您的专业背景是：	报名参加本次“行动π”...	可否用一两句话与我...	您在过
其他（请填写）：：艺术	组织活动的技巧，有趣的教	分享两句今日感想:1.不必每	有
建筑设计	跨界	应该从造房子的技艺与考源	没有
城市规划	拓展就业边界；认识有趣的	城市空间的分配方式反应了	有
建筑设计	跨界+学习		有
城市规划	做一些有有益的事	深圳市原特区外的非机动车	没有
城市规划	想获得教学经验，喜欢尝试	疫情时代国内的城市管理是	有
城市规划	学习教学经验，认识有趣的		有
城市规划, 古建筑保护/古建	最期待的是有这样一个学习	其实城市规划的工作流程与	有
其他（请填写）：：工业设计	学到更多知识	设计使得产品通过人的身体	有
城市规划	觉得城市规划的科普教育很	用城市规划的视角认识世界	有

The registration forms we received

As for the concern of “what if they quit halfway through”, we had two strings to our bow by dividing the Program into two parts. The activities in the first part were engaging and compact, as a weekend workshop of 13 hours in total. Participants will be given the title of “cross-disciplinary tutor” after completing all activities. After that, the second part is run voluntarily. Applicants need to work in groups and use their spare time to design and organize a public welfare activity for children in collaboration with our tutors. If the first part is just a mini-PBL program on activity design, the first and second parts together could form a complete learning loop from theory to practice.

Some of our concerns were allayed when we had a sufficient number of applicants for the first-part activities. Seeing “to meet interesting people” as a common motivation on retrieved registration forms, one of our external tutors said half-jokingly at a preparation meeting, “If some applicants signed up for the first part just to ‘make new friends’, will they sign up for second part?” Indeed the second part requires more effort from “cross-disciplinary tutors”. Whether the second part would take place at all was still unknown.

3.2

“Scaffolding” for designers to plan activities

It’s really hard to learn how to cook delicious noodles if you have never eaten noodles before. Similarly, it’s hard to imagine how to design a PBL activity when you haven’t experienced it as a participant.

When Zhang Mei came to YiPai’s activity room on Saturday morning for the weekend workshop, that is, the first part of the Tutor Empowerment Program, she had no idea what PBL meant at all. Hearing about this program from her colleague, she signed up because she also “wanted to do something beneficial for society”. At the beginning of the event, she was a little nervous when she was told that all participants needed to stand in a circle to play improv games. However, she was much more relaxed the next morning and even tried to be a “game initiator”-according to the rules of the game, all participants should keep walking in a circle until anyone stops. The rest should also stop immediately and stay put. The first one to initiate a change for everyone is an “initiator”. Zhang Mei noticed how all the other participants stopped right after her. She found herself enjoying this feeling of taking the lead.

Later, Zhang Mei discovered two pages of “improv game designers’ instructions” in her toolkit. Instructions explained the different purposes of different games, such as “help the participants become more focused”, “help measure the awareness of participants in a certain field”, etc. After further explanation by her tutor, Zhang Mei understood that leading the learners to play games together could also be an important part of teaching . Knowing what games are available and their respective functions will help her with activity design in the future.

The toolkit for learners


YiPai's tutor leads the group in a circle to practice meditation and play improv games

Zhang Mei has to experience the benefits of improv games as a participant before considering how she could make good use of improv games when designing activities. That is an example of the principle of "experience before designing". During preparation for the Program, "experience before designing " was a major principle to be followed. It was applied to design many activities in the first part of the Program.

On the first morning, participants needed to complete a mini-PBL project, whereby they worked in small groups to do a site visit and gave solutions to improve the accessibility of a particular beef rice noodles restaurant near YiPai. As participants

needed to work in groups, YiPai tutors took the opportunity to introduce thinking tools that could be used to organize resources within a group. Also, when participants were presented with a problem that seemed a little bit confusing, YiPai tutors would guide participants to do user portraits to further break down the problem.

After working out the solution for the noodle restaurant, participants were asked to share and give feedback to each other. At this point, YiPai tutors introduced “warm and cool feedback” rules (a kind of activity rules for participants to share a nd give feedback to each other). After the mini-PBL session about noodle restaurants, which seems to have nothing to do with activity design, YiPai tutors analyzed the mini-PBL activity and gave a detailed explanation of the key points that have to be considered at the beginning of activity design. Participants thus understood that although this is a mini-activity, it features all necessary elements, i.e., “activity purpose”, “driving questions”, “resources needed”, and “methods of sharing and presentation”. If they want to design an activity themselves, they can start with ideas on the four aspects.

Participants take a field trip to the rice noodles restaurant and its surroundings on the first morning

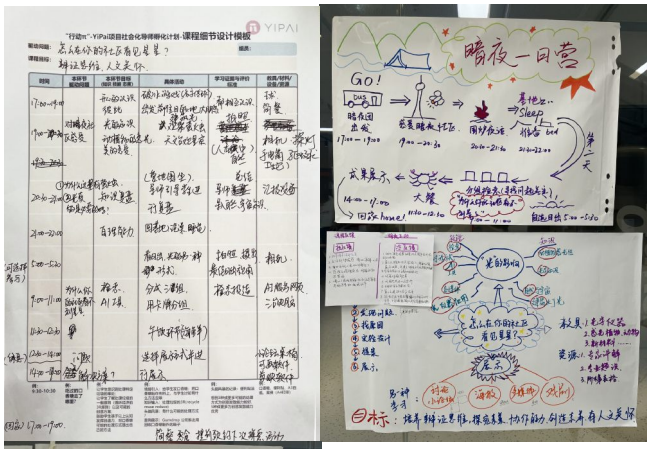
In addition to “experience before designing”, “participant-oriented” is another important principle that must be adhered to throughout the preparation of the Program.

When preparing for the Tutor Empowerment Program, YiPai tutors designed different activities based on the information from retrieved registration forms, especially their professional backgrounds, to better match their professional skills. For instance, as participants are mostly designers, our tutors only need to show a flowchart to give them a general idea of the steps involved in designing an activity. However, when referring to pedagogical concepts such as “coach” and “zone of proximal development”, YiPai tutors have to provide detailed explanations and demonstrations. Moreover, YiPai tutors will also keep an eye on the participants’ state during the activity. For example, noticing that participants get tired, tutors will organize a brief meditation session. When group discussion is in full swing, tutors will extend the activity time appropriately to facilitate sufficient communication within the group.

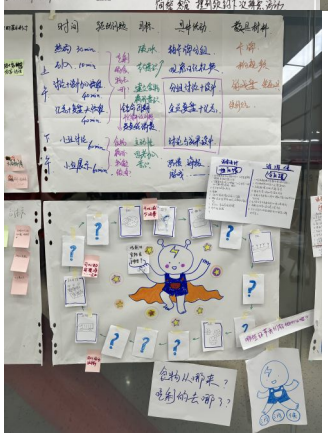
Tutors prefer to encourage participants and never force their views upon participants. In the afternoon, they led the participants in a reflection session and explored their understanding of what PBL could mean.

Participants came to know that organizing a PBL activity is a bit like “directing a stage play”. There is more behind-the-scenes work than meets the eye if you want to bring the audience an enjoyable and interesting experience.

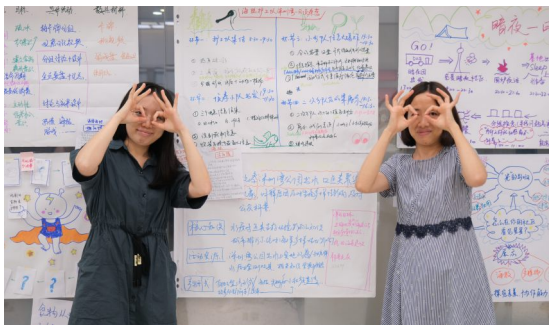
On the second afternoon, participants worked in small groups to make three preliminary designs for the activity. Moving from the “I have no idea of what I don’t know” stage at the outset to the “I want to learn more” mindset two days later, they found that “designing and organizing an activity” had gone from an unattainable challenge to a “doable” task for them.



“One-day Dark Night Camp”, an activity designed by participants



“Where Does Food Come From?”, an activity designed by participants”



Participants taking a group photo in front of their work

Participants taking a group photo with tutors

3.3

In the educational context: CMYK turns “projects” into “project-based learning”

It is a pity that the unique experiences and insights of professionals are often restricted within their working scenes. However, this situation could be changed for those who signed up for the second part of the Tutor Empowerment Program. When ideas came up at the co-planning meeting for second-part activities, views and skills were brought into the educational context, and designers became interdisciplinary tutors.

Yiren offered interdisciplinary tutors tools that are necessary for activity design. However, they also need professional support in education and learning, something like scaffolding, to truly transform the activities into a kind of learning experience. CMYK is such a pedagogical scaffolding, enabling designers to organize children-oriented activities.

For example, tutors could use C (competence) and K (knowledge) to design a learning theme and objectives for a project. Li Ting, an interdisciplinary tutor, invited her friend Cai Shu, whom she met in the first phase of the Tutor Empowerment Program, into a WeChat Group which was later named “Travel Group”. Li Ting has a son and a daughter. She noticed that every time her children returned from a trip, the trip didn’t leave much of an impression on them. Li Ting wanted to design an activity that would help children choose where to go next summer and learn about travel planning. She believes that the underlying logic of both urban planning and travel planning is to “know how to make choices and trade-offs”. The activity proved to be very appealing to parents. In less than half an hour after the information about the activity wasreleased to the parents’ group, all 12 places for young learners were booked up!

Participants who completed the first phase of the Tutor Empowerment Program were given the title of “interdisciplinary tutor”, but many of them, including Li Ting, didn’t stop there. After the first phase of Tutor Empowerment Program, YiPai tutors introduced the second part of the Empowerment Program to “interdisciplinary tutors”. “Interdisciplinary tutors” were invited to design and organize a public service activity. YiPai would provide support for activity operation and recruitment of learners. Internal tutors would assist in activity preparation, implementation and reflection to ensure that everyone will gain something during the process.

Lively discussions on preparations for the activity in the WeChat group set up by “interdisciplinary tutors”

“Travel Brochures” for children

CMYK tool can also be used to help activity designers take into account the characteristics of children of different age brackets and different developmental stages. After considering the dos and don'ts for a trip, Li Ting and Cai Shu designed and organized a two-hour-and-a-half activity for 8-10 years old, that is, the "Little Travelers" workshop. YiPai tutors sitting at the back of the classroom recorded learners' responsiveness throughout the activity with observation charts and interviewed them when the activity was over.

Adults in the classroom felt that "using the map app on the mobile phone to choose transportation" was the most exciting moment for children during the workshop, which was also confirmed by observation charts and interviews. Most of the participants were recorded as "showing positive emotions" and "listening attentively" during that section. When asked why they liked this session, some participants replied, "I feel it is very useful", and "I have never tried it before". In contrast, the session of selecting the travel destination was met with "awkward silence". Our "interdisciplinary tutors" reflected on this in the subsequent activity review. They found that these children don't know much about the common travel destinations in the country and naturally have no "desire" to go there. So, what can be done for improvement? The "interdisciplinary tutors" decided that an introduction should be given to some travel destinations before the learners choose where to go to motivate them to make a choice.

Li Ting and Cai Shu lead the children to choose a travel destination.

Learners' Behaviour Observational Chart							
	Learners Name:			Observer's Name:		Date:	
	0=never, 1=occasionally, 2=often, 3=always						
average score (after eliminating highest and lowest score)	shows positive emotion (focused, pleasant)	shows negative emotions (distracted, annoyed)	actively communicate with tutor/peer, listens carefully	inappropriate language, avoid comunication	finishes tasks in time, with care	lack sense of urgency, or cannot undersatand task	note
e.g: group discussion	2	1	2	1	3	0	impatient when peer speaks for long time
sharing summer holiday journey experience	2.22	0.38	2.56	0.13	2.20	0.33	clear expression/listens carefully / (few)one parent did not upload picture in time so lack of participation
decide + share next year's destination	1.67	1.00	2.00	0.38	1.90	0.78	cannot think of any destinations/not willing to share in public /distracted/expression not very clear
choosing transportation	2.11	0.78	2.56	0.00	2.10	0.11	very active / engaged /(few)left seat
learning how to do packing	1.78	0.67	2.56	0.13	2.20	0.44	finished sticking task in time/not very engaged/bored because finished early/decisions hugely influenced by peer
filling form for budget	2.00	0.56	2.44	0.25	2.50	0.22	can finish/not very focused/(some)did not fully understand task
making travel convention + sharing	N/A	N/A	N/A	N/A	2.50	N/A	bored at convention part/cannot stay in seats

The observation chart for various sections of the activity

The group that Zhang Mei joined organized another activity, "Renovating the Honghu Square", which is a children's workshop on designing the renovation plan for a public square in Luohu District. Participants were all children living around Honghu Square and recruited by local community workstations. The number of participants was higher than expected. They were so enthusiastic in expressing their opinions that it took five tutors (three "interdisciplinary tutors" from the group and two YiPai tutors) to guide the children through all the sessions as planned. Zhang Mei was guiding a group of children through a series of tasks. Some children spoke incessantly, and she could not bear to interrupt them, only to find out later that her group struggles with finishing tasks on time.

Zhang Mei wrote in her WeChat Moments, "Each child has his or her unique personality, with a variety of ideas in mind and it's really hard to keep them well-disciplined".Chen Qi, another "interdisciplinary tutor", also exclaimed, "As the activity time was cut down, the pace of tasks was so tight that I could not balance between lectures time and discussion time, but discussions focusing on design improvement is still very engaging for me". During a review meeting after "Renovating the Honghu Square" activity, YiPai tutors concluded, "the sequence of tasks can be optimized to avoid frequent switching between lectures for a big group and discussions among small groups".

The review of activities during the second part of the Program also inspired YiPai tutors on how to iterate activity design for the first part. For example, “In the future training for the first phase, we should add more information on how to better get class attention, and how to establish rules for group discussions”.

From “project” to “project-based learning” and from planning to implementation, “interdisciplinary tutors” become more proficient in the use of the CMYK tools, paying more attention to how old the participants are(Y), what knowledge the activity involves(K), and what participants can gain from the activity(C). CMYK, like scaffolding, can help a designer grow into a “tutor” and turn “projects” into “projectbased learning”.

At this point, Yiren’s assumption has been preliminarily confirmed.

Participants speak enthusiastically on how to renovate the public square

“Interdisciplinary tutors” express their feelings after implementing the activity they designed

3.4

From one person to a group of people: Tutor Empowerment Program is always on the way

Even if there are some people in each sector who are willing to share their professional thinking through innovative teaching activities, it is no easy job to find these potential "tutors", to get them to take action, or to help implement activities they design.

The second part of the Tutor Empowerment Program is still ongoing at the time of this writing, so we are expecting more activities and workshops to come. Each activity organized by YiPai may feature a different theme, may involve learners in different age groups and knowledge from different fields, and different teaching methods could be used, but what remains unchanged here is the continuous accumulation and reflection. Our vision is that in the future, more people will gather at YiPai for the Tutor Empowerment Program to form a sustainable community where everyone is both a learner and a content creator. When there are an increasing number of people willing to become "tutors", the boundaries of more industries will be broken down, which will lead to more learning opportunities. We expect that by then, every participant will gain a richer experience and see more beautiful scenery.

(Note: Zhang Mei, Li Ting, Cai Shu, and Chen Qi are all pseudonyms)

PROSPECT

This research is the latest research result of the future education project led by CYDF and collaborate with the research team from Beijing Normal University. We have further promoted the practical research of future education based on the theoretical groundwork laid in previous studies.

The cultivation of the learner for the future competence requires collaborative efforts among different educational entities, including family, school and society.The formation of spiral growth of learner for the future also demands sustained education over the long term. Therefore, one of the most effective forms of nurturing the learner for the future is to run through the process from childhood to adulthood in the time dimension,and across the realms of family, school, and social education.This requires us to lay the foundation for learners' early growth with the cultivation of reading skills within the family, to help them prepare for the future with the cultivation of exploration ability in the school, and to continuously stimulate their imagination and aesthetic ability with aesthetic education in society imparts irreplaceable human qualities in the age of artificial intelligence. These are fundamental traits of the learner for the future and the ultimate goals of our future educational concept.

In summary, parent-child reading is a family education method with high availability, strong practicality, and lifelong benefit, characterized by its ability to over class barriers for universal application. We have developed the "parent-child reading" project unit by matching the related theories from reading,family education, and psychology with the project generation mechanism of CMYK, thus providing an experimental pathway for family education.

Exploration-based comprehensive practice is a course with important educational value, which meets the needs of secondary school students' learning process and cognitive development and can effectively cultivate students' investigative abilities, enabling them to solve real-life problems. The distinctive feature of comprehensive practice is the experiential activities of students. In the process of autonomous exploration,

students learn knowledge and apply it to real-life situations, forming an effective synergy with the traditional classroom knowledge transmission.

In social education, art and aesthetic education exhibit diverse forms and broad audience advantages due to their universality, visualization and freedom. Imagination is one of the crucial starting points,and to a certain extent, endpoints of artistic creation and aesthetic education. The key value of art is to enhance imagination and aesthetic sense, not just to train specific skills. Imagination has the characteristics of transcending the limitation of time and space, bringing infinite happiness to aesthetics. The core feature of the learner for the future is indeterminate growth possibilities, especially in the future society of artificial intelligence, where human imagination is irreplaceable.

Future education goes beyond imagination; it also involves taking action. Since 2022, we have been continuously implementing and iterating CMYK in the social learning experience space of YiPai.The practice and iteration of reading projects,exploratory projects and aesthetic education projects will also start from YiPai and radiate to more educational domains.Our primary approach is through the social mentor empowerment camp project,using the CMYK as a support system. We provide professional educators with teaching scaffolding and conduct corresponding training to effectively guide them in utilizing scaffolding for project-based teaching to students. The goal is to collectively nurture the learner for the future. We believe that by empowering educators through mentorship programs, the CMYK can have a more significant impact, fostering generations of learner for the future in a larger space, reaching a more diverse population, and cultivating individuals capable of navigating an uncertain future.

Despite the future being full with unknowns,the uncertainty of the future also means more possibilities. In other words, uncertainty opens the door to various possibilities for the future: it opens up human creativity and the creativity of the entire natural

world, thereby paving the way to a better world. However, achieving this goal is only possible when we are prepared to invest sufficient effort(Immanuel Wallerstein, 2001, p.4). This is the driving force behind CYDF's unwavering focus on future education research. We hope to contribute to exploring and creating a better world, anticipating collaboration with more educators to take action and create a better future.

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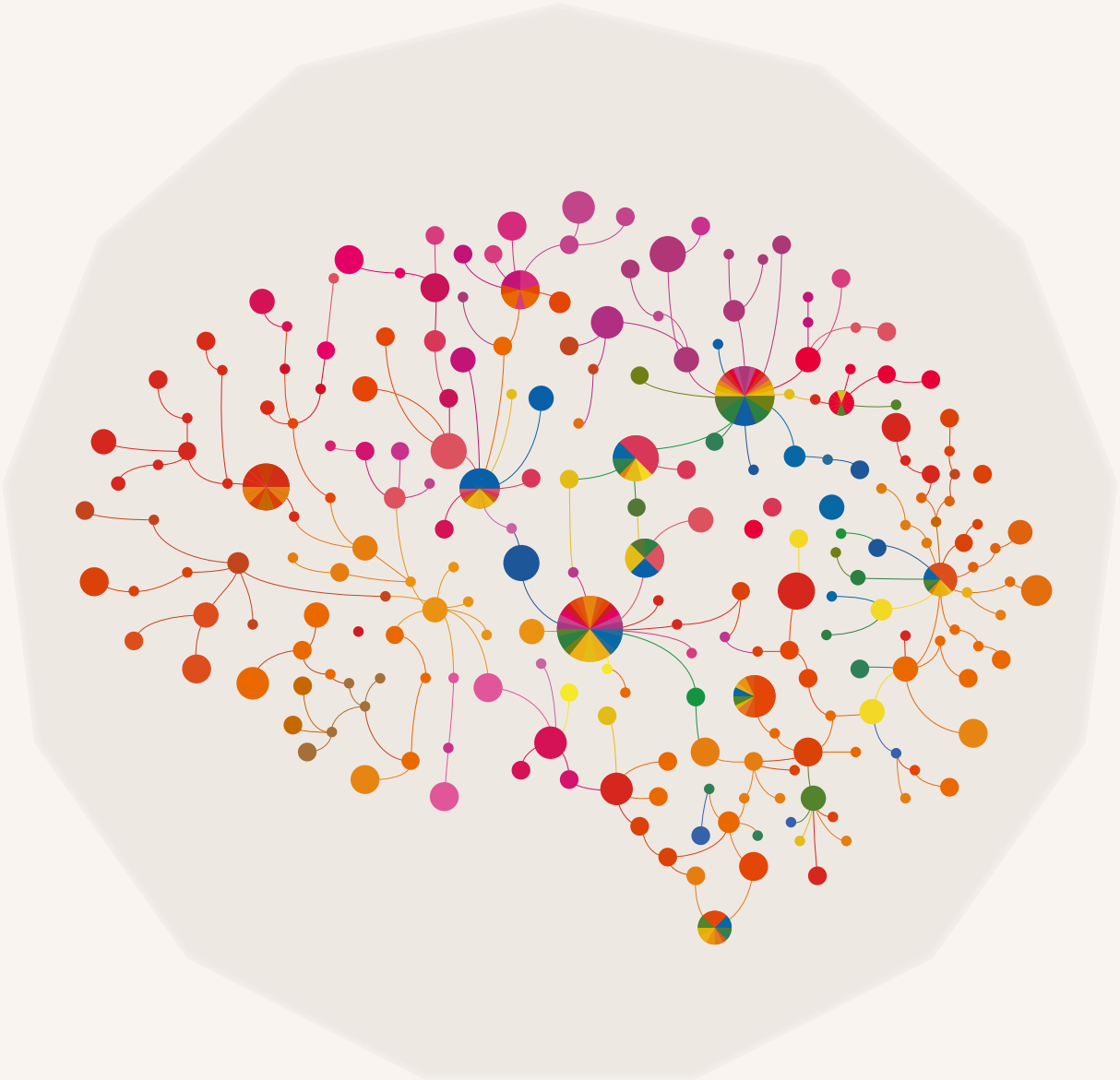

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