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CALL & Teacher Education

信息技术与教师发展

远程实习项目中职前汉语教师身份建构个案研究

杜雨季

华东师范大学

摘要：新教育技术背景下，教师在远程教学实践中的身份建构问题引起关注。本文聚焦于远程教学实习项目中职前汉语教师的身份建构问题，采用个案研究法与教育叙事视角，对参加 Live&Fun Learning Online Enhanced Tutoring 项目的两位高年级本科生进行深度访谈与实物资料收集，并将布迪厄实践理论作为分析视角，以探析远程教学实习中职前汉语教师身份建构的方式与影响因素。研究发现，就建构过程而言，职前汉语教师身份建构以问题为导向，如何应对问题成为教师身份建构的契机。远程实习模式实现了线上教学场域与线下学习场域的分离与互动，职前教师在二者之间实现教师与学生身份的切换，并将远程教学经验反哺于线下专业课程学习。在影响因素层面，学生与指导教师是影响职前汉语教师身份建构的主要因素。学生语言水平的提高与对职前教师的认可，以及指导教师积极的在线反馈与团队协作模式，推动职前汉语教师身份建构。希望本文能引起学界对新教育技术背景下远程教学实习项目中职前汉语教师身份建构的关注。

关键词：教师身份建构；职前汉语教师；远程实习；个案研究；叙事分析；布迪厄实践理论

一、引言

新教育技术的发展与新冠疫情的爆发改变国际汉语教学生态（李宇明等，2020），线上教学成为应对这场全球性危机的有效举措。与此同时，吴勇毅（2020：14）指出，新冠疫情下教育生态的改变也将影响今后汉语教师培养与培训方式，我们或许正在走向“新的充分利用现代科技的培训之路”[1]。

就教师培养而言，职前汉语教师[2]是国际中文教育教师培训的主要对象之一。随着汉语在线教学平台的开发与应用，基于网络的汉语教师培训项目早在疫情之前便受到学者的关注。章欣、李晓琪（2017）结合面向韩国市场的网络教学项目，探讨网络教师培训的关键问题，并为职前汉语教师培训研究提供路径。陈桦楠（2018）则介绍了一种依托于即时通讯技术的汉语远程教学模式——Live&Fun Learning OET，该模式也是本文研究对象进行远程实习的渠道。Live&Fun Learning OET 模式（简称 LFL）由来碗饭教育咨询（北京）有限公司创立，将网络即时通讯平台作为一对一在线汉语辅导的媒介，为国内高校汉语国际教育专业的学生提供远程教学实习的机会。参与该中文实习项目的学生在线辅导来自美国密歇根大学、布兰戴斯大学、英国诺丁汉大学马来西亚分校以及纽约大学不同水平的中文学习者，获得教学培训、教师指导与实习证明[3]。

随着教育技术的发展与在线教学的常态化，网络教学模式下国内外语教师的身份建构（identity construction）问题引起了学者的研究兴趣。张倩（2011）聚焦于在线英语教师的

[1] 杨扬,张志强,吴冠军,张丰,吴勇毅,苏德,周跃良,王鉴,李政涛,朱德全,李芒,辛涛,袁振国.“疫情下的信息技术与在线教学”笔谈[J].基础教育,2020,17(03):48-60.

[2] 本研究中的“职前汉语教师”，指没有汉语作为二语或外语教学经验或相关经验较少的新手教师，主要包括尚未毕业的学生教师或毕业后刚开始从事教学工作的教师。

[3] 感谢参与研究的两位职前教师，以及 Live&Fun Learning OET 实习项目负责人刘薇薇老师对本研究的帮助。

身份建构特征，张遐、朱志勇（2015）则对远程教育中教师角色认同理论与研究进行回顾，为相关研究提供理论视角和研究策略。新冠疫情期间，教师在最短的时间内将教学场所转移至线上，而这种特殊的教学实践方式下的外语教师身份建构，也引发学者的探讨。许悦婷（2020）关注疫情爆发后高校外语教师在网络教学中的身份认同问题，指出教师身份动态化与教学改革效果的关联。戴楚洁（2021）则聚焦于熟手汉语教师在远程一对一汉语教学中的身份建构情况，发现该模式下学生社会身份影响师生关系和教师对权威性的感知。从已有研究来看，相关文献主要聚焦于在熟手教师的在线教学实践，对新手教师、职前教师的关注较少，尚无研究关注职前汉语教师在线上教学实践中的身份建构情况。

职前二语教师的身份问题是近年来国外研究者关注的热点话题（滕延江，2018），而教师个体发展研究也受到国内汉语教师教育领域“前所未有的关注”[4]（黄启庆、刘薇，2017）。疫情期间特殊的教育生态下，远程实习项目及线上教学实践的特殊模式，更增加了探讨职前教师身份建构问题的必要性。Live&Fun Learning OET 模式或许能够作为远程教学模式下职前汉语教师的身份建构研究的切入点，给予我们观察职前汉语教师身份建构的方式与因素的可能性，以此评估远程教学实践对职前汉语教师的意义。

二、理论背景

第二语言习得研究于上世纪末开始向社会学转向（丁婷，2018），社会学中的身份建构问题引起教育研究者的关注。身份是“通过感知、行动和理解的循环往复将自己与世界联系的方式”（Van Lier，2007；戴楚洁，2021），而教师身份则指向教师个体在教学行动中对自我意义的追问，对“为什么我是教师”“我是怎样的教师”等本质问题的探索。朱梦华、黄丽锷（2019）归纳出三种不同的教师身份理论取向，包括社会化取向、自我整合取向与学习取向，其中布迪厄（Bourdieu）的相关理论成为教师身份理论的社会化分析视角之一。

实践理论是布迪厄的主要理论，也是其教育思想的基础。在布迪厄实践理论中，场域（field）、惯习（habitus）与资本（capital）是三个基本概念。场域指向“位置之间客观关系的网络或图示”[5]。其中，教育场域作为教师行动空间，近年来受到国内教育研究领域的关注（如马维娜，2002；冯茁，2008；牛海彬，2010）。教育场域被定义为“在教育者、受教育者及其他教育参与者相互之间所形成的一种以知识的生产、传承、传播和消费为依托，以人的发展、形成和提升为旨归的客观关系网络”[6]。作为该网络中重要组成部分，惯习指向人的社会生态性，是个体在社会化的个人境遇中逐渐习得并演变而成的“第二天性”[7]（郭凯，2005）。在布迪厄看来，惯习的运作虽然来自行动者，但其“既不完全是个人性的，也不是行为的全部决定因素”[8]。场域中的资本指向累积形成的劳动，具有生成性。

在身份研究中，二语教师的身份建构是教师教育领域的研究热点之一，而教师身份研究与职前二语教师教育存在密切关系（滕延江，2018）。职前教师身份建构研究领域中，教师

[4] 黄启庆,刘薇.国际汉语教师研究三十年回顾与展望[J].云南师范大学学报(对外汉语教学与研究版),2017,15(02):1.
[5] [美]戴维 斯沃茨.文化与权力——布尔迪厄的社会学(M).陶东风译.上海:上海译文出版社,2006.136.100-104.107.
[6] 刘生全.论教育批评[M].北京:教育科学出版社,2006. 98.
[7] 注：所谓“第二天性”，即惯习本身上不具有先天性，也并不完全由外部决定。
[8] 王岳川.布迪厄的文化理论透视[J].教学与研究,1998(02):40-45+5.

身份建构的影响因素引起学者的关注。张倩（2012）回顾西方关于职前教师身份问题的实证研究，并梳理了职前教师身份建构影响因素方面的研究，主要包括情境因素、经历因素和自传因素（Beijarrd et al, 2004）。其中，职前教师的经历因素指向其在教师教育过程中所获得的见习与实习情境中的经历（Lamote, 2010），职前教师不断与周遭世界建立联系，并在联系的过程中对自我身份进行不断的建构与重构。

本文以社会建构主义为基本立场，认为教师身份具有可变性；而职前汉语教师作为教学实践的新手，其身份建构在实习过程中处于流动状态。同时，布迪厄实践理论及该理论中场域、惯习与资本概念则为本研究的主要理论分析视角。

三、研究设计

1. 研究问题

本研究聚焦于以下两个问题：

（1）远程教学实习中职前汉语教师是如何进行身份建构的？

（2）远程教学实习中影响职前汉语教师身份建构的主要因素有什么？

2. 研究对象

Patton（1990：169）指出了个案研究与目的抽样之间的适切性，认为向研究者呈现可供深度研究、意义丰富的个案是“目的抽样的逻辑与力量”[9]。本文采用个案研究方法，以及目的抽样类型中的独特抽样与方便抽样，选取两位汉语国际教育专业的优秀职前汉语教师 L 与 C 作为本研究的个案对象。

L 就读于国内某外国语大学的汉语国际教育专业，本科三年级。L 成绩优异，热爱专业学习并积极参与专业实践。2020 年，L 获得 LFL 远程实习机会，并进行三个学期的线上教学实践。在 LFL 的实习期间，L 主要负责初级水平中文学习者的一对一在线辅导、学生联络、作业批阅与反馈等工作，同时参加 LFL 组织的集体备课环节和线上教学分享活动。C 与 L 就读于同一所大学的汉语国际教育专业，本科四年级。C 成绩优异，已于 2020 年保研至某所重点大学的汉语国际教育专业。2019 年，C 获得 LFL 实习机会并进行线上教学实践，共计三个学期。在 LFL 实习期间，C 主要负责初级水平中文学习者的一对一在线辅导、学生联络、作业批阅与反馈，以及集体备课环节和线上教学分享活动。

研究对象的选择基于目的性抽样原则。研究者与个案对象共同参与 LFL 的远程实习。在三个学期的参与式观察中，研究者发现个案对象工作态度积极主动，对待教学认真负责，受到项目负责老师的肯定。在课后交流中，研究者了解到两位个案对象在 LFL 实习前都有一定的短期教学经历，并在教学实践的过程中享受教学、将教师视为职业理想。同时，和 LFL 的同期实习人员相比，L 与 C 实践时间相对较长（至少 3 个学期[10]）。基于以上观察与考量，研究者最终选择两位职前汉语教师作为研究对象。

3. 研究方法

本文采用个案研究方法（Case Study）。个案研究是根据现象参与者的观点对自然情景中

[9] Patton, M. Q. qualitative evaluation methods.（2nd ed.）thousand oaks，Calif. : 1990.

[10] 本研究主要观察两位研究对象 2020 年 9 月至 2021 年 7 月的远程实习过程。两位职前教师于 2020 年 9 月至 2021 年 1 月进行第一学期的远程实习，2021 年 2 月底至 2021 年 6 月进行第二学期的远程实习。第三学期则是 2021 年 6 月至 7 月的夏季短学期。

某一现象的实例个案进行深入研究，教育研究领域的个案可以是教学活动的参与者和其他教育活动相关者。在对语言教师个体进行探究时，研究者与教师建立的合作关系也能够促进双方的共同发展（陆晓红，2012）。基于此，笔者认为个案研究方法与教师个体发展研究契合，因而选择个案研究法作为本文的研究路径。

在数据搜集方法上，本文主要使用半结构化访谈与实物资料法。具体过程如下：笔者与两位研究对象共同参加为期三个学期的远程实习，在实习活动中观察并记录研究对象的表现，并及时做好相关文件资料的搜集，包括学生作业及教师批阅反馈、师生邮件、教学反馈报告，以及与研究对象的线上交谈记录等。第三学期正式结束后，笔者使用在线会议平台与两位职前汉语教师分别进行了一对一的半结构化访谈，共计 2.5 小时，并在访谈结束后对录音进行转写，共计约 40,000 字。分析资料前，笔者将访谈内容中所提及的事件与实物资料进行核实，以确保被访谈者所描述内容的真实度。

本文采用教育叙事研究（Narrative Research）视角呈现数据文本。教育叙事研究聚焦于教育活动，旨在真实教育事件的剖析中获得意义与经验（赵蒙成，2014）。叙事研究视角以真实叙事为载体，强调“以经验的分享为取向，以实践的反思为媒介，以意义的构建为目的”（孙智慧、孙泽文，2018）。本文将以叙事分析（Analysis of Narratives）为本文分析路径，从叙事中对文本数据进行概括、归纳与分析。同时，场域理论将作为本研究的分析工具，帮助笔者根据研究结构挖掘文本数据背后的深层信息。

四、研究发现

1. 远程实习中职前汉语教师身份建构的方式

1.1 线上的教与线下的学

在 Live&Fun Learning OET 远程实习模式下，两位职前汉语教师都认为，线上教学实践帮助其将大学内的学习生活与在线的实习工作进行分离。C 用“打开电脑”与“关闭电脑”作为自己在老师状态与学生状态的切换方式：我感觉就是当你打开电脑，比如你和学生（在摄像头面前）面对面的时候，然后你就是个老师；当你关闭（电脑）的时候，然后你就回到了一个学生（的状态）。（C）

时间与方式的不同都有助于职前教师分开实习生活与学生生活。L 将工作日作为相对集中的线下学习时间，周五与周末专注于线上实习的任务：我在学校文体馆附近跟朋友吃饭，也会跟我的朋友去聊天。我们（那个时间段）聊天，都会说我这周要给学生上课，然后我发现我们两个同时到了周末，到周五、周六、周天的时候，我们两个谈话、发微信的内容都（和其他时间）不一样，聊很多上课和学生的事。我觉得（周五，周六，周天时）线上（教学）确实是把我的实习和我的学生生活分开了。（L）

惯习主要来自外在结构的内化，是“以连贯一致的系统方式对场域的要求作出回应”[11]。原有的汉语国际教育专业学生身份成为职前汉语教师的身份惯习，而实习项目便为其提供特殊的域限（杨宏丽、陈旭远，2012），使其“站在教师身份与学生身份的边界之上”[12]。场域指向“位置之间客观关系的网络或图示”，是有关于权力抗衡与较量的空间[13]。在本个案中，

[11] (法)皮埃尔·布迪厄，华康德.实践与反思——反思社会学导论[M].北京:中央编译出版社,1998.17-19.
[12] 杨宏丽,陈旭远.基于实践课程的实习教师身份认同考究[J].教育理论与实践,2012,32(28):33-36.
[13] (美)戴维·斯沃茨.文化与权力——布尔迪厄的社会学[M].陶东风译.上海:上海译文出版,2006.136.100- 104.107.

远程实习模式似乎使职前教师的线上教学场域与线下学习场域之间形成某种意义上的割裂，拉远了与教师身份建构资本与学生身份惯习之间的距离，推动其“线上教学实践者”的身份建构。

但是，线上实习生活与线下学习生活的分离，并不意味着二者之间的互动也因此削弱。L 在本科三年级时，学校开设了一门案例分析课，而 L 的教学经历便成为他在课上进行案例分析的灵感来源与有效素材：本科生有汉语教学经验的很少，我可能比别人有更多的实践。我们这学期有教学案例分析课,要去找教学视频进行分析。我室友选的是跨文化交际(主题),我就直接给了他我的上课视频,(发现)原来自己的上课视频也可以出现在课堂上。在这门课上，我自己进行了案例分析，明显会发现自己上过课后，我的分析会比别人更实际、务实一点，我觉得这是我最大的收获。(L)可见，远程实习模式实现了线上教学场域与线下学习场域的分离与互动，职前教师在二者之间实现教师与学生身份的切换，并将远程教学经验反哺于线下专业课程学习。

从没有教学经验的汉语国际教育学生，到线上教学经验的增加的实习教师，L 的在线教学经验反哺于自己的线下学习生活。同时，L 在远程实习中的作业批阅环节，对学生作业中出现的错误产生了浓厚的兴趣，并生出在实习结束后对所有作业资料进行整理，将其作为本科毕业论文的数据来源：我在线上实习里还有一个任务是作业批阅。我批改完之后用邮件给这个学生反馈回去，然后我其实隔一段时间会做偏误的收集。然后包括我自己的毕业论文，其实也是在想建一个针对纽大学习者的偏误语料库，然后来进行分析。(L)

布迪厄（1998）认为场域运作与转变的动力来自于资本与权力，只有在“与场域的关系中，资本才得以存在并发挥作用”[14]，并赋予场域中带有支配作用的权力。在远程实习及线上教学实践中获得的教学经验，成为了 L 在线下高校内专业课程中，完成课堂展示作业的主题与资料。而从日常批阅作业中获得的学生文件，也成为 L 本科学位论文的选题灵感与语料库数据来源。这些有形或无形的文化资源成为 L 在专业学习过程中的优势。当职前教师将线上教学场域中积累的文化资本转移至线下学习场域时，作为行动者的职前教师与其他专业学生相比拥有数量更多、质量更高的文化资本，因此在追求场域中特定主导资本时，便置于与其他行动者不同的场域位置（原晋霞，2008）。可见，职前教师在教学场域中积累的文化资本，成为线上教学场域与线下学习场域之前产生联系的契机。

1.2 发现问题与应对危机

实习过程中，问题往往由指导教师指出或职前教师发现；在指出或发现后，问题便成为引起职前教师反思的契机。在线上集体备课中，一向以积极反馈为主的指导教师在审核集体备课成果时，直接在线上文档中标注出了备课中的错误出处。L 对这一段经历仍然记忆犹新并不断进行反思：我记得我刚开始的时候,我们小组备课,当时改了三版之后就直接上传了,老师直接发了一封邮件过来，说我们某一个语言点的问题特别大，直接那一栏打了个叉，当时给我们小组的反馈是，备课小组里 12 个老师，没有一个人发现有这样的问题。那一个瞬间，我就觉得我还是学生，而且专业知识没有很好地在备课里体现。(L)

当面对学生未遵守远程作业收发规则时，职前教师在最终面临无法解决的问题时，向指导老师寻求帮助成为其最后的求援路径：学生可能过了两天还没有交作业，我会先给学生发

[14] [法]布迪厄,[美]华康德.实践与反思——反思社会学导引[M].李猛等.北京:中央编译出版社,1998:139.

一封邮件，如果学生还是没有回，或者实在联系不到学生，我可能在我解决不了的时候再去寻求帮助。（L）

问题不仅出现在教师教学备课的过程中，也会出现在学生层面。从学生的旷课问题中，L 发现自己缺乏某种教师应该有的原则性：我们确定时间之后，学生会有时候会迟到，会说“我们可以拖延半个小时吗”，或者有时候他会直接不上了。有的学生他就是不太遵守时间，然后我就觉得挺麻烦、困难的。（L）

面对学生的失联和师生信息对接的不平衡问题，职前汉语教师 C 发现自己缺少有效解决问题的路径，问题解决的最终结果有时会以失败告终：学生作业也是问题。一个是他们写不清楚，我看不明白是什么意思，然后就无法判断到底是对还是错，然后还有就是经常犯（同样的）错误，我不能和他就是对当面说，也不确定他是否打开了（我给他发的作业反馈邮件）。（在作业中）我会给他打一个问号然后发给他，然后后面学生也没有再返给我的一个信息，就这样中断了。（C）

虽然在线教学过程中学生会出现各种各样的问题，但实习期间发生的问题似乎成为职前教师反思自身的契机。C 认为在面对学生不遵守远程课堂规则时，自己不具备教师所应有的严厉品质：我们确定了时间之后，学生有时候会迟到，有时候会说我们可以拖延半个小时吗，有时候会直接不上了。我觉得这个就比较那个麻烦、困难，在有的学生不太遵守时间的时候。我还没有觉得自己特别严厉，没有让学生觉得我应该怎么样。（C）

教育场域理论中，冲突与矛盾是无法回避的议题。六生全（2006：85）指出场域这一关系网络发展演变的过程，也是场域中“冲突、矛盾和斗争不断酝酿与演化的过程”，并且这类冲突与矛盾并非只带来消极作用。在远程实习中，职前教师 L 与 C 在备课、教学、作业收发等环节不断遇到问题，而这些问题表面反映职前教学备课经验不足或对学生管理规则执行不够清晰等，但实际上则是“各种不同权力形式的拥有者之间对权力的争斗”[15]，迫使职前教师意识到个体在该场域中权力的缺失。正如方才所说，冲突与矛盾并非只是对场域中行动者构成威胁，不可只将其视作消极的存在。我们可以从研究对象的叙述中看见，实习过程中发生的问题及背后隐藏的矛盾，似乎成为了影响职前教师身份建构的关键性事件，迫使其意识到作为学生有限的文化资本和权力与理想中教师身份建构之间的冲突。

2. 远程实习中影响职前汉语教师身份建构的因素

2.1 指导教师对职前汉语教师身份建构的影响

远程工作的模式削弱了实习教师与指导教师之间的的伙伴协作关系。因为时差的关系，指导教师独立完成中文课的教学工作，而处于另一时区的实习教师则需要选择合适的时间，在课后完成作业批阅、在线辅导、学生口语作业反馈等辅助工作。在这种相对特殊的实习情境下，指导教师对职前国际汉语教师的身份建构产生影响。

面对指导教师在实习教师教学过程中的缺位，职前教师似乎并不确定自己是否具有足够的权力独自维持课程管理，而学生经常出现的旷课、迟到现象，也进一步加强了职前教师内心的自我质疑：我们确定了时间之后，他（学生）会有时候会迟到，有时候（学生）会说我们可以拖延半个小时吗？或者有时候他（学生）会直接不上了，我觉得这个就是比较困难的，有的学生他就是不太遵守时间。（C）

[15] [法]布迪厄,[美]华康德.实践与反思——反思社会学导引[M]. 李猛等.北京;中央编译出版社,1998:285.

当教师在处理学生课堂问题时，往往会在规则面前出现犹疑并最终选择柔性处理的方式。表面上是学生是否在线上课堂上准时出勤的问题，实际则为职前教师是否能在远程工作的环境下，以专业教师的课程管理原则去规范学生的问题行为：有一次我的学生忘了要上课，上课时间过了之后，他回了邮件问能不能补课。我当时是第一次实习，因为想到那个学生平常表现很好，我就说可以给你补课，于是从晚上 11 点给他补课。（L）

当学生屡次出现问题，未遵循职前教师的屡次提醒时，指导教师便成为了职前教师权力执行的"传话筒"，帮助职前教师督促学生完成相应的教学任务：我觉得自己学会怎么进行一些任务的对接，或者是一些反馈，然后怎么进行修改。我记得当时老师说，如果有学生一直有什么问题，可以给他发邮件。我发过几次邮件，然后老师就会和你解释他们（学生）为什么会犯这种错误，然后老师知道了这种问题，也会再告诉、提醒学生。（C）

实习教师通过邮件向指导教师求助之后，指导教师通过邮件对职前教师进行课堂规则的强调，向其赋予进行课程规则管理的权力：学生没有交作业，然后我给他发邮件之后学生说他会尽快补齐。其实我们知道学校这边的要求是超过三日之后补作业也是不批改的。如果我在 1~4 月份的时候，学生可能超了四五天了才发来，我依然会给他改了之后再反馈过去，但是现在如果他超了三天他没有发，那我就是没有改，会有一个原则性的执行。（L）

指导教师与实习教师通过邮件与在线信息的交流，向职前教师进一步规范了其作为教师的权力，而这种赋予权力的过程被 L 比作"得到了某种指令"：之后老师说，如果说你的学生在课堂结束之后出现，就不用补课，因为这样会增加你的负担。我发现从这个时候开始，好像是得到了某些指令一样。老师告诉我可以这么做，可以不给学生补课，然后我那节课以后（在学生出现旷课情况之后）再也没给学生补课。（L）

在面对一些问题性事件的时候，职前教师与课程负责教师（其也是职前教师的实习指导教师）同属于一个"阵营"，共同成为了问题的解决者。在线上实习这一特殊情境下的共事形式给予职前教师一定的团队归属感：本来跟刘老师和高老师的话，我（感觉自己）是被培训者，就像是他们是在带一个新手的感觉，但是有那么一瞬间（让我改变了），就是高老师有些在我们那个群里通知了全员，然后告诉我们说，学生有什么什么样的情况，然后我们统一起来怎么去回复、去应对，我像是一个团队中的一员，是这样子。（L）

在布迪厄实践理论中，资本是行动者的实践工具（任文、徐寒，2013：17），而教育场域下教师的文化资本便是其在教学活动中践行权力的前提。教育场域下的文化资本将合法性附于建构特定现实的方式之上，而这便是某一群体主宰另一群体的基础（Inghilleri，2005：70）。作为此次中文项目的主要负责人、授课者与职前教师实习过程中的指导者，LFL 合作的各个外方大学的中文教师，掌握足以便于其在在教学活动中践行权力的文化资本。而作为大学高年级本科生，L 与 C 在教育场域下作为学生的惯习也随之不断内化。当职前教师带着自身已有惯习与资本来到全新的教育场域时，很可能处于相对弱势的地位。但是，当指导教师试图以邮件的形式，成为职前教师与外方学生之间的联络者，帮助职前教师向外方学生强调与课堂、作业有关的细则，并代替职前教师向学生的违规行为作出警告时，指导教师将其已有的文化资本及其背后所隐藏的权力与职前教师实现了暂时的共享，该特定场域下的权力共同体也同时产生，影响职前汉语教师的身份建构。

2.2 学生对职前汉语教师身份建构的影响

尽管远程实习削弱了师生的互动，但职前教师仍将学生的进步与对自己的认可视为这段远程实习的最大意义：我的成就感第一个就是学生的汉语水平提高了。我自己很享受备课的过程，然后我觉得让我觉得我做的一切都值得的时候，是我的一个美国学生，他没有任何的汉语背景，学过一年之后，他的汉语水平要远远高于我的另一个华裔学生，我会觉得是一个很值得的事情。（L）

在短期的远程教学中，教师发现初级水平学生在自己的教学与互动中并没有丧失学习中文的兴趣，反而加强了学生继续学习中文的想法与学习动机，成为职前教师产生感触、进行反思的节点：然后他当时那天让我最感触最深的，是他的反馈，他上课的时候他跟我说，以后会继续学习中文的下一个 level（水平）。（L）相反，一旦与学生直接相关的线上授课与辅导环节出现差错，便也成为形成职前教师挫败感的主要因素：我觉得最大的挫败感是最开始，我感觉如果是准备得不是很认真，然后这节课也能上，但是上完之后感觉，学生好像没有掌握很多东西，然后自己好像，也不是很在状态，就会有很就会挫败感，感觉得自己好像并没有准备好。（C）

帮助学生渡过语言学习中的问题与危机，引导学生突破远程汉语学习所带来的挑战，增加了职前教师对教师身份的认同：在这个过程中你能感受到这个学生是有进步的，或是你发现他有问题，进行一个小小的纠正，引导他说出目标的句子，然后在后面的课里他又会自己用到了，我会觉得我很有成就感。（C）他（接受线上辅导的学生）说我这一年的对他帮助很多，他说自己原来其实对中文真的很害怕，有一段时间确实是整个状态特别不好，但是那段时间，我依然是很开心地准备各种各样的话题，让他觉得始终很快乐。（L）

布迪厄（1998）认为场域具有动力学原则，即正是因为场域存在各种悬殊的力量，资本才得以存在并发挥作用。场域中，资本赋予行动者用于支配场域的权力，兑换各自不同的资本，改变力量差异的程度，成为场域不断生成发展的动力。[16]二者在资本上的差异指向双方在场域中所存在的不同的力量。相较于学生而言，职前汉语教师在线上教学实践这一特定情境中具有更多文化资本，而学生应其身份而具有的象征资本，则是职前教师身份建构的影响因素。在线上教学场域的特殊机制下，职前教师与学生对各自不同的资本进行兑换，其各自不同的力量也随之动态更新。

五、总结

近年来，教师个体发展研究受到国内外语言教师教育领域的关注。疫情期间特殊的教育生态下，远程实习项目及线上教学实践的特殊模式，也增加了探讨职前教师身份建构问题的必要性。本文主要以质性研究方法，探究远程教学实习中职前汉语教师身份建构的方式与影响因素。研究发现，在身份建构方式层面，职前汉语教师身份建构以问题为导向，如何应对问题成为教师身份建构的契机。远程实习模式实现了线上教学场域与线下学习场域的分离与互动，职前教师在二者之间实现教师与学生身份的切换，并将远程教学经验反哺于线下专业课程学习。在影响因素方面，学生与指导教师是影响职前汉语教师身份建构的主要因素。相较于实习教师之间的同侪互动，指导教师积的线上反馈与远程团队协作意识利于职前汉语教

[16] [法]皮埃尔·布迪厄, [美]华康德著, 李猛、李康译,《实践与反思——反思社会学导引》，中央编译出版社.1998:139.

师身份建构。

基于互联网的远程教育实习模式下，职前汉语教师的身份建构过程是复杂、动态的。本研究只选用两位职前国际汉语教师作为研究样本，并只是基于一个远程实习项目作为背景，因此研究结论的适用范围可能比较有限，无法做出普遍性推论；但仍希望能引起学界对职前国际汉语教师身份建构的关注，以及对新教育技术背景下职前国际汉语教师身份建构方式与影响因素的探讨。

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A Cace Study of the Identity Construction of Pre-Service Chinese Language Teachers in a Distance Internship Program

Abstract: With the application of new educational technology in language courses, the identity construction of language teachers in distance teaching practices, especially in recent years, has gained the attention of researchers. This paper focuses on the identity of pre-service Chinese language teachers, offering an in-depth analysis of their identity construction in a distance internship program. The study looked into the identity construction of two senior undergraduate students, who participated in an online teaching program as intern teachers for a 10-month period. Participant observation and semi-structured interviews were used as approaches for data collection. From the perspective of narrative analysis, the study aims to explore the ways in which the two pre-service language teachers constructed their teacher identity in distance teaching practices, as well as the factors which contribute to their identity construction. It is found that the identity construction of pre-service Chinese language teachers can be seen as problem-oriented, which indicates that how they responded to problems can be considered as an opportunity for teacher identity construction. Moreover, the online working mode enables pre-service teachers to separate the teaching field from their learning field. The separation helps them better transform online teaching experience into practical knowledge and develop insights into their own instruction cases. During online teaching practices, students and instructors are the two main factors affecting the identity construction of pre-service Chinese language teachers. Compared with the peer interactions among intern teachers, the positive feedback from instructors and the efficiency of teamwork with instructors facilitate the construction of teacher identity of pre-service teachers. It is hoped that this paper may draw attention to the identity construction of pre-service language teachers in online teaching practices, and provide possible reference for studies in the near future.

Keywords: teacher identity construction; distance teaching; pre-service Chinese language teacher; case study; narrative analysis

EFL teachers' corpus literacy empowerment: Exploring a multifaceted teacher training model aided with corpus-based

LI Shuquan, XU Manfei
South China Normal University

Abstract: Over the past decades, the popularity of corpus linguistics has attracted attention at home and abroad. A multitude of research articles, conference papers, and book chapters have made corpora well-known in linguistic research. However, these monumental breakthroughs have not yet been sufficiently converted into a language-teacher-training perspective especially in primary and secondary educational context. This paper argues that the empowerment of EFL teachers' corpus literacy is pivotal in their whole professional developmental stage. This study will also directly contribute to the establishment of a multifaceted teacher training model, which is not only for perspective teacher trainees but also for in-service English teachers. With the help of step-by-step teaching instructions based on corpus, vocabulary, grammar and discourse are taught through free and user-friendly corpus tools and resources. This study also discusses pedagogical implications on how to cultivate English teachers' corpus literacy and the main obstacles that may be encountered in the process of implementing corpus literacy training.

Keywords: corpus literacy; language awareness; corpus linguistics; teacher training; English education

1. Introduction

The last couple of decades have seen a dramatic increase in corpus availability and a steady growth in the number of supporters of the use of corpora in language teaching. The increasing popularization of corpus tools and resources may be attributed to the technological improvements which have made corpora and corpus tools easier to construct, download, buy and access. The accessibility of huge bodies of naturally occurring texts has made it possible for non-experts to gain new insights into language structure and how language is actually used of particular language materials.

Corpora allow learners to be creative and engage in a process of interpreting the data and creating models of their own. Within teacher education, corpora offer great potential for developing language awareness and research skills (Coniam, 1997). Corpora also stimulate learners' curiosity by providing the linguistic hints and encouraging them to formulate questions during the process of working through naturally occurring data (Bernardini, 2002). Teachers who choose to use corpora in their language classrooms will need to be discerning about corpus software and the common functions and applications of them. Generally speaking, extraction of data from texts, processing the output, and interpretation of output are three basic phases when using corpus tools.

Mukherjee (2006) and Braun (2007) argued that the influence of applied corpus-linguistic

research on the actual practice of language teaching is in reality still relatively limited. Constraints such as absence to computers and the Internet, the time-consuming design of corpus-based activities, and the lack of inductive learning strategies to interpret concordance lines have concerned most teachers (McCarthy, 2008; Reppen, 2010; Breyer, 2011). Another major drawback is that so far little attention has been paid to the inclusion of corpus-linguistic content in the curricula or syllabus of teacher education programs (Boulton, 2011; Flowerdew, 2012; Leńko-Szymańska, 2014). Apprentice users do not always know how to choose between different types of corpora and also appear to experience considerable difficulties in formulating corpus queries. They have very little idea of how to access free, easily available and user-friendly corpus resources (Römer, 2010; Tribble, 2012; Chambers, 2019).

2. Literature review

Heather and Helt (2012) defined corpus literacy as a multifaceted set of complex skills to use the technology of corpus linguistics to investigate language and enhance the language development of students. Mukherjee (2006) and Callies (2019) have identified several components of corpus literacy: (*a*) understanding basic concepts in corpus linguistics; (*b*) searching corpora and analyzing corpus data by means of corpus software tools; (*c*) interpreting corpus data; (*d*) using corpus output to generate teaching material and instructional activities.

Researchers have always been seeking to investigate teachers' corpus literacy by means of various types of approaches. Mukherjee (2004) conducted a survey on English language teachers (N = 250) in Germany who attended teacher training workshops on corpus linguistics and found that there is an immense gap between corpus linguists' enthusiasm about the language-pedagogical potential of corpus resources and the harsh reality of English language teaching in Germany. Farr (2010) also made similar attempt to elicit responses from a random sample of 10 general MA programs in ELT/TESOL/TEFL in both the UK and the US, and discovered that only 3 of them (roughly 30%) make any direct reference to corpus linguistics in their syllabus description literature. Recently, Callies (2019) reported that younger generation of language teachers who have been trained in the use of corpora for research purposes in their university studies demonstrate certain expertise in familiarizing how to integrate corpora and corpus resources to primary or secondary school settings. Approximately one third of the participants learned about corpus linguistics in their university studies.

Today's language teachers need to have an array of technology-related competencies and skills that can also be passed along to their students. Evidence has shown that engaging in corpus-based activities promotes corpus literacy, which is an intrinsic part of a teacher's methodological repertoire and empowers them to work in a modern world where technology is immensely incorporated into language teaching.

This article will contribute towards the establishment of a sound theoretical and pedagogical model for the integration of corpus literacy into language teaching and learning by offering feasible and typical examples of corpus-based tasks for increasing teachers' understanding of the

teaching on vocabulary, grammar, and discourse. We have also outlined some practical considerations and directions for the inclusion of corpus linguistics in language teacher training programs that attempt to enhance teachers' language awareness and linguistic sensitivity.

3. A multifaceted teacher training model

In view of the existing training models or programs on developing EFL teachers' corpus literacy (e.g., Farr, 2008; Breyer, 2009; Heather & Helt, 2012; Leńko-Szymańska, 2014; Callies, 2016; Ebrahimi & Faghih, 2016; Zavera, 2017; Krajka, 2019; Farr & O'Keeffe, 2019; Muhammad, 2020; Ma *et al.*, 2021), it seems fitting to call for the integration of corpus linguistics into the curriculum for English language teachers by exposing them to the use of corpora and corpus methods from a researcher's, teacher's and learner's perspective. Several issues need to be taken into consideration on the integration of corpus literacy into language teacher training programs. First of all, sufficient teacher mediation and guidance is a necessary prerequisite for successful application of corpora in language teaching. Besides, it is of great importance to gain insight into trainees' perspective on challenges they face when using corpora in the classroom. Additionally, technological infrastructure and instructional materials may advance participants necessary skills on the use of corpora for conducting research in educational settings. Last but not least, more attention could be paid to the necessary pedagogical knowledge and skills for successful application of corpus literacy in language classrooms.

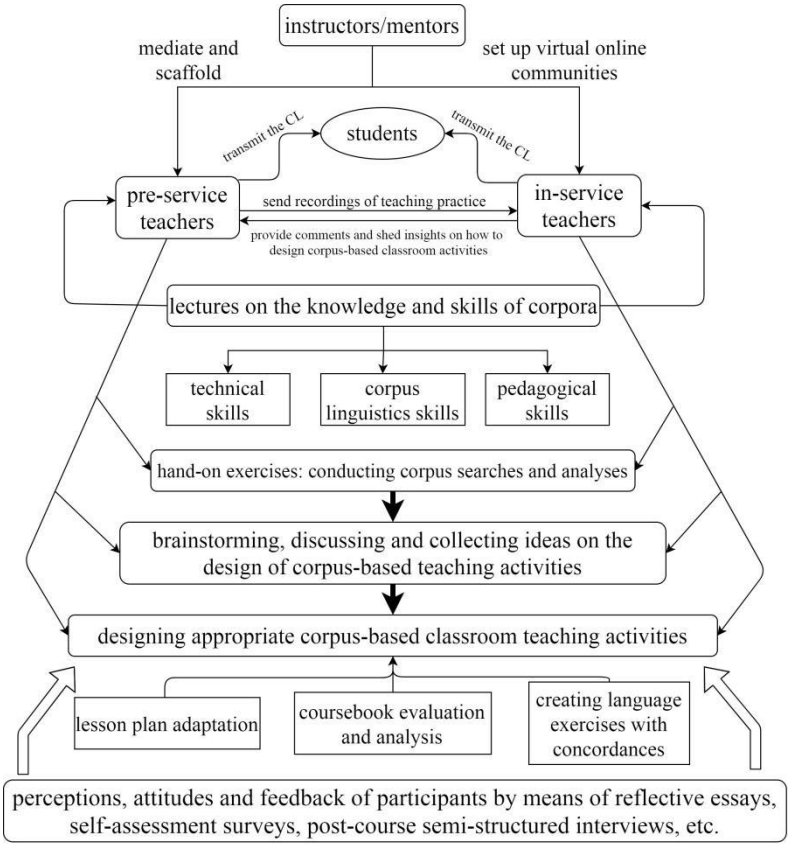

Figure 1. A model of the cultivation of corpus literacy in EFL classroom settings

From Fig. 1, it is clear that both pre-service and in-service teachers who participate in the training program should go through five stages. In stage one, they are given some lectures on the basic knowledge and skills of corpora. In stage two, they need to finish some hand-on exercises concerning corpus searches and analyses in order to get familiar with interface and functions of corpus tools and corpora. In stage three, participants collaborate with teammates to brainstorm ideas on the design of corpus-based tasks. In stage four, each participant is going to contribute at least one section of the group mini-project by adapting already-available non-corpus-based lesson plan, evaluating textbooks in a corpus-assisted way, or creating language exercises with concordances. In the last stage, they are required to report their individual feelings on the implementation of corpus-based language teaching. It should be noted that some EFL teachers might have not heard about corpus or its implementation in language teaching, so program organizers may need to mediate and guide pre-service teachers throughout the whole training session. On account of in-service teachers' teaching reality, it would be better to establish virtual online communities in which forums for discussion can be a feasible alternative. This model also highlights the importance of linking pre-service student teachers with in-service teachers to ensure that they help each other to promote corpus literacy in a continuous and sustainable way.

4. Corpus-based EFL teaching instructions

Some researchers have offered samples on corpus-based language teaching. Breyer (2009) designed a corpus-based teaching activity to compare the use of "*some*" and "*any*". Krajka (2019) put forward some language-related tasks successfully used in an EAP classroom setting. Callies (2019) conducted an activity on the acquisition of intensifying adverbs. Students were divided into groups to examine the use of intensifying adverbs ending in "*-ly*" that precede an adjective, adverb or verb. As more online distance education programs proliferate, the use of corpora in teacher education is becoming increasingly common. Both perspective teachers and in-service ones are eager to learn how to work with corpus tools and apply them efficiently in language classrooms, but there are few examples on how to use the tools in real EFL primary or secondary classrooms. Therefore, we are in need of more corpus-based teaching materials with concrete teaching suggestions which are integrated into existing textbooks.

When designing corpus-based activities, teachers and learners have to be provided with access to corpora with simpler interfaces and fewer options to avoid confusion for corpus analysis. We also need to consider which groups of learners may profit most from which type of materials. For beginners, we can provide easy-to-digest information (e.g., the use a corpus of children's literature or "graded reader texts") and not to overwhelm them with the complexities of rules. For intermediate or more advanced learners, choice of topic and level of lexical difficulty should be tailored to their specific needs. Supplementing the reading texts with screen capture videos would make the topics more understandable and interesting. Recordings of everything done on the computer screen along with the instructor's narration better explain the procedures of conducting

corpus-based language teaching and learning. Due to the length of this paper, three corpus-based teaching activities are omitted, and we may present them in the conference held in October.

5. Concluding remarks

The present study has attempted to describe how corpus literacy can be promoted for EFL teachers by exploring a multifaceted teacher training model aided with corpus-based teaching instructions. In our exploratory and investigatory research on the role of corpus linguistics in supporting pre-service and in-service teachers in their work, it can be assumed that corpus resources and methods have great potential to improve the educational experience and complement other effective and existing approaches.

For corpus linguistics to realize its enormous potential for data-driven and research-based language learning and teaching, both perspective teacher trainees and experienced, qualified in-service teachers must be provided with corpus literacy instruction. To popularize the use of corpora and foster language teachers' corpus literacy, it would be feasible to integrate corpus literacy instruction in initial stages of language teacher education degree programs and extending it throughout the whole English language teaching curricular. To further stimulate EFL teachers' interest in doing corpus-based research, we argue that the required technological infrastructure in educational settings is the prerequisite for exposing teachers to longer or more intensive instruction and training in corpus linguistics which may bring about better immediate and long-term responses in their uses of corpora for teaching and research purposes.

In our exploratory research, we simply reviewed previous studies concerning the cultivation of corpus literacy. Broadly speaking, we do not conduct investigation on EFL teachers' attitudes towards the effective training of corpus literacy. In future research, interviews might be adopted to explore their attitudes on the implementations of corpus literacy. Questionnaires or surveys can also be collected to measure the participants' corpus literacy to uncover individual's corpus search/analysis competence. More research also needs to be done to determine the extent of corpus literacy that teachers need to possess to successfully teach with corpora. To better understand teachers' existing problems and needs, workshops or online teacher-training programs on applied corpus linguistics seem promising alternatives. The corpus literacy training model we have established needs further verification on its validity and reliability. It would be better if we put this framework into practice and embark on subsequent empirical or longitudinal studies to demonstrate its effectiveness with both statistical and qualitative evidence (e.g., corpus-based tasks, questionnaire, observations, teacher diary/log, interviews, reflective essays, teaching assessment, etc.). To implement this model in reality, we can invite a larger number of participants within and across different schools and universities to train them to use and exploit corpora on the actual classroom practices so that the model could be generalized more broadly.

Only by extensive exposure to corpora with suitable teacher training in the applications of corpora in language education can future teachers bring a substantial change in the scope of corpus use in language classrooms in a wider educational setting. It is hoped that EFL teachers

gain more confidence in handling corpus-processing software and in interpreting the output of their analyses.

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职前国际中文教师 TPACK 现状调查与分析

师亚欣
北京外国语大学

摘要：TPACK（即整合技术的学科教学知识）是信息化环境下对教师教学能力的新要求。本文参照 Schmidt 等人开发的量表，设计了职前国际中文教师 TPACK 量表，对北京市某高校 100 名职前国际中文教师进行调查。研究发现：（1）目前职前国际中文教师 TPACK 整体处于中等水平，对于 TPACK 七个要素的掌握程度存在不均衡现象；（2）相关性方面，TPK 与其他六个要素之间呈显著正相关关系，由此可见 TPK 是现阶段职前国际中文教师提高自身 TPACK 能力的重要突破口；（3）影响因素方面，是否参加微课比赛、有无线下或线上中文教学经历均会对职前国际中文教师 TPACK 产生显著的差异性影响。

关键词：职前国际中文教师；TPACK；整合技术的学科教学知识；信息技术

一、引言

2020 年新冠肺炎疫情的爆发加速了信息教育时代技术的变革，线上中文教学由边缘到中心，职前国际中文教师面临在未来教学中如何将技术知识、教学法知识和学科内容知识三者有机整合的挑战，这是信息化环境下对教师教学能力的新考验。职前国际中文教师是否已具备相应的现代技术素养？能否将技术知识、教学法知识与学科内容知识三者间有机整合以应对新的挑战？因此本文拟调查新形势下职前国际中文教师 TPACK 现状及影响因素。

Mishra 等人 2005 年提出 TPACK(Technological Pedagogical Content Knowledge)，即整合技术的学科教学知识，包含三个单维度的核心要素和四个由核心要素相互交叉形成的多维度的复合要素，共计七个要素。三个核心要素为 TK（技术知识）、CK（学科内容知识）和 PK（教学法知识）；四个复合要素为 PCK（学科教学知识）、TCK（整合技术的学科内容知识）、TPK（整合技术的教学法知识）和 TPCK（整合技术的学科教学知识）。TPACK 强调教师在进行信息技术与教学整合过程中，技术知识、教学法知识、学科内容知识三者间的相互联系和作用，是信息化环境下对教师教学能力的反映。

二、研究方法

本文参照 Schmidt 等人开发的量表，设计了职前国际中文教师 TPACK 量表，对北京市某高校 100 名职前国际中文教师进行调查。本研究共发放问卷 100 份，回收 99 份，共有 96 份有效问卷，有效率为 96.00％。通过 SPSS 对调查问卷数据进行统计，得出 Cronbach's Alpha 值为 0.922，KMO 值为 0.932，Sig 值达到 0.000，说明本调查问卷内容设计与研究目标吻合程度较高，信度、效度可靠，可用于进一步分析研究。

具体分析时，笔者先通过 SPSS 对调查数据进行描述性分析统计，以探究职前国际中文教师 TPACK 现状，然后使用 Pearson 相关性分析对职前国际中文教师 TPACK 七个要素之间的相关性进行分析。最后通过独立样本 T 检验对调查数据进行检验，以探究微课比赛、线上和线下教学经历是否影响职前国际中文教师 TPACK 水平。

三、研究结论与建议

3.1 结论

3.1.1 职前国际中文教师 TPACK 现状

研究发现，目前职前国际中文教师 TPACK 整体处于中等水平，对于 TPACK 七个要素的掌握程度存在不均衡现象，各维度均值由高至低依次排列为 CK＞TPK＞PK＞TCK＞TPCK＞PCK＞TK。CK 均值最高，是由于调查对象本科专业多为汉语国际教育专业，且已研修一学年国际中文教育学科内容知识类课程。TK 均值最低，虽然研修现代教育技术类课程有利于提高技术知识，但是作用有限，尤其是在新冠肺炎疫情爆发加速信息教育时代技术的变革、短时间内大量新型技术涌现的背景下，职前国际中文教师需要面对诸多技术方面的挑战。

职前国际中文教师 TPACK 七个要素之间呈现显著正相关性，TPK 与其他六个要素之间的相关系数最高，由此可见 TPK 是现阶段职前国际中文教师提高自身 TPACK 能力的重要突破口，需强化 TPK 学习，以便促进 TPACK 短时高效提升。

3.1.2 职前国际中文教师 TPACK 影响因素

影响因素方面，是否参加微课比赛、有无线下或线上中文教学经历均会对职前国际中文教师 TPACK 产生显著的差异性影响，这与许多学者的研究结果一致。是否参加过专业领域的微课比赛，在 TK、TCK 方面差异显著；是否有中文教学实习经历，在 PK、PCK、TCK 三个方面差异较显著；是否有线上中文教学经历，对 PCK、TCK 两个方面差异显著。是否参加微课比赛、有无中文教学经历及线上中文教学经历均会对职前国际中文教师 TCK 产生显著影响。由此可见，通过参加微课比赛、线上或线下中文教学，可以有效促进职前国际中文教师技术知识、教学法知识、学科内容知识三者间有机整合能力的发展。

3.2 建议

3.2.1 增加相关技术培训或讲座

通过调查发现，现代教育技术类课程对现阶段职前国际中文教师提高自身技术知识作用有限，相关院校应及时开展针对新技术的讲座或培训，普及讲解在中文教学中如何利用新兴技术，帮助职前国际中文教师度过教学中的技术难关。

3.2.2 鼓励职前教师参加微课比赛

微课比赛在促进职前国际中文教师技术知识、整合技术的学科内容知识方面作用显著，因此可以鼓励职前国际中文教师积极参加专业领域的微课比赛，以赛促学，从而深化对学科内容知识的理解，提高自身技术知识水平，促进教学能力和专业素养的提升，为今后从教奠定夯实基础。

3.2.3 提供丰富的教学实习机会

后疫情时代，线上教学已成为中文教师必备的教学技能，现阶段职前中文教师已具备较为扎实的专业基础知识。教学实习是促进教学理论知识向实践转化的必要渠道，也是影响职前教师 TPACK 的关键因素，相关院校应创设丰富的线上教学实习机会，培养职前国际中文教师运用现代教育技术进行中文教学的能力，促进其 TPACK 能力的发展。

[作者简介] 师亚欣（1998-），女，汉族，北京外国语大学汉语国际教育专业硕士研究生。

CALL in Vocational Education

职业教育信息化发展研究

Research on the development of vocational education informationization in the era of educational informationization

GAO Ruijie, LIU Mingjin
Sichuan Water Conservancy College

Abstract: The Education Informatization 2.0 Action Plan issued by the Ministry of Education has provided a great impetus for the development of vocational education informatization in China, so as to realize the purpose of deep integration of information technology and education, promote the innovation and development of education informatization, and achieve the goal of promoting the improvement of teaching, optimizing management and enhancing performance. This study analyzes the current trend and important issues of China's vocational education informationization in the past decade from the perspectives of two major categories, namely, vocational education-diploma education and non-diploma vocational training; and also analyzes how to get out of the current dilemma of talent gap in ten key fields of China's manufacturing industry. The research data reveal that university-enterprise cooperation, informationization building, cloud computing, modern vocational education system are the current research focus; Information-based teaching ability, information literacy, targeted poverty alleviation, mixed teaching, smart education, artificial intelligence and teaching mode are the research hotspots and development trends for the future. It also analyzes how to build a more mature vocational education system and puts forward new ideas for promoting the great cause of rejuvenating the country through science and education. It is expected that the analytical results can better help researchers learn about the vocational education informatization from a more comprehensive perspective and provide a more rational and practical research support for this field.

Keywords: Education Informatization 2.0, Vocational informatization, vocational education

The Introduction

In 2018, the Ministry of Education issued ***the Education Informatization 2.0 Action Plan*** (hereinafter referred to as the "action Plan"), which proposed that education informatization comprehensively promoted education informatization and opened the intelligent era. With the continual application of cloud computing, big data, Internet, mobile Internet, some new technologies, such as virtual simulation in the field of education, the deeper integration of information technology and education are promoted, which can better improve the innovation development of the education informatization and optimize the management and performance [1]. The Outline of the ***National Medium and Long-term Education Reform and Development Plan*** (2010-2020) (hereinafter referred to as the Outline of the Education Plan) also clearly points out that "Information technology has a revolutionary impact on the development of education and must be attached great importance".

As an important part of China's national education system, vocational education, higher education and basic education form a form of tripartite confrontation. With the upgrading of China's industrial structure and the emergence of new forms of industry, the Internet, artificial intelligence and big data are gradually applied to the front line of production. Senior applied talents who conform to the transformation of industrial structure and new forms of industry can better meet the needs of industrial development, which also highlights the necessity of the development of vocational education informatization. According to the authoritative McKinsey & Company, Chinese enterprises will need 140 million highly skilled personnel by 2020, and the gap will be about 22 million. On the one hand, the market is facing a huge skilled personnel gap; on the other hand, the quality of students in vocational colleges has not yet adapted to the development trend of industrial automation and intelligence, resulting in the imbalance between supply and demand of talents in the market. It can be seen that the informatization development of vocational education is ready for development.

1. Education informatization 2.0

Education informatization 2.0 should realize the transformation from dedicated resources to large resources, Change from improving students' information technology application ability to improving their information technology literacy, from integrated development of application to integrated development of innovation. Therefore, the release of this plan will promote the improvement of teaching, management and performance. Through promoting the application of information, the students are capable of getting good information thinking and adapting to the requirements of the development of the information society, Therefore, the students are qualified with the basic skills in solving teaching, learning and life problems by means of the application of information technology. The introduction of "platform + education" service mode can realize the integration of public service platforms and support systems of all levels and different types of education resources, which gradually realize the interconnection and opening of resource and management platforms, and build a national public service system of digital education resources. It can fully play the role of the market in resource allocation, so as to integrate crowdfunding and crowd-innovation, and upgrade the mode of education service supply and improve the level of education governance by supplying excellent teachers, educational data and information dividend.

2. Research status of vocational education informatization

2.1 The urgency of developing vocational education informatization

In May 2012 ,the Ministry of Education issued ***the Opinion on Accelerating the Development of Advanced Vocational Education Informationization*** , in which the basic train of thought on the development of vocational education informatization and the overall goals of the "twelfth five-year" period has been cleared about, and the configuration information infrastructure, digital campus construction, the virtual simulation teaching environment and resources, vocational education integrated management system, etc. are also covered. Promote the reform of vocational

education informationization innovation in the following ways: improve the vocational education informatization basic ability of digital resources, strengthen the e-government application ability of the vocational education, upgrade the level of vocational colleges digital campus construction, improve the information literacy of vocational education workers, and vigorously develop modern distance vocational education key link. At the same time, strengthen management from organization management, fund support, application research, implementation mechanism and standard management, so as to provide system guarantee for the healthy development of vocational education informatization[2].The introduction of this Opinion effectively promoted the extensive and in-depth application of information technology in vocational education, and promote the modernization of vocational education with information technology.

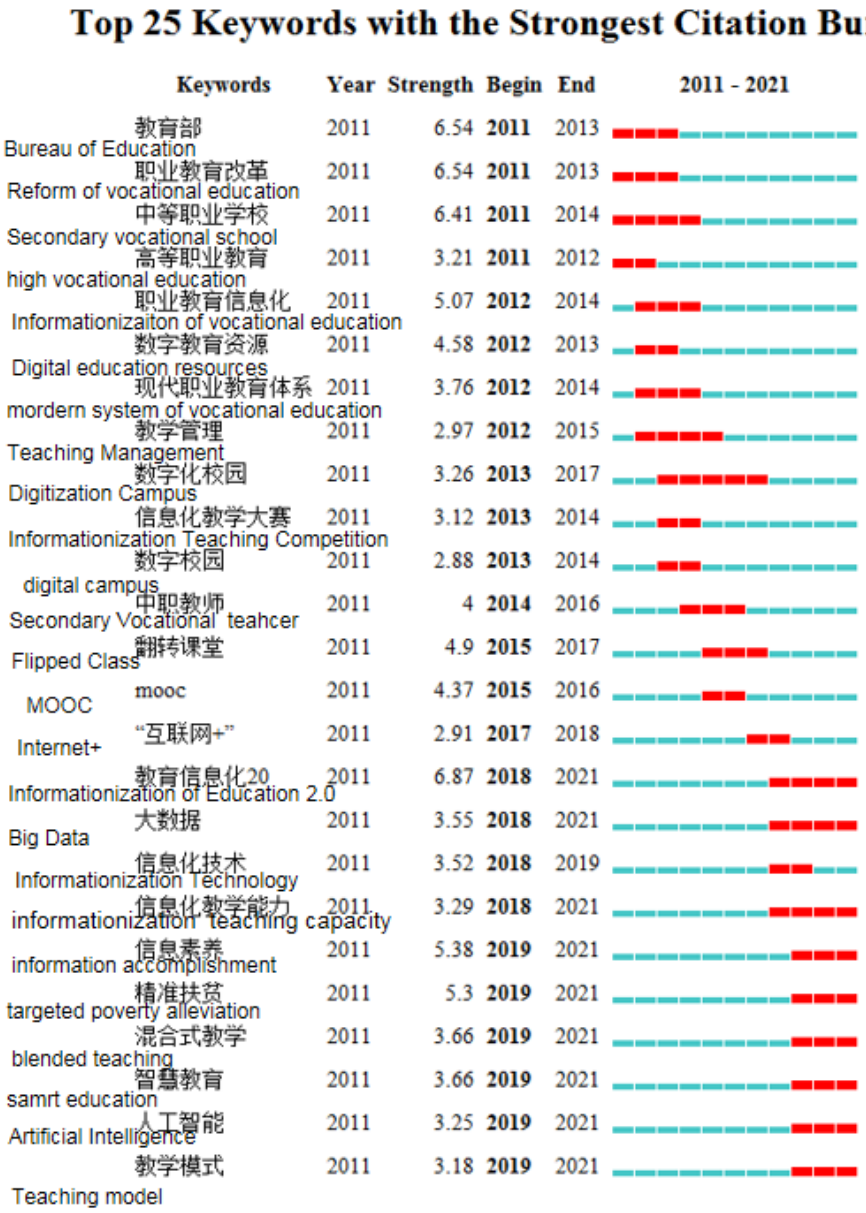
Meanwhile, with the upgrading of China's industrial structure and the emergence of new forms of business, the Internet, artificial intelligence and big data are gradually applied to the front line of production, and senior applied talents who conform to the transformation of industrial structure and new forms of business can better meet the needs of industrial development. However, the serious phenomenon that vocational schools are facing at present is that the comprehensive quality of most students cannot adapt to the development trend of automation and intelligence in manufacturing industry, resulting in the imbalance between supply and demand of talents in the market. With the help of the promotion of vocational education information teaching, students can make up for the shortcomings in this field, so that they can get more opportunities and advantages in the job market.

2.2 Research hotspots and trends of vocational education informatization based on academic education

This study applied Citespace, a visual bibliometric analysis tool, to analyze the informatization of vocational education in China (2011-2021) based on the literature information platform--CNKI. Advanced retrieval type was adopted with "subject", "key words", "essay" as retrieval, and with "professional education", "information technology" as key words, and literature retrieval time range was set from 2011-2021.All periodical information are all derived from the SCI, EI source journals, core journal of Peking University, CSSCI, CSCD, so as to guarantee high quality source of retrieval. After screening all kinds of unqualified literatures, a total of 779 literatures were retrieved as research objects. Through CiteSpace cluster analysis, the key nodes with centrality of high-frequency words above 0.1 were obtained, informatization construction (0.12), university-enterprise cooperation (0.26), cloud computing (0.16), modern vocational education system (0.17) . The above aspects represent the focus of research in this field. Secondly, with the help of a Burstness command, the top 25 key high-frequency words with regards to vocational education informatization in the last decade(2011-2021) can be found in CiteSpace (Figure 1). After focusing on the observation of mutation words in the past five years (2018 -- 2021), it is found that informatization teaching ability, information literacy, targeted poverty alleviation, blended teaching, smart education, artificial intelligence and teaching mode are the

current research hotspots ,which indicate the future development trend. Therefore, the informatization of vocational education has become an irresistible force.

Figure 1 Top 25 Keywords with the Strongest Citation Bursts



2.3 The huge demand for educational informatization of non-academic vocational education

Non-academic vocational education accounts for half of China's vocational education system, which mainly includes vocational skills education and vocational examination training. The rapid development and structural transformation of China's economy have resulted in the mismatch between supply and demand in China's labor market, and also the structural problems because of the lack of skilled technical personnel. Although the vocational education based on non-academic education informationization can largely alleviate this phenomenon, it is still very serious. According to the ***Planning Guide of Manufacturing Talent Development*** issued by the Ministry

of Education , manufacturing in China is facing a larger advanced skills talent gap, which can be seen from table 1.

Top of the talent demand forecast in the ten key areas of manufacturing is the new generation of information technology industry, and the talent gap will reach 9.5 million by 2025. Similarly, the shortage of talents of electric power equipment and advanced materials will also reach 9.09million and 4million respectively. All these fields need the deep infiltration of information education. Therefore, there is a great demand for education information in non-academic vocational education.

Table 1 Talents Demanding Prediction in Top 10 Key Fields in the Manufacturing Industry (unit:million)

Serial Number	Top 10 Key fields	2015	2020		2025	
		Gross talents	Predicting Gross Talents	Predicting Talents Gap	Predicting Gross Talents	Predicting Talents Gap
1	The 1st generation of information technological products	10.50	18.00	7.50	20.00	9.50
2	high-end numerically-controlled machine tool and robots	4.50	7.50	3.00	9.00	4.50
3	Aerospace equipment	0.491	0.689	0.198	0.966	0.475
4	Ocean engineering equipment and high-tech ships	1.022	1.186	0.164	1.288	0.266
5	Advanced rail transit equipment	0.324	0.384	0.06	0.43	0.106
6	Energy-saving and new energy vehicles	0.17	0.85	0.68	1.20	1.03
7	Electric power equipment	8.22	12.33	4.11	17.31	9.09
8	Agricultural machinery and equipment	28.3	45.2	16.9	72.3	44
9	Advanced Materials	6.00	9.00	3.00	10.00	4.00
10	Biological medicine and high performance medical devices	0.55	0.80	0.25	1.00	0.45

3. The development of vocational education under the background of education informatization 2.0

Under the background of education informatization 2.0, there is a brighter prospect for the development of vocational education . Wang Jiping, director of the Department of Vocational Education and Adult Education of the Ministry of Education, said in his interpretation of the ***Implementation Plan of National Vocational Education Reform*** (hereinafter referred to as the "Proposal") that "Vocational education is an important breakthrough for deepening educational reform,and they are two different and equally important types of education."

3.1 Strong support from national policies

In 2014, Premier Of The State Council Li keqiang mentioned that China's economic development has entered into a period of medium-high growth and upgrading. To support sustained and healthy economic and social development, China's economy must be upgraded to the medium-high end of the global industrial value chain. To achieve this goal, a large number of skilled personnel are needed. And the strong support of national policy for vocational education can accelerate the construction of modern education system, which closely linked information technology and training programs, so as to lay a foundation for the cultivation of technical skills in short supply. The professional setting based on information technology can promote the synchronous development of discipline and industry, which adapt to the development needs of new technology, new technology and new materials. It can promote the modernization of vocational education.

3.2 Strengthening University-Enterprise cooperation

In *made in China 2025* (2015), The State Council emphasized that enterprises should be encouraged to cooperate with universities to cultivate scientific research personnel, technical talents and compound talents who are urgently needed by the manufacturing industry. At present, driven by the vocational education informatization development, the training mode of university-enterprise cooperation will further deepen the integration between industry and education, encourage manufacturing enterprises to closely involve in the research and development of professional standards and the implementation of teaching practice curriculum , so as to promote the policy of vocational education group running school, accelerate the harmonious development of the trinity system study. From scale expansion to the quality improvement, from the ordinary school-running mode to the participation of enterprise with professional characteristics. Meanwhile, based on the stage of modern information education, the implementation of the certificate of 1 + X can help the students to get more certificates of professional skills in the domain of national advanced manufacturing and modern service and emerging industry within talents shortage. All above measures are to ensure the establishment of the integrated enterprise education certification system under the background of education informationization 2.0.

3.3 Help in targeted poverty alleviation

Vocational education information platform is characterized with widespread and big benefit groups etc., by means of information technology, the goal of sharing vocational education resources can be realized , and the precision for poverty alleviation is improved. In practical

situation,the literacy and technical skills of farmers in poverty-stricken areas can be promoted,so as to achieve the goal of poverty alleviation by applying technology.Through strengthening the construction of infrastructure and software and hardware resources by the government in poverty-stricken areas , and the coalition of government, enterprise and the vocational colleges, there will be an integration of the school vocational education, the enterprise, and industry training. In this way,knowledge and technology can be transferred to local farmers and poor areas, and an accurate database of vocational education poverty alleviation based on big data is established.By means of statistical analysis, It will provide scientific data analysis support for follow-up services of poverty alleviation work based on vocational education informatization, which will undoubtedly benefit the virtuous cycle of targeted poverty alleviation work based on vocational education informatization.

3.4 Collaborative development with Artificial Intelligence

At present, China's digital economy and vocational education development have entered into the fast lane. Therefore, It is high time that we should seize the opportunities of the times, connect the vocational education and economic development and promote the development of vocational education informationization under the background of improving fast digital drive industry.Adjust the pace of vocational education with the artificial intelligence, strengthen and innovate digital skills training for technical personnel, and improve the digital transition of profession and curriculum, establish interpersonal coordination teaching mode, and cultivate high-end artificial intelligence talents for a smart society.At the same time, in view of the market demand for innovative talents, students' ability of innovative consciousness should be simultaneously strengthened, not only limited to the users of artificial intelligence, but also strive to become the participants and manufacturers of artificial intelligence. Therefore, it is necessary to align the era of artificial intelligence with the new requirements of talents training in higher vocational colleges, and pay attention to the status quo of upgrading industrial transformation and cross-border integration, so as to achieve the goal of jointly promoting the high-quality development of vocational education.

4. Conclusion

China's education information 2.0 emphasizes the view of great resources based on the Internet, and regards educational informatization as the endogenous variable of educational system reform, which promotes the concrete implementation of "Internet + education".Under this background,vocational education informatization develops fast, and the network, digital, intelligent, personalized, lifelong education system are gradually built up. The core of education informatization 2.0 is to open the new era of vocational education,deepen the integration between the new technology and vocational education,accelerate the construction of vocational education informationization, support the development of high-quality skilled personnel training task. There is a long way ahead for the vocational education sector with tough construction tasks and the coexistence of challenges and opportunities, only with new ideas of innovation construction, the

mission of the times can be completed, which can pave the way for the healthy development of China's vocational education.

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CALL Learners

技术赋能外语学习

Innovative practice of Artificial Intelligence Talent Training Mode under CDIO-OBE

JIA Ning, ZHENG Chunjun, ZHOU Yijia
Dalian Neusoft University of Information

Abstract:

Dalian Neusoft University of information has constructed a school running system of production and education integration and application-oriented, formed the operation mechanism of school enterprise cooperation, and realized the complementary cultivation of talents oriented to industrial demand. The tutor team can absorb the outstanding talents from enterprise to form a collaborative tutor team of industry, enterprise and school, breaking the traditional concept. Through the close combination of production, learning and research, we can promote the transformation of scientific and technological achievements into real productivity.

Based on the above basic conditions, the innovation system of the whole chain artificial intelligence talent training mode is constructed by integrating the CDIO Outcomes-based Education(OBE) and the tutor system of school enterprise cooperation.

It is mainly reflected in the following aspects:

(1) The construction of new blending education system based on school enterprise cooperation.

(2) The design of new teaching mode of tutorial system under the concept of CDIO-Outcomes-based Education(OBE).

(3) The development of vertical chain extracurricular practice system.

(4) The construction of tutor team in industry university research cooperation.

We also introduce real project into the teaching process. Schools and enterprises jointly build blended educational resources and projects. The teaching mode of deep participation of tutors in the learning process is constructed, and the extracurricular practice system is constructed to ensure the orderly development of talent training. Through parents' meeting, tutor meeting, teachers' communication meeting, outstanding students' commendation meeting, teacher-student forum and entrance education course, the closed-loop of home, school and student education is formed to serve personnel training in an all-round way. Enterprises and schools are deeply integrated, tutors develop together, both sides jointly build resources, research and tackle key problems, and cultivate tutor team. The existing teaching results have been highly appraised and recognized by the teaching peers of artificial intelligence.

Keywords:

CDIO, Outcomes based Education(OBE), Artificial Intelligence Talents, Training Mode, School Enterprise Cooperation, Tutorial System, Whole Chain System

I. Introduction

With a new round of technological revolution and industrial revolution, as well as the boom in the new economy worldwide, higher requirements have been raised for engineering talents cultivation in the new era [1]. In order to meet the needs of the times and society, it has become an important method for the cultivation of professional talents in China's universities to reform the education mode and create online and offline learning environment for engineering students on the internet. Among them, CDIO represents the concept, designing, implementation and operation [2], which gradually attracts the attention of the education field, and constructs the ability to smoothly link theory and practice under the guidance of this concept[3].

The whole course tutorial system for undergraduates advocates the educational concept of student-centered [4-5], teaching students in accordance with their aptitude and cultivating their personality, which are in line with the education. By continuously promoting the reform of teaching management system such as hierarchical teaching, class system and tutorial system, small class teaching are implemented to stimulate students' learning initiative, enthusiasm and creativity and cultivate top-notch innovative talents [6].

However, in today's personnel training process, there are the following problems: the curriculum content is separated from the industry, and the practice project does not have the characteristics of industry [7-8]. The tutor work of undergraduate education is not deep enough, the mechanism is not perfect, the teaching mode is not effective enough, and the tutor work is not deep enough. The tutor's extracurricular practice activities are not well designed [9]. The ability training of teachers does not match the demand of industrial talents. There is no perfect mechanism for tutor management [10]. There is a lack of multi-level management mechanism and evaluation mechanism among universities, colleges and departments.

In order to solve the above problems, we have built an application-oriented school running system with the integration of industry and education, formed an operation mechanism of school enterprise cooperation and win-win cooperation, and realized the complementary docking of talent training, industrial demand and enterprise demand. This docking has laid a good foundation for the talent training of the school enterprise collaborative tutorial system. The tutor team can absorb outstanding talents from the industry or enterprise to form a collaborative tutor team of industry, enterprise and school, breaking the traditional concept. Through the close combination of production, learning and research, it promotes the transformation of scientific and technological achievements into real productive forces and realizes the win-win situation of colleges and enterprises.

In this paper, we talk about the following contents: the new system of school enterprise collaborative hybrid education, the new mode of tutor system under the concept of OBE, the new system of extracurricular practice, the construction mode of tutor team.

II. Construction of Blended Education System based on School Enterprise Cooperation

At present, college students' access to knowledge is more diversified, which threatens the knowledge authority and academic monopoly of colleges and universities, and directly promotes

the transformation of university education. Teachers should change their role from knowledge imparter to designer and director of learning activities, which makes a new learning partnership between teachers and students. How to build a learning community between teachers and students has become a problem in the reform and development of higher education.

This major and enterprises jointly create a hybrid teaching mode suitable for the operation of colleges and universities. The whole teaching process includes three parts: before class, in class and after class. The status of the traditional teaching mode is gradually replaced by the new teaching mode. When blended teaching is carried out with learner as the center, what learners need is not only a single course teaching, but also a new learning mode. This mode can give full play to their subjective initiative, actively acquire knowledge, take personal learning as the center, and make full use of various new technologies and methods.

In view of the problems existing in the traditional teaching mode, such as the single teaching method, the lack of education resources and the gap between the actual needs of enterprises, we propose a school enterprise collaborative blended education system. Our goal is to improve students' professional core skills and ability quality, and promote talent training.

The employment units of artificial intelligence related majors are mainly data organization, data analysis and data operation and maintenance departments of enterprises and institutions. Each employer has different requirements for students' professional skills and ability, but all of them reflect the comprehensive of the core requirements of the students in different degrees. The blended teaching mode of school enterprise cooperation can become an effective means to cultivate students' core skills and comprehensive ability. The school and the enterprise jointly formulate the talent training plan and design the learning objectives together. Through targeted integration of teaching and online resources, professional construction can be effectively carried out.

Based on the training mode of full chain artificial intelligence talents, the integrated curriculum system, integrated practice project and integrated quality project are constructed in the school enterprise collaborative blended education system.

(1) Integrated Curriculum System

Through the joint enterprise, the vocational skills are refined, analysed, and integrated into the curriculum resources, teaching activity designing and curriculum objectives. We introduce the real data into the class, build education resources, and rebuild a hybrid teaching mode suitable for the operation of colleges and universities. We combine before class, in class and after class together.

Before class: learning from micro video and courseware, self-test questions before class.

In class: combining with courseware, micro video, bullet screen, rush answer, question and classroom ability test and other modes.

After class: assigning homework and exam, read micro video and courseware, realize offline self-test after class.

(2) Integrated Practice Project

Through the university enterprise joint laboratory, practice base, etc., modern engineering practice is carried out for enterprises, the real project of enterprises is transformed, and the integrated practice project suitable for the whole chain artificial intelligence talent is formed, so as to cultivate students' ability to solve practical engineering problems. The school and enterprise jointly formulate project objectives, project standards, practice system and practice content, cooperate to complete the construction of internship teaching resources, and formulate assessment standards and methods.

In the process of practice project implementation, while focusing on cultivating students' autonomous learning, we should guide students how to make use of the learned knowledge to solve unfamiliar engineering problems. In order to ensure the smooth progress of the practical project, the instructor needs to work with the relevant technical personnel of the enterprise to determine the technical route required from the projects, predict the problems that may occur in the process of students' completion and the knowledge that needs to be supplemented. The instructor should follow up the whole process, strengthen the communication and discussion between teachers and students, find out and correct problems in time.

On the basis of one-to-one project examination, the students are required to complete the examination on the basis of practice. In this way, students' ability of expression and cooperation is trained. Meanwhile, students' achievement reports are appropriately commented, and some questions are given more in-depth questions and answers, so as to further improve students' comprehensive quality.

(3) Integrated Quality Project

Based on the framework of the school enterprise cooperation model, we create various forms and diversified education quality projects of school enterprise cooperation, aiming to give students an opportunity to carry out real enterprise projects. With the help of the vocational education concept of school enterprise cooperation, the real production environment of the enterprise is created, and the professional quality and practical skills of the students are cultivated according to the requirements of the enterprise for the post talents, so as to achieve the zero-distance connection between the school and the enterprise.

Under the blended teaching mode of school enterprise cooperation, the integrated quality education project not only meets the professional teaching activities, but also penetrates the professional quality education, forming a whole of mutual connection, coordination and mutual promotion between professional education and vocational quality education. It mainly includes three aspects:

a. Construct the project standard of highlighting professional quality.

b. Establish the assessment mode and integrate into the assessment of students' professional quality.

c. Establish quality evaluation standards, so as to ensure that the connotation of professional quality and job requirements are coordinated.

III. The Construction of Tutorial System Teaching Mode under the Concept of CDIO-OBE

In recent years, domestic colleges and universities are exploring the higher education beyond graduate education, and can also establish a new education and teaching system tutor system, in order to implement the modern education concept of full staff education, whole process education and all-round education, so as to satisfy the requirements of quality education and the change of talent training objectives. The tutorial system establishes a kind of "guidance" relationship between teachers and students. According to the students' personality differences, the tutorial system can teach students in accordance with their aptitude and guide their thinking, learning and life.

In the process of undergraduate education, our goal is to guide students' study, work and life, and cultivate their ability for thinking independently and solving problems. Under the concept of CDIO-OBE, based on the training mode of full chain artificial intelligence talents, we explore and construct the tutorial system teaching mode under the background of new engineering by combining teaching with scientific research, so as to improve the practical skills of undergraduates in artificial intelligence and realize the training goal of applied talents. In the first year, tutors and quality teachers cooperate with each other with different emphasis. From professional skills to quality education, on the basis of combining the characteristics of students in different stages and grades, we organize students to carry out targeted activities, such as in and out of class learning groups, cross grade students' mutual assistance, tutors and teaching assistants' personality guidance, etc. While strengthening the communication between teachers and students and between students, the teaching quality and learning effect have been improved.

Relying on the artificial intelligence major and aiming at improving the practical ability of undergraduates, the tutorial system teaching mode under the CDIO-OBE concept is constructed. From the beginning of the learning, each student has been arranged with tutors who providing them comprehensive guidance in the aspects of academic planning, learning process, skill improvement, scientific research and exploration, and moral quality. Based on the practical needs of students' development, we pay more attention to the coordinated development of knowledge, ability and quality in the process of students' growth.

Combined with the tutor's scientific research direction and teaching characteristics, on the basis of analysing the characteristics of students at different stages and grades, through the tutor's individual guidance and teaching, students' spirit of exploration and ability of independent thinking can be cultivated, and they can become applied talents with sense of responsibility. The construction of tutorial system teaching mode mainly includes the following contents: in class and extracurricular study groups, cross grade students' mutual assistance, tutor and teaching assistant's personality guidance. The construction method of the mode is shown in the following figure:

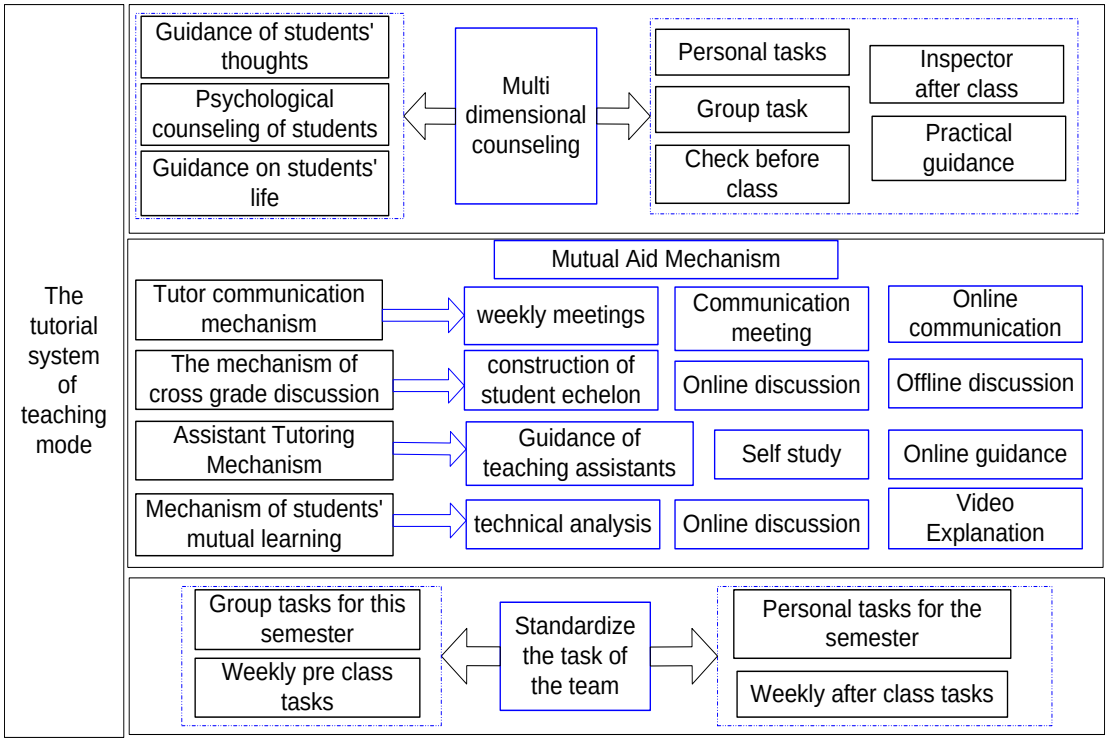

Fig.1. The new mode of tutorial system teaching

(1) Standardize the Task of the Team

Teaching activities often require students to work in groups. In order to ensure the effective application of the tutorial system, the tutor is the unit of the learning groups inside and outside the class. There is a seamless connection between tutors, course teachers and quality teachers to achieve seamless docking inside and outside the classroom. Combined with the characteristics of students' stage and grade, we can adopt the "task driven" group cooperation mode from two aspects of teaching content and practical projects, which can not only cultivate students' enthusiasm, but also stimulate students' individual development.

For example, for the course content, the learning tasks inside and outside the course can be refined. According to the practical tasks, we can decompose the practical tasks, implement the schedule, and standardize the use of learning resources. We encourage students to participate in innovation and entrepreneurship practice activities inside and outside the school, encourage students to participate in tutor's scientific research projects, and understand the development of technology in the process of the projecting with the tutor, so as to adjusting the learning direction in time.

At the same time, in view of group based learning and practice activities, a perfect inspection and assessment mechanism is formed from the aspects of curriculum content system, organization and implementation of practice links and group based on the evaluation system.

(2) Establishing the Mechanism of Students' Mutual Aid

Based on the education concept of all staff education, we conduct targeted guidance for key students, consciously guide students and relieve pressure. In terms of study and life, we have established mutual aid groups and implemented the principle of "one helping one". The students

who are good at learning are responsible for tutoring the other students in the same group to ensure that all students can complete the task through representatives.

Through the arrangement of learning tasks completed by group members, the habit of communication and exchange among group members is cultivated, and various learning resources are shared, so as to form mutual influence and promote interpersonal practice among group members, so as to realize the construction of learning community.

We create a mutual communication environment for students, encourage senior students to share experience with junior, and give guidance to junior students to promote cross grade communication. Senior students can improve their communication ability and sense of responsibility by providing similar life and learning guidance to lower grade students. The lower grade students get knowledge and experience by communicating with senior students, so as to avoid detours in study and life. Through communication, freshmen quickly enter the university life and learning state.

(3) Multi-dimensional Counselling Strategy

Quality teachers, professional tutors and assistant counsellors lead students to make progress together. The college carries out a series of special lectures, extracurricular short classes, scientific research salon, special training and discipline competitions.

In terms of guidance to students, online and offline guidance and Q & A are carried out under the leadership of tutors. With the help of the online platform, the tutor and the students complete the daily task arrangement, acceptance, professional Q & A, etc. The tutor meets with students offline regularly every week to complete academic supervision, inspection, professional Q & A and promotion through face-to-face. In addition, according to the needs of students, multi direction assistance after class is set up, such as communication speech, office software, career planning, postgraduate entrance examination guidance, etc.

In addition, the guidance for students includes extracurricular preview, ideals and beliefs, construction of study style, professional identity, vocational academic planning, quality education, innovation and entrepreneurship education. It lays a solid foundation for students to complete their learning tasks, reach professional standards, and develop a better career.

IV. "Five series" Extracurricular Practice System Construction under Tutor Mechanism

Based on the training mode of full chain artificial intelligence talents, the "five series" activities under the tutorial system are constructed. Professional tutors and assistant counselors lead the students to carry out a series of special lectures, extracurricular short classes, scientific research salons, special training and discipline competitions every academic year.

The construction of extracurricular practice system under tutorial system is a special link for students' extracurricular learning time. After many times of investigation, analysis and coordination of various resources, students' in class learning is extended to extracurricular learning, which ensures the continuity of in class and out class learning, and the mutual promotion of learning resources, so as to form rich extracurricular practice content of students. Through the

effective use of extra-curricular time, a good style of study has been formed, students' active learning habits have been cultivated, knowledge consolidation and transformation have been done well, the theoretical knowledge and practical application have been seamlessly connected.

The specific construction contents of the practice system are as follows:

(1) Special Lecture

In order to provide students with a broader vision and learn more about the industry frontier, we organize professional related special activities, and invite professionals from alliance enterprises to give lectures and "AI Forum" for students. The topics of the lectures and activities are open to all students in the Department. Through this form, students can learn more about the development, knowledge and application of artificial intelligence specialty, laying a foundation for the study of professional courses.

(2) Extracurricular Short Class

In order to further increase the way of knowledge acquisition and enhance the capacity of knowledge, we invite tutors with engineering experience for students. To meet the needs of project application, several short extracurricular courses for artificial intelligence specialty are designed: ‘playing with artificial intelligence class’. According to the students' skill level and professional foundation, the tutor explains the frontier knowledge and application methods to them, and trains them in many directions.

(3) Scientific Research Salon

In order to create a good scientific research atmosphere and provide a convenient communication channel between teachers and students, we hold a series of scientific research salons from time to time. Enterprise technical tutors and key scientific research teachers are invited to provide students with cutting-edge technologies and innovative methods in specific scientific research direction. Meanwhile, the cultivation needs of students with different learning abilities are taken into account.

(4) Special Training

Special training of programming skills is designed for students, which can comprehensively apply various theoretical knowledge and skills learned, and help students to practice comprehensive, systematic and strict technology and basic ability. At this stage, enterprise tutors are also introduced to participate in the design of special training questions, which can broaden the design ideas and broaden the vision. It can also make the enterprise tutors know more about the professional skills of professional students, so as to lay a foundation for further cooperation in the future.

(5) Subject Competition

In order to further improve students' professional skills and innovation and entrepreneurship ability, we hold a discipline competition to encourage students to use new technologies to develop innovative applications. At the same time, experts from relevant organizations and industries are invited to provide assistance and guidance for the works from the perspective of technology and industry, so as to make the project more innovative and entrepreneurial. In the competition stage,

we also invite experts from schools and enterprises to evaluate the competition works, and encourage the development team to design excellent works.

V. Construction of Tutor Team based on Industry University Research Cooperation

In the educational environment of industry university research cooperation, teachers' scientific research work has distinct characteristics of industry university research cooperation, and the research results in their disciplines directly serve the discipline construction. Through the construction of teacher training system, the training of teachers is linked with production, teaching and research. We combine professional training and technical qualification certificate with enterprise investigation and practice, and combine basic training with improving basic theory and teaching level, so as to improve teachers' theoretical quality and application ability.

Based on the in-depth cooperation between schools and enterprises, the professional knowledge level and engineering practice ability of teachers are comprehensively improved through internal training, external training, and regular scientific research sharing mechanism.

High level teachers are the prerequisite for cultivating high-quality students. Under the school enterprise collaborative tutor system based on the OBE-CDIO, relying on the school enterprise cooperation platform, we should strengthen the personnel training and continuously improve the structure of the teaching staff. Through the introduction of enterprise engineers, internal training and exchange of teachers, and the participation of foreign teachers in vocational training, the practical teaching skills of teachers can be improved in various forms, so as to establish a double qualified teachers' team with full-time and part-time combination, excellent quality and reasonable structure. The construction mode of tutor team is shown in Figure 2.

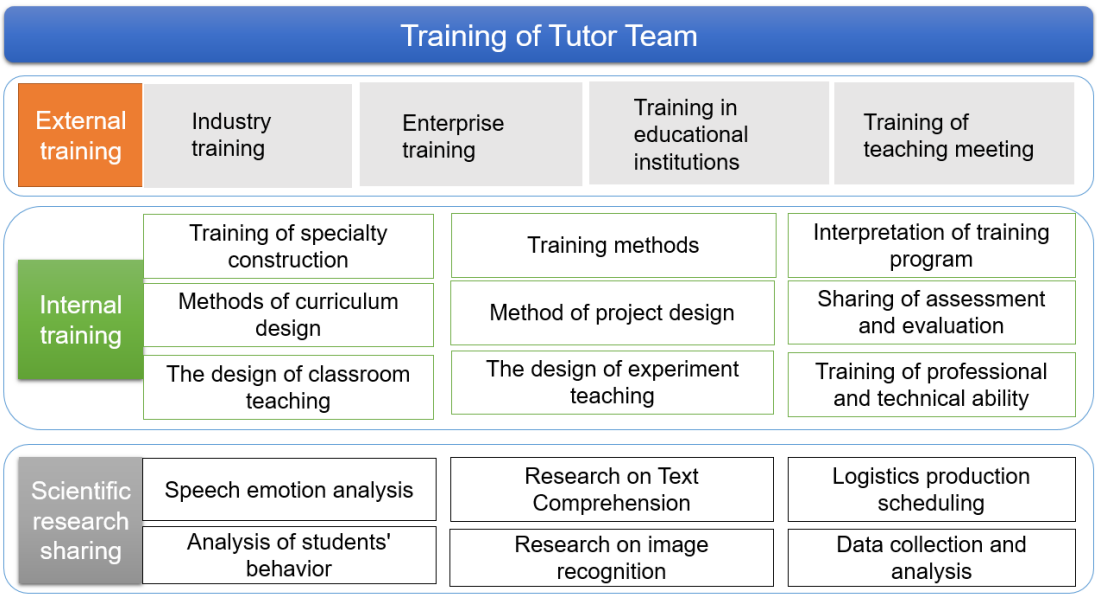

Fig 2. Construction of Tutor Team

(1) Practice, Training and Other Forms of Combination

Teachers' practical skills and technical level are the key to ensure the continuous improvement of teaching quality. The centralized training mode is adopted twice a year to hire

enterprise engineers to carry out technical training for teachers, so as to improve teachers' practical ability.

(2) Training of Young Teachers

The training of young teachers is an important part of the teaching construction. Combined with the actual situation of the major, we carry out the training work of young teachers, and promote the improvement of teaching quality and level of young teachers through tutor system, teaching training, class tutor and other works.

In order to improve the teaching quality of young teachers, we connect the young teachers with rich teaching experience, and help the teaching assistants to be familiar with the teaching ideas and teaching skills. Young teachers are required to face students directly, deeply understand their learning situation and enhance their classroom teaching ability. In addition, backbone teachers provide all-round guidance to young teachers from work, study and life.

(3) School Enterprise Joint Research on Science and Technology and Construction of Curriculum

We have carried out many activities together with enterprises, combined with science and technology enterprises, carried out blended education and teaching reform on students' professional courses, jointly formulated curriculum objectives and resources. The enterprise resources are integrated into the curriculum, the project database, case database, test question database and other resources are constructed.

(4) Scientific Research and Teaching Discussion

The college organizes exchange and discussion activities, summarizes the problems existing in the teaching process, and explores solutions. According to the commonly technology of related positions in enterprises, the theme is selected for internal communication. Scientific research sharing is carried out according to the scientific research direction of teachers.

VI. Conclusion

With the extensive development of blended teaching in colleges and universities in recent years, we have obtained certain experience and achievements. On the basis of blended teaching, we put forward a new model of the construction of blended educational resources. Blended education includes curriculum teaching, project practice and extracurricular activities that students participate in at school. It closely combines majors with industries and well-known companies to jointly build educational resources and integrate five new technologies into talent training. Under the whole tutorial system, the innovation of teaching mode makes the tutors pay attention to the improvement of students' innovation and entrepreneurship ability in the second classroom, and also deeply participate in the offline links of hybrid teaching, which is more suitable for the new ideas of talent cultivation.

The vertical chain of extracurricular practice concept has become the core carrier of students' ability training. The tutor guides the students to form vertical echelon in the form of high and low grades, and completes tasks in groups, which can stimulate students' interest in exploring the

unknown, improve their consciousness of active learning, and enhance their innovative spirit and ability. Through the establishment of weekly meeting mechanism, the planning of teaching ability and scientific research group discussion and sharing topics, the academic level of teachers can be continuously improved. After the practice and exploration of this major, the school designs a talent training mode combining OBE education mode with CDIO. Colleges and enterprises jointly build tutor team and explore the whole chain talent training mode, which has achieved good results in higher education.

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A multifactorial study on concessive clause positioning by Chinese EFL learners: In comparison with the native speakers

KANG Hui
Dalian University of Foreign Languages

Abstract: Multifactorial analysis on concessive clause positioning have been implemented on native speakers, and second language learners as well. This study furthers the present research by examining nine contextual factors predicting Chinese EFL learners' concessive clause positioning in comparison with the native speakers. 1,356 concessive subordinations constructed by although and though were extracted from native and learner argumentative essays evenly, and logistic regression models were employed to examine the effectiveness and direction of the factors that tune concessive clause positions. It was found that similar to English native speakers, Chinese EFL learners also tend to (1) prepose the concessive clauses, especially those in indirect clausal relationships, (2) adjust the clause positions by subordinators, and (3) observe the horror aequi Principle (i.e. avoiding similar linguistic items). In contrast, Chinese EFL learners differ from the native speakers in that (1) they do not often denote metadiscursive meanings by concessive subordinators, and rarely do they tune concessive clauses via this meaning; (2) they tend to postpose concessive clauses in complex situations, which may probably due to their low English proficiency and observance of Complexity Principle (Rohdenburg 2000, 2003); (3) they do not comply with the English end-weight principle quantitatively (measured in word counts), which may be caused by the difference in language typology. This research contributes to both linearization studies and pedagogical applications in EFL teaching and learning.

Key words: Concessive clause positioning; Chinese EFL learners; Multi-factorial analyses; Comparison

1. Introduction

A concessive clause can be placed before the main clause, such as Example (1), and can be placed after the main clause, such as Example (2).

Example (1) Although major improvements to pedagogic methods and learning resources have been made in recent years, it is still the case that traditional book-based learning is often not retained over the long haul.

Example (2) As such He would have no knowledge of what moment is present, even though He would know what all events were and in what relation they stand to other events (before, simultaneous with, and after).

The alternation of adverbial clause positions (preceding or following the main clause) is caused by multi-factors.

Practically, we extracted 1,356 concessive subordinations conjoined by although and though from the native speakers' corpora and the Chinese EFL learners' corpora evenly. We also employed logistic regression models to detect effectiveness and directions of the eight factors explored in Kang & Xu (2020).

2. Literature review

Application of multifactorial work on adverbial clause positioning started with Diessel (2008), who examined the effects of four factors (iconicity, implicit meaning conveyed by the

subordinator, complexity of the adverbial clause, and length of the adverbial clause) in a single logistic regression model and found iconicity of sequence made the biggest contribution to temporal adverbial clause positioning choices. Following Diessel (2008), Wiechmann & Kerz (2013) examined concessive clause positioning through a multifactorial analysis of five motivators, namely, deranking, complexity, length, bridging and subordinator. They reported that discoursal factor bridging had the largest effect in governing concessive clause positioning and that the subordinator (choice between although and whereas) was also important. Kerz &Wiechmann (2015) showed that subordinator and position discriminate genre (academic and newspaper).

Although these findings are revealing, the gaps exist in multifactorial analysis of adverbial clauses: (1) little attention was directed on Chinese EFL learners' performance in adverbial clause positioning; (2) The similar concessive subordinators of although and though look similar, yet they received little attention from the present research.

3. Methodology

3.1 Data

We retrieved research data from argumentative essays in consideration that the concessive subordinations occur more frequently in this genre than in other genres. Specifically, native data were retrieved from BAWE (Nesi et al., 2008), LOCNESS(Granger, 1998), and NESSIE(Xu, 2012), while learner data were retrieved from WECCL (Wen et al., 2009) and TECCL (Xu, 2016). The general corpus profiles are listed in Table 1.

Table 1. corpora profile

	Native corpora				Learner corpora		
Corpora	NESSIE	LOCNESS	BAWE	Total	WECCL	TECCL	Total
Essays	781	323	512	1,616	4,726	6,898	11,624
Tokens	291,911	230,138	1,360,932	1,882,981	1,243,739	1,397,688	2,641,427

Table 2 Data set profile

	although	though
native	1397	532
learner	1065	896

To have a closer observation on the position of the concessive clauses, we tagged the concessive clause positions of all the though-led clauses, and 1,000 randomly selected although-led clauses from the native and learner corpora each. It was found that the concessive clauses have strong tendencies to be preposed (c.f. Table 3). To explore distinctions between preposed and postposed concessive clauses, we extracted research data based on the minimum count—339 native postposed clauses. In total, we extracted 1,356 concessive subordinations, 339 from the native preposed, native postposed, learner preposed, and learner postposed data sets each.

Table 3. Total and extracted data points

data points in total				
	although	though	postposed	preposed
native	1000	532	339	1193
learner	1000	896	350	1546
extracted data points				

	although	though	postposed	preposed
native	408	270	339	339
learner	311	367	339	339

3.2 Factors explored

We explored factors on four linguistic layers—morphological, discursive, semantic, and syntactic layers, and the detailed information is listed in Table 4. The first column is the linguistic layers the factors dwell on; the second and third columns denote the factors and their tagging terms; the fourth column lists the levels of each factor; the fifth column specifies each factor; the sixth column presents the influence of the factors on the concessive clause positions from literature, which is listed in the last column; and the seventh column contains deep motivations of the factor influence in literature. Note that the concessive clausal relationship is not fully explained in Table 4 for its complication. The concessive clausal relationships studied in the present research were categorized with reference to previous research, such as Quirk et al. (1985), Sweetser (1990), König (1994/2006), Barth (2000), and Kang & Xu (2020). This factor is illustrated in Table 5, which contains definition, subcategories and necessary examples.

Table 4 Detailed factor information

linguistic layers	factors	tagging	levels	specifications	clause positioning tendencies regarding the choices between levels of the factors	deep motivations	relevant literature
morpho-logical	subordinators	subordinator	although; though		unclear		
discursive	bridging	bridging	YES; NO	whether subordinating clauses contain any anaphoric items referrring to the preceding clauses	adverbial clauses containing anaphoric terms usually precede the main clauses.	old before new; iconicity of sequence?	Quirk et al. 1972; Chafe 1984; Givón 1990; Prince 1980; Birner & Ward 1998
semantic	specific clausal relationships	spc.clau.rel	DIRECT, INDIRECT, META-DISCURSIVE	the concessive clausal relationships (c.f. Table 5)	concessive clauses in indirect clausal relationships tend to precede the main clauses, while those in metadiscursive clausal relationships tend to follow the main clauses.		Quirk et al. (1985), Sweetser (1990), Azar (1997), Izusu (2008), König (1994/2006), Barth (2000), and Kang & Xu (2020)
	hedging	hedging	YES; NO	whether the subordinating clauses contain terms indicating possibility	concessive clauses with hedging terms indicating possibility tend to follow the main clauses		Kang & Xu (2020)
syntactic	length	sub.main. ratio	numeric values	ratio of subordinating and main clause word counts	heavier concessive clauses tend to follow the main clauses	end-weight principle	Quirk et al. 1972; Hawkins 1994, 2004; Biber et al. 1999; Diessel 2008; Wiechmann &Kerz 2013
	sub-clauses	sub.clau	YES; NO	whether the subordinating clauses contain clauses of any type	more complex concessive clauses tend to follow the main clauses		
	embeddedness	embedded-ness	YES; NO	whether the whole subordination is embedded in a larger complex sentence	embedded concessive subordinations tend to have preposed adverbial clauses	ambiguity avoiding	Quirk et al. 1985; Kang & Xu (2020)
	initial adverbials	ini.adv	YES; NO	whether initial adverbials exist in the whole subordination	subordinations with initial adverbials tend to have postposed adverbial clauses	horror aequi	Dressler 1976, McCawley 1988, Rohdenburg 2003
	deranking	deranking	YES; NO	whether the predicate verbs of the subordinating clause is incomplete	deranked concessive clauses tend to follow the main clauses	?	Quirk et al. 1985; Kang & Xu (2020)

Table 5. Concessive clausal relationship categorization

Main categories	Sub-categories		Examples
Direct concession (the main clause is a rejection of the caused consequence of the adverbial clause.)			(6) Although Athenian women were permitted to wear make-up, Ischomachus preferred his wife not to, believing it was an act of deception.
Indirect concession (the explicit or implicit meaning of the main clause is a rejection of the supposed proposition of the adverbial clause)	Counter-assertion	The adverbial clause supports the reversed matrix assertion.	(7) Although there is some connection between the rise in crimes and the lack of prayer in public schools, the factor is too minute to be accounted for.
		The implicit meaning of the adverbial clause and the matrix contradict each other.	(8) Although the range of delivery time is usually long, the customer can arrange delivery around their needs.
	Counter-inference and prediction		(9) Although they cannot cure the disease, they have tried hard. (10) Although this is a dangerous disease that may be contractable, the agricultural industry will not fall by as greater degree as anticipated.
	Counter -suggestion		(11) Although the high price of college education is warranted, tuition fees should not be exorbitant.
Restrictive/metadiscursive concession (the adverbial clause rectifies or adds information to the main clause)			(12) You have done a good job, although a bit late.

Table 6. Annotation on Example (13)

factor	subordinator	bridging	spc.clau.rel	hedging	sub.main.ratio	sub.clau	embedded-ness	ini.adv	deranking
annotation	although	NO	indirect	YES	0.65	YES	YES	YES	NO
specifi-cation		such refers back to the preceding clause	the situation that He would have no knowledge of what moment is present is in contrary to fact that He knows a lot	the term would is a hedging word	ln(23/12)(main clause has 12 words, and the concessive clause has 23 words)	the concessive clause has embedded clauses led by what, and in what	the whole concession is embedded in a larger coordination complex sentence	the initial adverbial as such exists in the concessive complex sentence	the concessive clause has a full predicate would know

Example (13)

if God is outside of time and had knowledge of time it would be knowledge of time as a 'B-series' and as such He would have no knowledge of what moment is present, even though He would know what all events were and in what relation they stand to other events (before, simultaneous with, and after).

An annotation case on the sentence in bold of Example (13) is presented in Table 6.

3.3 Statistical methods

To explore the effectiveness and directions of the potential factors, we employed binary logistic regression modelling, which yields effectiveness and directions of independent variables in adjusting the alternation of the dependent variable between its two levels.

4. Results and discussion

4.1 Factor distribution

Table 7. Factor distribution in native and learner data sets

Factor	subordinator		bridging		hedging		embeddedness		
Levels	although	though	NO	YES	NO	YES	NO	YES	
Native	408	270	398	280	568	110	577	101	
Learner	311	367	306	372	629	49	615	63	
Factor	ini.adv		deranking		sub.clau		spc.clau.rel		
Levels	NO	YES	NO	YES	NO	YES	direct	indirect	metadiscursive
Native	544	134	600	78	500	178	82	422	174
Learner	478	200	660	18	592	86	181	443	54

4.2 Effective tuning factors

4.2.1 Native speakers' performance

Research results of the general concessive subordinations are listed in Table 8, and specific results on directions and effectiveness of the three inconsistent factors are listed in Table 9.

Table 8. Logistic regression model results on bootstrapped native data sets

	Coefficients	Std.	Error	z value	Pr(>|z|)
(Intercept)	0.22281	0.10876	2.049	0.0405	*
subordinatorthough	-0.94203	0.07731	-12.186	<2e-16	***
bridgingYES	0.80475	0.07768	10.359	<2e-16	***
spc.clau.relindirect	1.08539	0.09716	11.171	<2e-16	***
spc.clau.relmtdcsv	-4.68232	0.28076	-16.677	<2e-16	***
hedgingYES	0.31982	0.10977	2.914	0.00357	**
sub.main.ratio	-0.63634	0.05729	-11.107	<2e-16	***
sub.clauYES	-0.92514	0.09655	-9.582	<2e-16	***
embeddednessYES	-0.45085	0.1054	-4.277	1.89E-05	***
ini.advYES	-1.38987	0.09786	-14.202	<2e-16	***
derankingYES	1.15205	0.14926	7.718	1.18E-14	***

Table 9. Comparison of results regarding three factors in models on four data sets

Factor-level	Data sets	direction-effectiveness
deranking-YES	native concessive subordination (bootstrapped)	+***
	although-subordination (boots trapped)	ineffective
	although-subordination in Kang & Xu (2020)	ineffective
	though-subordination (bootstrapped)	+***
hedging-YES	native concessive subordination (bootstrapped)	+*
	although-subordination (boots trapped)	+**
	although-subordination in Kang & Xu (2020)	-***
	though-subordination (bootstrapped)	ineffective
embeddedness-YES	native concessive subordination (bootstrapped)	-***
	although-subordination (boots trapped)	+**
	although-subordination in Kang & Xu (2020)	+***
	though-subordination (bootstrapped)	-***

Morphologically, native speakers place the concessive clauses discriminatively according to different subordinators.

On the pragmatic level, native speakers observe the principle of old before new.

Employ metadiscursive means of preposing the concessive clauses to strengthen them, and adding restrictive clauses to the main clauses to soften the main clauses, the concessive clauses with hedging terms are placed before the main clauses to lay a softening background.

Although-subordination compared with Kang & Xu (2020) hedging new dataset has high school student essays. High school students may prefer to hedge before main clause. or this hedging feature is not steady across data sets.

Syntactically, native speakers observe end-weight principle quantitatively and structurally. Observe the principle of horror aequi. Unstable in that deranking is effective only in though-subordinations. Embeddedness drove subordinating clauses to the follow the main clauses in though subordinations, yet pushed the concessive clauses to the front position of the main clauses. Overall, it is found that the native speakers distinguish concessive clauses according to different subordinators, observe principles in language use. Though features the postposed property in the pre.post.rate, and embeddedness.

4.2.2 Learner's performance

Table 10. Learners' performance

	Estimate	Std.	Error	z value	Pr(>|z|)
(Intercept)	1.1735	0.2117	5.542	2.99E-08	***
subordinatorthough	-1.1959	0.1918	-6.236	4.48E-10	***
spc.clau.relindirect	0.5901	0.2043	2.889	0.003867	**

spc.clau.relmtdcsv	-17.0821	487.6174	-0.035	0.972054	
sub.main.ratio	0.8945	0.1754	5.101	3.38E-07	***
sub.clauYES	-1.0632	0.3044	-3.493	0.000478	***
embeddednessYES	-1.8677	0.3585	-5.21	1.89E-07	***
ini.advYES	-1.1877	0.2053	-5.785	7.23E-09	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05

Results show that although learners use more bridging terms, which suggests that they use anaphoric terms to maintain textual cohesion. Yet the anaphoric terms referring back to the preceding clauses do not tune the learners' concessive clauses. This may be caused by the Chinese typology of special links (Wang, 2019). Chinese anaphoric cohesion frequently covers longer spans than between the neighboring clauses, which may contribute to the ineffectiveness of the anaphoric items in tuning the concessive clauses.

We also found that learners prepose concessive clauses with indirect relationships. The direction is similar to the native speakers, which suggests that learners also tend to prepose the adverbial clauses to heighten them. Yet the p value is 0.004, which shows that the effect of indirect clausal relationship in tuning the concessive clauses is not very significant. Metadiscursive relationship does not tune learners' concessive clauses very much. We examined the data and found that learners employed only a small number of metadiscursive relationships—54 out of 443 compared with the native metadiscursive relationships 174 out of 422. That is, learners do not use metadiscursive relationships frequently, and rarely do they tune the concessive clause positions when the concessive clauses are in metadiscursive relationship.

Syntactically, the learners perform similarly with native speakers in that they tend to postpose concessive clauses if they contain smaller clauses, or if initial adverbials exist in the whole concessive subordinations.

From the postposed concessive clauses with sub clauses, we may draw the conclusion that learners also observe the end-weight principle in that the concessive clauses with sub-clauses are more complex than those without sub-clauses. But we also found that the learners act conversely on the factor of clause ratios to the native speakers. In fact, learners prefer to place heavier concessive clauses in front of main clauses. In this sense, the learners do not observe the end-weight principle. Admittedly, the learners performance on the two factors relating to end-weight principle is puzzling. But a closer observation shows that the factor clause ratios measures clause weight in terms of word counts, while the factor sub-clause measures the clause weight in terms of syntactic complexity. So the results show that learners violate the end-weight principle in terms of word counts, but follows the end-weight principle in situation of syntactic complexity.

The learners also tend to postpose concessive clauses with features of embeddedness and initial adverbials, which is quite similar to native though data features. But though has a tendency of being postposed while the natives tend to prepose their concessive clauses more than the native speakers. Therefore, learners' performance relates little to the property of concessive subordinators.

The three factors that place the concessive clauses to the sentence final parts all add to the complexity of the concessive subordinations. It is quite possible that the learners observe the Complexity Principle proposed by Rohdenburg (1995, 2000, 2003). The Complexity Principle holds that in the case of more or less explicit constructional options, the more explicit one(s) will

tend to be preferred in cognitively more complex environments. In complex circumstances, learners would directly put forward the main clause proposition before processing the subordinating parts. Frequently, this leads to ambiguity and unbalanced sentence structures.

5. Conclusions

Based on corpus data and multifactorial calculation, this research explored, examined, and compared factors that tune the concessive clauses positions by native speakers and Chinese EFL learners. This research contributes to language property discovery and second language acquisition.

An Empirical Study on the Relationship Between the L2 Motivational Self System on Chinese English Major Students' Willingness to Communicate

LI Tianhao
National University of Singapore

Abstract: This study adopts a quantitative method to explore the relationships between the three components of the L2 motivation self system (i.e., ideal L2 self, ought-to L2 self, and L2 learning experience) on Chinese English major students' L2 WTC. 185 Chinese English major students joined a questionnaire survey, and the data were analyzed by SPSS 20.0. Results show that Chinese English major students' ideal L2 self and learning experience positively influence their L2 WTC inside and outside the classroom. In contrast, the ought-to L2 self has no significant effects on their L2 WTC. English major students with a high level of ideal L2 self and positive English learning experiences are more willing to communicate in English inside and outside the classroom. The study offers possible implications for English teachers to improve English major students' L2 WTC, such as helping them construct ideal L2 self images, and carefully designing teaching activities.

Key words: L2 Motivational Self System; L2 willingness to communicate; English major students; Ideal L2 self; Ought-to L2 self; English learning experience

1. Introduction

As English is widely used as an international language, and China is more open to the world, English communicational skill has become increasingly crucial for Chinese EFL learners. However, Chinese students tend to pay little attention to developing their oral English skills (Peng, 2012; Peng & Woodrow, 2010). For years, they have often been considered as 'reticent learners' who are good at passing paper-based exams but lack the willingness to communicate in English (Wen & Clément, 2003). Therefore, the cultivation of Chinese students' English abilities and especially oral English skills should be stressed.

The notion of willingness to communicate (WTC) is perceived as a personality-based, trait-like predisposition (McCroskey & Richmond, 1991). L2 WTC was first defined by MacIntyre et al. (1998) as "a readiness to enter into the discourse at a particular time with a specific person or persons, using a L2" (p. 547). Previous studies have identified a wide range of variables that affect L2 learners' WTC, such as motivation (Lee & Drajati, 2019; Peng & Woodrow, 2010; Lee & Lee, 2019), anxiety (Peng, 2012; MacIntyre, Baker, Clément, R, & Donovan, 2003), gender (MacIntyre et al., 2003), confidence (Lee & Drajati, 2019), and so on.

Among those influential factors, motivation can be quite significant. Dörnyei (1998) considered it one of the critical factors that influence the rate and success of L2 learning. The L2 motivational self system theory (L2MSS) provides a theoretical momentum for L2 motivation research (Peng, 2014). Dörnyei (2005, 2009) developed this theory by combining the concept of

possible selves (Markus & Nurius, 1986), the self-discrepancy theory (Higgins, 1987), and incorporating previous studies of L2 motivation such as integrative and instrumental motivation (Gardner, 1985). According to this theory, the model of L2 motivation includes three components (i.e., ideal L2 self, ought-to L2 self, and L2 learning experience). The ideal L2 self is defined as a desirable self-image that L2 user would like to be in the future (Dörnyei & Al-Hoorie, 2017). The ought-to L2 self is about the attributes that one believes one should possess to meet others' expectations and to avoid possible negative outcomes (Dörnyei, 2009). L2 learning experience is considered as "situated, 'executive' motives related to the immediate learning environment and experience (Dörnyei, 2009, p. 29)". To date, this model has received much attention from researchers and is supported by many empirical studies. Several researchers have examined the relationship between the L2 motivation self system and L2 WTC in various cultural and educational contexts (Kim, 2009; Kim & Kim, 2014; Kong et al., 2018; Lee & Lee, 2019; Peng, 2014).

Given the crucial role that motivation plays in L2 learners' learning, it ia worthwile to combine motivation and L2 WTC together and see how L2 WTC can be motivated. Besides, since Chinese non-English major students have received much attention from researchers (Zhan, 2017), more empirical studies are needed to explore the effects of motivation in Chinese English majors' L2 WTC. Therefore, this study is aimed to examine the relationship between the L2 motivational self system and Chinese English major students' L2 WTC. Two research questions are addressed: (1) Do the three components of the L2 motivational self system correlate with Chinese English major students' L2 WTC (2) Can three components of L2 motivational self system predict Chinese English major students' L2 WTC?

2. Methods

2.1 Participants

185 English major students from a key university in Shandong province participated in the study (Male=24, Female=161). Forty-five percent of the students are senior students, while twenty-eight percent of them are in the third year. One hundred thirty-two students have passed CET-4, and 109 students have passed CET-6. Both tests do not necessarily require students to take the speaking test. Sixty-five students took IELTS, and eight students took TOFEL. Both tests examine the test-taker's speaking skills. Sixty-four participants had overseas experiences.

2.2 Instruments

Instruments used in the study include a questionnaire. The questionnaire comprised three parts: participants' demographic information, items for L2 motivational self system, and items for L2 WTC. The scales were adopted from the existing literature (Peng, 2014; Liu, 2012) and used a five-point Likert scale format. Items in Part 2 examine the three aspects of the L2 motivational self system: *Ideal L2 self* (6 items), *Ought-to L2 self* (6 items), and *L2 learning experience* (7 items). In Part 3, items were used to examine participants' L2 WTC inside the classroom (7 items) and outside of the classroom (7 items). The research conducted pilot studies several times to make

the questionnaire more suitable for Chinese English major students. The questionnaire's validity was assessed using the Kaiser-Meyer-Olkin index (.89), Bartlett's Test of Sphericity (χ2=4328.606; *df*=595; p<.001). Then, the scales' reliability was confirmed by calculating the Cronbach's alpha value (ranged from .80 to .93),

2.3 Data collection and analysis

The Chinese version of the questionnaire was posted online and collected 185 questionnaires back. The researcher firstly explained the purpose of the research and the nature of the survey to all potential participants. It took approximately 15 minutes to complete the questionnaire.

Questionnaire data analysis was conducted through SPSS 20.0. After removing incomplete and invalid responses, 175 valid cases remained for data analysis. Firstly, descriptive statistics such as mean, standard deviation were calculated. Then, a Pearson correlation analysis was performed to examine the correlation between the three parts of L2 motivational self system and L2 WTC. Thirdly, hierarchical multiple regression analysis was conducted to assess the predictive power of the L2 motivation self system on L2 WTC. Demographic variables were included in the first model, and the three variables of the L2MSS were included in Model 2 to examine their potential influence on the dependent variable.

3. Results

3.1 Descriptive analysis

Table 4.1 *Descriptive Statistics of Participants' L2MSS and L2 WTC*

	Mean	SD	Skewness	Kurtosis
Ideal L2 self	3.76	0.75	-.43	.26
Ought-to L2 self	2.96	0.84	.14	.01
Learning experience	3.54	0.67	-.19	.50
L2 WTC inside the classroom	3.49	0.75	-.03	-.44
L2 WTC outside the classroom	3.54	0.76	.11	-.52

N=175 Min=1 Max=5

Table 4.1 presents a descriptive analysis of participants' L2MSS and L2 WTC. Data are normally distributed with absolute skewness (between -.43 and .14) and kurtosis (between -.52 and .26) values at less than two. The mean values of these variables range from 2.96 to 3.78 on a 5-point scale. In the three variables of L2 motivational self system, the highest value is obtained from Ideal L2 self (M=3.76), followed by the value of learning experience (M=3.54). Value of Ought-to L2 self (M=2.96) is the lowest among these variables. This result indicates that most participants tend to imagine an ideal self who can speak English fluently and are satisfied with their English learning experience. Besides, they generally have lower levels of ought-to L2 self.

As for the two variables of L2 WTC, the mean scores are similar. The value of L2 WTC outside the classroom (M=3.54) is slightly higher than that of L2 WTC outside the classroom

(M=3.49). This suggests that English major students are generally willing to communicate in English and would intentionally find opportunities to practice their oral English out of their interests.

3.2 Correlation analysis

Table 4.2 shows that English major students' ideal L2 self (r=.36, p<.01), (r=.40, p<.01), and learning experience (r=.53, p<.01), (r=.60, p<.01) are positively linked to their WTC inside and outside the classroom while there is no significant correlation between students' WTC and the ought-to L2 self (r=.08, p>.05), (r=.13, p>.05). This suggests that whether English majors are willing to speak English or not depends on the ideal L2 self and learning experience rather than the ought-to L2 self.

Table 4.2 *Correlation Analysis of L2MSS and L2 WTC*

	L2 WTC inside the classroom	L2 WTC outside the classroom
Ideal L2 self	.36**	.40**
Ought-to L2 self	.08	.13
Learning experience	.53**	.60**

* p<0.05 ** p<0.01

3.3 Regression analysis

Hierarchical multiple regression analysis was conducted to further examine whether the three variables L2 motivation self system could predict L2 WTC inside and outside the classroom. 4.3 indicates that in Model 1, overseas experience (β=.34, p<.05) significantly predicts English major students' L2 WTC inside the classroom. Then, Model 2, which explains 31% of the variance (F=15.71, p<.01), indicates that the ideal L2 self (β=.16, p<.05), learning experience (β=.54, p<.05) are statistically significant predictive variables, while overseas experience is no longer significant. The ought-to L2 self (β=-.05, p>.05) is not statistically significant, suggesting that it could not predict L2 WTC inside the classroom. Table 4.4 indicates that in Model 1, gender (β=.39, p<.01) and overseas experience (β=.37, p<.01) significantly predict students' L2 WTC outside the classroom. Model 2 (p<.01) accounts for 31% of the variance (F=23.49, p<.01). The ideal L2 self (β=.14, p<.05), learning experience (β=.57, p<.01) significantly predict English major students' L2 WTC inside the classroom, while gender and overseas experience are no longer significant. The ought-to L2 self (β=-.02, p>.05) is not a significant predictive variable.

Table 4.3 Hierarchical regression Analysis for variables predicting L2 WTC inside the classroom

	Model 1	Model 2
	B	
Gender	.22	.04
Overseas experience	.34*	.19

Ideal L2 self		.16*
Ought-to L2 self		-.05
Learning experience		.54*
	.06	.31
F(*p*)	5.80 (.00)	15.71 (.00)

β=Beta (standardized regression coefficient); * *p*<.05; ** *p*<.01

Table 4.4 Hierarchical regression Analysis for variables predicting L2 WTC outside the classroom

	Model 1	Model 2
	B	*B*
Gender	.39**	.18
Overseas experience	.37**	.12
Ideal L2 self		.14*
Ought-to L2 self		-.02
Learning experience		.57**
	.10	.40
F(*p*)	9.85 (.00)	23.49 (.00)

β=Beta (standardized regression coefficient); * *p*<.05; ** *p*<.01

4. Discussion and conclusion

This study explores the effects of the L2 motivation self system on Chinese English major students' L2 WTC. Results show that students' ideal L2 self and learning experience would positively correlate and predict their L2 WTC, while the ought-to L2 self has no significant influence on it.

Firstly, the study found that English major students' ideal L2 self is positively associated with their L2 WTC inside and outside the classroom. The ideal L2 self is about one's internalized aspiration to become a competent English user (Peng, 2014). Chinese English major students tend to have a high level of ideal L2 self, and this ideal image motivates them to speak English more often. Compared with non-English major students, English majors have a relatively more profound identification with English and the culture of English-speaking communities (Chan, 2018). The passion for learning English, the willingness to integrate with foreign cultures, the desire to study or work abroad, and other factors would jointly help students establish and strengthen their ideal L2 images. The gap between their actual self and ideal self motivates them to work hard and reduce the discrepancy (Dörnyei & Al-Hoorie, 2017). Previous researchers have confirmed the motivational effects of the ideal L2 self on L2 WTC (e.g., Lan, Nikitina, & Woo, 2021; Wang, 2014; Wei, 2020).

Moreover, L2 learning experience significantly predicts English major students' L2 WTC inside the classroom. The descriptive data shows that English major students tend to have a

positive learning experience and a higher willingness to communicate in English. The correlation and regression analysis results confirmed the positive association between L2 learning experience and L2 WTC. Yashima (2002) suggested that "studying gives learners confidence in communication" (p. 62). English class offers Chinese English learners most opportunities to communicate in English (Peng, 2012). Similar to other groups of English learners, Factors involved in L2 learning experience, such as teachers, classmates, the type of assigned tasks, etc impose strong impacts on their attitudes towards English learning (Peng, 2012; Shi, 2008) and then their willingness to communicate in English. For example, if students think the teacher's guidance is helpful or the learning tasks are helpful in their learning, they will be more willing to join the class discussion (Peng & Woodrow, 2010). This finding is consistent with previous studies' findings (e.g., Liu, Yao, & Hu, 2012; Peng & Woodrow, 2010; Peng, 2014; Yashima, 2002; Wang, 2014). Chen (2018) agreed that learning experience is the best predictor of Chinese English majors' L2 motivation and learning behaviors.

Another observation of the study is that ought-to L2 self does not significantly influence students' L2 WTC. The ought-to L2 self exerts motivational effects when one wants to meet others' expectations and to avoid possible negative outcomes (Dörnyei, 2009). The data analysis results show that students' level of L2 WTC is not greatly affected by other people's negative evaluations. Most of the participants disagreed that they had to study English because of external pressure. Since college students have become mature and developed independent thinking skills, the pressure from society may not be the primary driving force of their English learning behaviors (Gao& Zhou, 2009; Peng, 2015).

Peng (2014) have confirmed this insignificant relation between the ought-to L2 self and students' L2 WTC. However, some researchers (Wang, 2016; Li & Liu, 2021) found a positive correlation between the two variables, while Wei (2020) investigated a negative relation.

This inconsistency may be due to differences in research design and methodology adopted in those studies. Wang (2014), Li and Liu (2021) used mixed methods, including the questionnaire survey and semi-structured interviews, and gained more in-depth information. The qualitative data analysis in their studies shows the motivational effects of tests on L2 WTC. If participants need to take tests that examine their speaking skills, their L2 WTC would significantly increase to get good grades. However, most English exams do not compulsorily examine Chinese students' speaking abilities. Also, not all English teachers attach importance to students' oral English in their final course assessment. Therefore, though motivational effects of ought-to L2 self on L2 WTC may exist, it is difficult to find it by solely analyzing the questionnaire data (Peng, 2014; Wei, 2020).

Another possible explanation is that the three components of the model interact with each other or other variables, such as anxiety (Peng, 2014), intolerance of ambiguity (Wei, 2020), and do not exert effects in isolation (Liu et al., 2012; Wang, 2014). According to Wei's (2020) model, the ought-to L2 self was negatively related to Chinese college students' L2 WTC, with their intolerance of ambiguity playing a significant mediating role. Influenced by overdue attention to

the accuracy of expressions in English teaching, Chinese students have a low tolerance for ambiguity. Driven by this, they tend to take avoidance strategies to avoid negative comments, and their willingness to communicate in English decreases. Peng (2014) found that the ought-to L2 self positively influences Chinese college students' L2 anxiety. Their L2 WTC inside the classroom was predicted by anxiety, learning experience, and international posture, while L2 WTC outside the classroom was directly predicted by international posture. Besides, differences in the age and majors of participants may also lead to inconsistent research results. Given this controversial effects of the ought-to L2 self, more empirical studies are needed.

The study offers some implications for teachers of English major students to increase students' L2 WTC. The different effects of the ideal L2 self and the ought-to L2 self confirmed the idea that compared with external motivation, intrinsic and self-internalized motivation impose stronger stimulative effects (Noels, Pelletier, Clément, & Vallerand, 2000; Dörnyei, 2005, 2009; Peng, 2015). This suggests that English teachers should pay more attention to constructing students' ideal L2 self images. They can present some role models in English learning, offer opportunities to interact with foreign cultures. Apart from designing classroom activities and creating a positive classroom atmosphere, it would be meaningful and worthwhile for teachers to design production-oriented English activities in out-of-class digital environments (Lee & Drajati, 2019; Lee & Lee, 2019). Besides, given the low emphasis on oral ability in assessing students' English abilities, teachers can increase the proportion of class performance in course assessment and assign more performance-based tasks.

Despite the findings and implications, the study still has several limitations. It only used a quantitative method and recruited a limited number of participants. Future researchers should consider recruiting more participants from diverse backgrounds and improve the research design. Qualitative data analysis is needed in order to obtain deeper understandings of the complex relationship between the two variables and explore the reasons behind it. Moreover, This study assumed a linear relationship between L2 motivation and WTC. Since some researchers have emphasized the complex and dynamic natures of these two variables (Dörnyei, MacIntyre, & Henry, 2015; Ducker, 2021; MacIntyre and Legatto, 2011; Zhan, 2018), it is worthwhile for future researchers to take the dynamic characteristics into consideration, and adopt innovative research designs.

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新媒体在外语教学中的应用探索——以抖音在日语语法课外教学中的使用为例

李莹 李晶
大连外国语大学

摘要：随着信息时代的发展，新媒体作为一种重要载体，对教育教学提供了全新的机遇和挑战，为高校外语教育提供了一个可以利用的广阔的教育平台。本文以抖音在日语语法教学中的使用为例，探索新媒体在高校外语教学中应用的方式，并针对在应用过程中学生的反馈进行分析和探讨，发现学生利用新媒体进行提前预习、复习强化、师生互动后对学习显示出了兴趣，能够有效地理解和记忆。通过本研究旨在利用新媒体对高校外语教学进行创新，提升教学水平。

关键词：新媒体、外语教学

引言

“互联网+”时代的到来，各类新媒体将文字、声音、图像和影像等资料全天候互动地、全覆盖地传播到所有用户手中。尤其是新媒体的普及，更是给年轻人，尤其是高校中的大学生的生活、学习、交际等各个方面带来了巨大的影响。这种影响也给高校教育提供了全新的挑战和发展创新的平台。高校外语教育中可以利用新媒体快捷、形式多样等特点，结合其本身的包容性和多元化的特征，使得学生可以接触到更多的知识和信息，提升高校外语的教学效果，也有助于学生的独立思考及个性展示（王勃 2015）。陈玲（2011）也提到新媒体能够优化学习环境，激发学生的学习兴趣，可以将外语教学中听觉、视觉和感知能力进行良好的结合，增进学生的记忆力。同时，朱晔（2015）提到新媒体的使用途径时提出可以应用于教学活动的各个环节，扩展到课堂教学之外。本文从新媒体应用的角度，以日语语法课外教学中抖音短视频的使用为例，探讨新媒体在外语课外教学中的应用方法，以及新媒体为大学生的外语学习所带来的效果以及出现的问题。

一、实验设计

以往的教学模式中，学生在备考能力测试时，经常存在记不住句型的困扰，本项目则以时下最流行的短视频方式，采用最具有趣味性的素材进行教学资源建设，以此增加学生自主学习的动力，并有效地提高学习效率。同时可以成为教辅工具，减轻教师课下辅导的负担。

本实验及对象是辽宁省大连某高校软件专业日语强化倾向一年级的学生，共 68 人。授课教师以日剧为内容依托，挑选日剧中使用 JLPT 各级别语法、句型的相关场景，经过混剪制作成短视频的形式，发布在教师个人的抖音账号中。每个合成视频中由 3-5 个影视片段组合而成，在短视频中出现相关关键词时，弹出字幕进行重点提示。学生只需关注账号即可反复播放视频，同时可以用“点赞”的方式进行学习效果的自我测评，有疑问的部分可以在留言区留言共同讨论。

实验为期一个学期共 4 个月，每周 2 课时，每周发布 2-3 个抖音视频，涵盖期间所学内容。学生观看后不强制留言评论。

课堂上，教师会对所发布的视频片段进行简单的讲解，短视频作为辅助帮助完成教学任务。

二、实验结果和分析

告别传统纸质版教材中的白纸黑字枯燥的例句，取而代之的是更为丰富更为立体化的短视频形式的素材，兼具声音和图像，给学习者带来了很大的视觉冲击。实验结束 1 个月后，教师从以下四个方面对 68 名学生进行了问卷调查，收回有效问卷 61 份。

1.内容上

针对“对教师所发布的短视频内容有什么意见？是否喜欢，并写明原因。”这一问题，88%以上的学生们（54 人）都明确回答“喜欢”教师所发布的短视频内容。因为“内容丰富及写实”，“有趣”、“生动”、“接近生活”，“体会了在生活中的日语”“日语与生活联系在了一起”，而且“看到很多句型在日剧中的实际应用”。

学习外语的大学生经常会观看一些原文的影视剧或者动漫影片，这些影视作品集趣味性和生活性、文化性于一身，内容生动有趣，也带着很多社会人文的内容。从影视剧中找出场景会在情感上与观看者产生共鸣，是学生们喜欢短视频内容的主要原因，学生们也会在这种生动、有趣、贴近生活的视频中，被激发了情感，主动去记忆、背诵相关的知识点。

高校日语学习，对于大多数大学生来说都是从零开始的。学习外语时，将自己置身于目标语言的环境中对学习起到事半功倍的作用。然而，并非大多数学生都有机会去到目标语言的国家，亲身体会语言环境。除了老师的讲解和自身理解，情境对于学生来说也很重要。而且，教师在家讲解语法时所举的例子其实就是在为学生构建一个情境。大多数情况下都是利用语言去描述、创设一个场景。但是语言的描述往往缺乏全面性，而情境的出现却更直观、更生动、更快速地引导学生对语法使用的理解，更能够主动地、自主地学习。

另外，按照语法项目从影视作品中提取相关片段的做法是语言资源和时间的有效利用。作为曾经的外语学习者一定还记得当年在课堂上老师从某个影视剧或书中提取出来的一句话吧。那样的句子对学生来说一定是印象深刻的，那个片段也一定是记忆最深刻、最牢固的。影视片段能够达到这种效果除了有演员的因素外，更重要的是例句所依托的情境。不是一整部影视剧而是一个片段这种有效的利用才能让学生快速且有效地搞清楚句型或语法在实际情境中的应用，再结合抖音等基于移动信息技术的短视频平台的功能进行量的强化，达到了加强学生对语法内容的理解和应用情境的认知。节省了学生在观看影视作品是进行筛选的时间，视频的观看更有针对性和目的性，方便学生的实时反馈和教师的及时评价。

2.形式上

针对“抖音短视频的学习形式有没有不适应的地方？哪里不适应？为什么？是否愿意继续使用这种形式学习外语？”这一问题，90%的学生（55 人）都明确回答“没有不适宜”这种抖音学习日语的方式也“愿意继续使用”。

虽然有一部分学生认为“虽然通过短视频学习到了更多知识，但同时因为注意力分散和自制力不强导致浪费的时间更多”，因为“短视频学到的东西有限，毕竟是娱乐性视频”，但是大部分学生回答“这种方式学习很有趣，会让人记忆深刻”“视频与知识结合，效率高”，更是提到了“因为闲暇时间就会刷抖音，碎片化时间里就学会了知识，任务也不繁重，让人喜欢”。

近年来，很多教育大咖、学者们都提倡碎片化时间的利用。碎片化时间可以将系统性的知识分块、分片进行阐述，供学习者学习。具有时间短、内容精炼、可重复性的特点，这样

的学习形式特别容易记忆。日语语法项目看似独立却有体系，适合分散地碎片化时间来学习，并可以通过多次学习强化记忆，独立项目的学习与否也并不影响其他项目的理解和吸收。这种学习形式与“生动、有趣、贴近生活”的内容相结合，更吸引了学生，激发了学生的学习意愿。

3.使用习惯上

针对“什么时候观看教师发布的短视频？用于预习还是复习？是否会在空间的时候翻出来看？”这一问题，93%的学生（57 人）都明确回答有时间就会看看，其中有 6 名学生并没有太主动地观看而是“刷到就看看”“随机观看”。另外，用处并不相同，有的人用于复习，有的人用于预习，有的人预习复习结合。观看的时间也分睡前、课余时间、放假在家等不同。因为“老师挑出来的重点和难点都会在不同时间起到不同的作用效果”，并且可以“加强记忆”。

向洲芹（2018）的研究中提到以抖音为代表的短视频新媒体注重用户的个体化和个性化，可以根据用户的不同需求来为用户定制独特的传播策略和传播手段，实现“一对一”传播。特别是有“关注”“智能推送”等功能。“关注”之后，用户能够快速找到相关视频，并且反复观看。另外，观看同一类型的视频一段时间后，系统能够根据用户的观看习惯，主动推送相似内容的视频。因此，即便学生“刷到就看看”或者“随机观看”，也会在“智能推送”的功能下，接触到与日语学习相关的推送，可以深入地有选择地观看，并进一步学习。

4.效果上

针对“你觉得使用抖音短视频学习日语之后对自己的学习带来什么样的影响？有什么效果？”这一问题，95%的学生（59 人）认为抖音短视频学习日语是有良好效果的。学生们明确回答说“学习更快乐，更有兴趣学了”“增加学习动力”“让自己更有兴致学习日语”，从这些回答中，我们能够看到这种学习方式直观地激发了学生学习日语的兴趣，产生了学习的动力，增强学习的自信。另外，学生们不仅学习到了教师依托视频进行讲解的语法内容，“听说方面更敏感，提升了一点语感”“口语沟通有所上升”“了解了更多的日本文化和日语知识”“生活更充实，学到的知识更加饱满，确实自己的学习能力和范围提高了一些”。

朱春丽（2016）指出充满乐趣的情境在语言类课堂上能够更好地引导学生学习，帮助学生集中注意力，提高对外语课堂的学习兴趣的同时，学生在观看视频等时进行外语听力联系，培养语感提高听力能力。新媒体的使用开启了全新的外语学习模式。每一段视频都有特定的针对性，无论是预习还是复习，学生们观看时有充分的情境代入感，身临其境的学习更能够提升学习效果。

5.问题所在

尽管在问卷调查中 88%以上的同学都对使用新媒体进行外语学习表示出较好的体验评价和效果评价，但是我们不能忽略剩下的 12%的意见。在这些学生的意见中集中体现出了两个方面。一是来自于娱乐功能与学术内容的冲突。他们认为“短视频能学到的东西还是有限的，毕竟是娱乐性视频”“会被其他娱乐性的视频冲淡所学到的知识”，而且“视频不懂的地方不能随时提问”“偶尔会感觉内容讲的不够精细，有一笔带过的感觉”。二是来自于对传统教学方式的习惯导致的不适感。学生们虽然能够接受这种新颖的学习方式，但是更喜欢线下授课的方式，认为新媒体的介入“效果不是特别好”。

上述的问题提醒我们在使用新媒体进行教学或辅助教学需更加谨慎，不要盲目地只关注新的教学形式所带来的便利和良好效果，更应该关注学生们的学习体验的反馈和心理，这也

是新媒体在外语教学中应用所带来的全新的课题。

三、新媒体在外语课外教学中的优势及今后的课题

通过上述对结果的分析，我们可以看出利用短视频类新媒体进行外语教学的优势有以下三点：

一是赋予了外语学习以“智能化”的新元素。新媒体软件的娱乐功能提升外语学习的兴趣，新媒体的核心技术“人工智能”更能无限制扩展学习内容和学习领域。

二是将系统化知识进行“碎片化”传授，利用“碎片化”学习积累更全面的知识，建立完整的知识体系。语言类教育需要素材，文本、视频、音频都是不可或缺的教育素材。新媒体平台上丰富了外语教学素材的内容虽然外形零散，但是只要教师因势利导，就能够提升外语教学素材的层次、完善知识体系，从真正意义上提高教学的质量和水平。

三是情境“为幕”“视、听”领先。根据情景式教学法的理念，借助影视剧作品中的场景为学生提供理解相关语法、句型的背景，通过反复的观看和聆听加深学生对知识点的印象和记忆。空间时间的翻看更能够加强量的积累从而达到质的变化，从“看得懂”到“听得懂”，最后“说得出”到“用得对”。一方面能够利用新媒体平提供的形式与内容，夯实学生的语言知识，另一方面能够通过新媒体自由、开放的模式，培养学生勤于思考、用于探索的精神。

最后，我们也从学生们的反馈中发现，学生们对视频的质量也提出了希望，认为“视频节奏比较慢”，可以使用“剪映卡点”之类的技术手段，增加视频的趣味性和观赏性。视频的编辑者即授课教师不仅需要推敲视频内容与学科内容的合理性和契合度，还要创新视频的编辑思路，这无疑给教师们提出了更高的要求。

新技术为教育带来了新平台和新成果，但是在使用时应该本着“育人主导，技术为辅”的原则，切记因为新奇而忘却了教育的初衷。

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新文科下外语专业本科生信息技术能力的教学研究

李之桐

中国传媒大学

摘要：新文科下，外语专业本科生信息技术能力的培养至关重要，但是目前在课程开设上还在探索阶段。本文通过对比分析面向外语专业本科生开设的《计算机辅助翻译》和《Python 机器翻译》两门课程的授课情况，对于外语专业本科生信息技术能力的培养进行了探究，并提出针对性教学策略。

关键词：信息技术能力；新文科；外语专业本科生；Python；计算机辅助翻译

一、引言

技术的飞速发展，使外语专业本科生面临巨大挑战，也对每一位外语专业本科生提出了更高要求。《国家中长期教育改革和发展规划纲要（2010-2020 年）》指出，高校应培养学习者应用信息技术去解决面对的问题的能力。[1] 对于外语专业本科生，普遍更强调双语能力和文化交际能力，随着语言服务的全球化和商业化，语言服务行业从业者还要需具备极强的信息技术能力。[2]

在本文中，作者结合自己的实际教学经验，拟对以下几个问题进行探讨：

（1）外语专业本科生的信息技术能力培养现状；

（2）针对外语专业本科生的不同信息技术课程的对比分析研究；

（3）外语专业本科生信息技术能力教学策略；

二、高校外语专业本科生信息技术能力培养现状

论文 [3] 提出信息技术能力有着从单一能力到综合素养的演变趋势。在论文 [4] 中，作者对北京大学 2016 年入学文科生计算机基础情况进行摸排，结果显示计算机已经基本普及但学习者之间分层明显，大部分对计算机的使用主要是使用办公软件。论文 [5] 显示高校文科专业学习者信息素养处于较低水平，但是在培养方案中没有相关课程设置。在论文 [2] 中，作者探讨了外语专业本科生信息技术能力的定义并提出两种培养路径。

本文作者面向外语专业本科生开设两门课程《计算机辅助翻译》和《Python 机器翻译》，在下面的部分，作者结合实际教学经验及教学案例，对两门课程进行对比分析，并提出教学策略。

三、外语专业本科生信息技术能力课程对比分析

本小节主要对《计算机辅助翻译》和《Python 机器翻译》两门课程进行对比分析。

首先，两门课程的学习者对课程内容都具有浓厚的兴趣。《计算机辅助翻译》属于必修课，课程内容新颖，且学习内容可以便利语言学习。学习者在选修《Python 机器翻译》课程时，普遍对于“Python”语言以及“机器翻译”有浓厚兴趣。

在学习过程中，《计算机辅助翻译》学习者可以较好跟进学习进度。课程的各个章节之间关联性低，前一章节的学习对新内容的学习影响不大，但是比较考验学习者灵活应用各个

章节学习内容解决综合问题的能力。《Python 机器翻译》各个章节关联性高，例如前期 Python 基础知识章节没有理解的话，后面的内容无法跟进。学习者往往在基础知识学习时，容易上手，有较强的成就感。到实例应用时，学习难度进阶，一部分学习者无法跟进，产生受挫情绪。

综上所述，两门课程均能很好的培养学习者的信息技术能力。《计算机辅助翻译》课程，更多的是培养学习者综合利用技术和互联网解决问题的能力。《Python 机器翻译》对学习者来说学科跨度较大，但是对于学习者综合能力的提升也较强，对于学习者的逻辑思维能力有较大提升。

四、外语专业本科生信息技术能力教学策略

论文[6]概括总结了文科学习者的思维特点：形象思维能力强，抽象能力较弱；感性思维能力强，理性思维能力较弱；想象力强，具体操作能力较弱。根据学习者的学习特点，同时结合实际教学经验，为外语专业本科生开设课程可采取以下教学策略：

1.重实例

信息技术类课程对外语专业本科生来说，学习内容相对抽象。课程中要强化实例教学，案例的选择要生动有趣，贴近生活。在《Python 机器翻译》课程中，有一个章节是讲述如何基于文本进行词云的绘制。在该案例中包括自然文本的处理、词频统计以及图片生成，是一个综合性案例，学习者在学习中可以同时对多个知识点进行巩固加强。词云因其生动有趣、实用性强的特点，学习者在学习时兴趣高涨，因此对于有关知识的理解也更加深刻。

2.多引导

在技术类课程中，学生很容易遇到各种各样的操作问题。面对学习者的提问时，授课者可以通过提问的方式引导学习者思考，或者提供解决资源，请学生通过自己的思考尝试解决问题。学习者提出疑问的时候，也是培养学习者信息技术能力的最佳，而直接回答问题会使学习效果大打折扣。

3.建团队

学习者在团队中往往会更加思维活跃。在《计算机辅助翻译》课程中，请学习者以小组为单位创建自己的翻译公司，教师以甲方的身份与公司合作。在这个过程中学习者不再是完成作业的学习者，而是自主创业的老板，学习者有了更多的热情去完成项目，最终项目的完成度高于预期。

五、结语

本文首先分析了目前高校外语专业本科生信息技术能力培养现状，其次以《计算机辅助翻译》和《Python 机器翻译》为例对外语专业本科生信息技术能力课程进行对比分析，最后提出了外语专业本科生信息技术能力教学策略。

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Engaging EFL learners in multimodal composing

WANG Xiaocen
Qingdao University

Abstract: Multimodal composing (MC) is widely recognized as a new social practice of making meaning. The current mixed research explored thirty-two EFL learns' perceptions, strategies and challenges in the process of MC practice. Data collection includes questionnaires, semi-structured interviews and written reflections. The data were encoded by the grounded theory and verified by triangulation. The findings revealed that EFL learners were positive about MC, especially in its effectiveness of meaning construction, improvement of composing motivation and stimulation of readers' expectation. Regarding strategies, most students preferred the combination of image, text and table. The multimodal orchestration were various and the technical tools were used frequently. However, students were still confused in the aspects of material collection, composing development and modes application. The pedagogical implications for MC teaching are also discussed.

Keywords: multimodal composing; EFL learners; perceptions; strategies; challenges

1.0 Introduction

Multimodal composing (MC), first proposed in the field of New Literacy Studies, is defined as the utility of multimedia and technology for the writing process, design and creativity (Edwards-Groves 2011). It is a dynamic, changeable and complex process mediated by the interaction of multiple factors (Smith 2016). Previous studies on MC mostly started from itself, such as its novelty (e.g. Edwards-Groves 2011), essence (e.g. Smith 2016), potential (e.g. Jewitt 2012), aiming to introduce and explain MC as a new teaching method. Studies on MC in the L2 context has involved teachers' evaluation (Hafner & Ho 2020), teachers' design (Lim & Polio 2020), teachers' engagement (Jiang et al. 2019), students' cognition (Kim & Belcher 2020) and students' investment change (Jiang 2018). Most of these studies focused on only one aspect. And studies on MC learning are not deep enough, especially students' attitude, strategy use and learning difficulties in the whole process of MC.

This study aims to probe deeply into students' MC learning from their cognitive attitude, specific strategies and challenges encountered in the process of making a multimodal composition. Therefore, this study adopts students' perspectives, uses questionnaires, semi-structured interviews and written reflection to analyze students' perceptions, strategies and challenges in MC, which appear many differences compared with traditional writing. Systematic investigation of students' MC learning could help researchers get rid of the misunderstanding of the "service status" of writing. It provides a good opportunity to deeply analyze the complex process of meaning construction. Thus supplementing the research on MC from the perspective of student. This study

mainly focuses on three questions: How do EFL learners perceive MC? What strategies do EFL learners employ in MC process? What challenges do EFL learners encounter in MC process?

2.0 This study

A total of 32 English as a foreign language (EFL) learners participated in the study, including 4 males and 28 females. They were juniors in the university in an eastern coastal city of China, aged between 21 and 22. Before entering college, they had received an average of 9 years of formal English education in the school setting. Only three of them had been exposed to the writing forms similar with MC before. In the first advanced English class, Mr. Wang (who has four years of teaching experience in Advanced English Courses) assigned a MC task. Students were supposed to write a composition with the title "What You Can Do for Your World", in which figures, tables, images and efficient examples were all welcomed. The teacher also provided a report as an example on the same topic in National Geographic (2020) magazine for students, as shown below.

The researcher constructed a custom-made questionnaire that she entitled Multimodal Composing Questionnaire (MCQ). The design of the MCQ, drawing heavily on the wisdom of prior research and the experience of the participants. 32 students answered the questionnaire within 30 minutes and handed it to the researcher at the spot. The researcher used Microsoft Office Excel to summarize and sort out the data. And then, the data was imported into the Statistical Product and Service Solutions (SPSS) for reliability and validity tests, all meeting the requirements of empirical research. Qualitative data from students' semi-structured interviews and written reflections were also collected to enhance the representativeness of the data. Ten students were randomly chosen for a 30-minutes semi-structured interview. The interview was conducted in students' native language, Mandarin Chinese. Each interview was audiotaped and transcribed

for analysis. The transcribed contents were provided for the interviewees to confirm whether the transcripts were consistent with their ideas. Twenty students volunteered to write a reflection according to an outline (including ten open questions) provided by the researcher, aiming to describe and reflect on their overall experience in producing multimodal compositions. Putting the reflections together according to students' initials, the researcher found some keywords, so as to realize the triangular argument among the data of questionnaire, semi-structured interview and written reflection. The method of content analysis was used to analyze the interviews and written reflections, which is useful to analyze the text content with the advantage of revealing the hidden facts and contents in the text (Neuendorf 2017).

3.0 Research findings

3.1 Research Question 1

As shown in Table 1, EFL learners were positive about MC compared with traditional writing, which is embodied in three aspects: meaning construction, writers' motivation and readers' expectation.

As for meaning construction, all participants thought that MC promoted the effectiveness of meaning construction (Item 1, M=4.44). 68.75% of students agreed that MC improved the coherence of the article (Item 7, M=3.78). Secondly, in terms of writers' motivation, 87.5% of EFL learners reported that MC was full of innovation (Item 4, M=4.34), and 81.25% of students showed that MC was more interesting than traditional writing (Item 5, M=4.19). The novelty and interest of MC make more than half (53.13%) of the students tend to complete MC tasks rather than writing a traditional work (Item 9, M=3.56). What's more, 65.63% of students reported that MC was more useful for improving writing ability than traditional writing (Item 6, M=4.06). However, two-fifths of students held a neutral attitude towards MC, which was largely due to the complexity of MC tasks. 56.25% of the participants reported that MC was more complicated than traditional writing (Item 8, M=3.56). Last, regarding readers' expectation, 93.76% of the participants believed that MC was more attractive to readers (Item 2, M=4.41). This was also revealed in students' interview.

I think the target reader of MC is broader than that of traditional writing. Because multiple modes, such as images, are easier to understand than words, which lowers the threshold of reading and improves readers' interest. (S1)

Table 1

Results of comparing MC and traditional writing.

Items	M	Std	SD	D	N	A	SA
1. Compared to traditional writing, MC promotes the effectiveness of meaning construction.	4.44	0.50	0 (0%)	0 (0%)	0 (0%)	18 (56.25%)	14 (43.75%)
2. Compared to traditional writing, MC products are more attractive to readers.	4.41	0.61	0 (0%)	0 (0%)	2 (6.25%)	15 (46.88%)	15 (46.88%)
3. Compared to traditional writing, MC can better convey writers' ideas and purposes.	4.41	0.55	0 (0%)	0 (0%)	1 (3.13%)	17 (53.13%)	14 (43.75%)
4. Compared to traditional writing, MC tasks are more novel.	4.34	0.77	0 (0%)	1 (3.13%)	3 (9.38%)	12 (37.5%)	16 (50%)
5. Compared to traditional writing, MC is more interesting.	4.19	0.73	0 (0%)	0 (0%)	5 (15.63%)	14 (43.75%)	12 (37.5%)
6. Compared to traditional writing, MC is more conducive to improving English writing ability.	4.06	0.86	0 (0%)	1 (3.13%)	8 (25%)	11 (34.38%)	10 (31.25%)
7. Compared to traditional writing, MC promotes the coherence of the article.	3.78	1.02	1 (3.13%)	3 (9.38%)	6 (18.75%)	14 (43.75%)	8 (25%)
8. Compared to traditional writing, MC is more complicated.	3.56	0.86	0 (0%)	4 (12.5%)	10 (31.25%)	14 (43.75%)	4 (12.5%)
9. Compared to traditional writing, I'm more inclined to finish MC tasks.	3.56	0.75	0 (0%)	2 (6.25%)	13 (40.63%)	14 (43.75%)	3 (9.38%)

3.2 Research Question 2

Findings on EFL learners' strategy use were presented in Table 2 in the descending order of mean rank. The preparation strategies before composing are mainly embodied in the material collection. 90.63% of EFL learners collected a variety of resources such as words, images, charts, tables, audios and videos (Item 1, M=4.13) in the preparation stage. Among various new semiotic resources, image became the first choice for most students. As for the sources of image, 87.5% of students downloaded appropriate images directly from the Internet (Item 3, M=4.03)，and 65.59% of them modified the images downloaded to meet their composing requirements (Item 12, M=3.63). At the same time, three-quarters of students took photos related to real life in person (Item 5, M=3.91). Several students established image corpus in the process of MC. In addition to data from the MCQ, the following excerpts from one student's reflection indicated the reason why she preferred images.

I usually use many images, because readers can see clearly what this image is saying at a glance. I seldom use videos because in today's fast-paced era, some readers may not click on videos, which makes MC meaningless. (S2)

Although the subjects in this study were required to complete MC tasks in English, 65.65% of them preferred to search the Chinese version of the nonverbal mode first, and then translated into English (Item 9, M=3.66) when presenting them. Only one-fifth of students directly collected nonverbal resources in English.

Strategies in the process of MC are various. As for the application of modes, the combination of image, text and table was used the most, accounting for 84.38% (Item 2, M=4.06). Regarding the presentation form of semiotic resources, especially the form of charts, 78.13% of students applied different types of charts, such as histogram, pie chart and so on (Item 4, M=4.00). Students didn't employ those charts automatically generated by the questionnaire tool. Instead, they sorted out and selected the appropriate chart, and drew it by themselves by using Microsoft or other tools. Moreover, three-quarters of students preferred to use colorful modes. As for the

application of multimedia technology, 75% of students made full use of the functions of Microsoft Word and other kinds of tools (Item 7, M=3.84). Finally, regarding the location collocation of verbal and nonverbal modes, more than 70% of students put the charts or tables above or below the relevant paragraphs (Item 8, M=3.78). Nearly 70% of them explained views in words first and then presented the images, tables, and so on.

Table 2

Strategies used when producing MC works.

Items	M	Std	SD	D	N	A	SA
1. Before composing, I collect a variety of resources such as words, images, charts, tables, audios and videos.	4.13	0.65	0	1 (3.13%)	2 (6.25%)	21 (65.63%)	8 (25%)
2. When composing, I like to use the combination of images, tables and texts.	4.06	0.61	0	0	5 (15.63%)	20 (62.5%)	7 (21.88%)
3. Before composing, I always download appropriate images directly from the internet.	4.03	0.64	0	1 (3.13%)	3 (9.38%)	22 (68.75%)	6 (18.75%)
4. When composing, I apply different types of charts, such as histogram, pie chart, line chart and so on.	4.00	0.66	0 (0%)	0 (0%)	7 (21.88%)	18 (56.25%)	7 (21.88%)
5. Before composing, I would take images related to my real life in person.	3.91	0.95	0 (0%)	4 (12.5%)	4 (12.5%)	15 (46.88%)	9 (28.13%)
6. When composing, I prefer to use colorful images, tables and charts.	3.88	0.78	0 (0%)	2 (6.23%)	6 (18.75%)	18 (56.25%)	6 (18.75%)
7. When composing, I make full use of the functions of Microsoft Word and other kind of software.	3.84	0.97	0 (0%)	5 (15.69%)	3 (9.38%)	16 (50%)	8 (25%)
8. When composing, I always put the charts or tables above or below the relevant paragraphs.	3.78	0.96	0 (0%)	5 (15.69%)	4 (12.5%)	16 (50%)	7 (21.88%)
9. Before composing, I prefer to search the Chinese version of the nonverbal mode, and then translate it into English when presenting.	3.66	0.85	0 (0%)	4 (12.5%)	7 (21.88%)	17 (53.13%)	4 (12.5%)
10. When composing, I prefer the charts designed by myself with the help of computer technology, rather than those generated by questionnaire software.	3.66	0.77	0 (0%)	3 (9.38%)	8 (25%)	18 (56.25%)	3 (9.38%)
11. When composing, I would explain my views in words first, and then present the charts, images, tables and so on.	3.63	1.14	1 (3.13%)	7 (21.88%)	2 (6.25%)	15 (46.88%)	7 (21.88%)
12. Before composing, I modify the downloaded images appropriately.	3.63	0.96	0 (0%)	6 (18.75%)	5 (15.69%)	16 (50%)	5 (15.69%)

3.3 Research Question 3

The challenges encountered by participants were shown in Table 3, which could be divided into three categories: material collection, composing development, and modes application.

Regarding material collection, “Spend much time on information and materials collection” (Item1) ranks first among all challenges, accounting 87%. It could be explained by the fact that more than half of the students lack standards of material collection (Item 7). In terms of composing development, the two most frequently encountered challenges were “limited meaning expression restricted by individual English knowledge” (Item 2) and “poor ability on MC ideas and contents construction” (Item 3). More than 85% of students thought that their English knowledge limited meaning construction in MC to different extents. As for Item 5 and Item 11, the addition of nonverbal modes makes it more difficult for students to design the structure of the composition. 70% of students paid too much attention to the structural design of MC. And nearly half of them were troubled by the interruption of thoughts. As for modes application, the information overload appeared. 73% of students had difficulties in choosing appropriate materials (Item 4). And 43% of students were puzzled about the amount of nonverbal modal resources (Item

9). Finally, more than three-fifths of students reported that they didn't know how to use various resources creatively (Item 8). This was largely due to the fact that some of them were unfamiliar with modes collocation (Item 10). As a result, students' creativity, innovation and imagination is limited, and the role of MC in prompting students' creativity failed to realize.

Table3

Challenges encountered in the rank order

Challenges	#of students who chose it (percentage)	Categorization
Spend much time on information and materials collection.	26(87%)	Material collection
Individual English knowledge limits the meaning construction.	26(87%)	Composing development
Poor ability on MC ideas and contents construction.	24(80%)	Composing development
Difficult to choose from a majority of information collected	22(73%)	Modes application
Too much concentration on the structural design of MC.	21(70%)	Composing development
Confused about the evaluation criteria of MC.	21(70%)	Composing development
Lack of standards in the process material collection.	19(63%)	Material collection
Don't know how to use multiple modal resources creatively.	19(63%)	Modes application
Puzzled about the amount of nonverb modal resources.	13(43%)	Modes application
Unfamiliar with the verbal and nonverb modes collocation.	13(43%)	Modes application
Thoughts are more easily disturbed.	13(43%)	Composing development

4.0 Conclusion

All in all, this study highlighted students' cognitive changes in MC, summarized specific strategies and showed the challenges they encountered in MC. It can be seen that students are positive about MC and could actively use various strategies to complete their multimodal compositions, but there are still some puzzles and difficulties. Regarding the problem of students' students' blind search for invalid resources, teachers are supposed to design modes collection and categorization training in classroom tasks. In order to avoid students' anxiety because of the complexity of the tasks, it's better for teachers to first guide students to transform linguistic texts they previously wrote into multimodal texts. What's more, it's necessary for teachers to jump out of the evaluation framework of traditional writing, instead, learning the multiple evaluation criteria of MC. However, the gender distribution of the subjects in the current project is unequal. Future research on MC could investigate whether there are differences in perception, strategy use and challenges between males and females. Besides, the ability promotion effects of the MC tasks remain unknown, especially on students' creativity. It's useful to use action research or think-aloud study to explore students' ability development through MC tasks. Moving forward, subsequent MC research can be conducted to determine the learning gains in second and foreign language learning.

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Corpus-based and Data-driven Learning

基于语料库和数据驱动的学习

The Exploration and Practice of Corpus-Based Data-Driven Vocabulary Teaching Method — Taking Teaching English High-Frequency Metaphorical Words as an Example

HUN Jiexu

Dalian University of Foreign Languages

Abstract: In recent years, there has been an increasing number of studies on data-driven vocabulary teaching methods based on corpora, and the effectiveness of them for vocabulary learning has been confirmed by many researchers. This study, taking teaching English high-frequency metaphorical words as an example, proposes a method — building electronic dictionary method — to motivate students to actively use the data-driven approach to vocabulary learning. In this study, students are guided to use the corpus to explore the form, meaning, and correct usage of the learned vocabulary in depth by developing their own visual electronic dictionaries. The method has been proved to be effective in practice. This study has some implications for the construction and implementation of data-driven teaching methods, the construction of corpora, especially metaphorical words corpora, and the promotion of students' mastery of the modern technology and the correct forms, meanings, and usages of vocabulary.

Keywords: corpus-based; data-driven; vocabulary teaching methods

1 Introduction

Effective teaching and learning of vocabulary have always been the focus of research in the education field. In recent years, research on data-driven vocabulary learning methods (DDL) based on corpora has been increasing, and the advantages and effectiveness of DDL have been confirmed by many researchers. The current situation is that most students still use the traditional vocabulary learning method of checking dictionaries to learn vocabulary, and they lack subjective motivation to adopt DDL for vocabulary learning. In the era of big data, it is worth considering and exploring how to teach students to use data for vocabulary learning and how to motivate them to adopt the corpus-based DDL method. This study takes teaching English high-frequency metaphorical words as an example to practice a strategy, the electronic dictionary construction strategy, to motivate students to actively adopt DDL method to vocabulary learning. By developing their own visualized English high-frequency metaphor words electronic dictionaries, students are guided to use the corpus to actively explore the forms, meanings, and correct usage of the learned vocabulary in depth.

2 The Design and Practice

2.1 Teaching Background

The subjects of this study are sophomore computer science majors (English intensive) at the School of Software, Dalian University of Foreign Languages. The

students were first exposed to the concept of corpus and DDL. After a full year of intensive English learning in their freshman year, the students have realized the inadequacy of traditional vocabulary learning methods and have a subjective desire to learn English in a more authentic way and to learn vocabulary more accurately.

2.2 Instructional Design

The entire instructional design was based on guiding students to construct their own visualized English high-frequency metaphor words electronic dictionaries. Students are asked to use the data provided by the corpus to explore the laws of language usage and metaphorical meaning; and are guided step by step to select words, filter and acquire data, clean data, organize data, build a corpus, design and construct an electronic dictionary, etc. Throughout the process, students actively and positively adopt the DDL method for vocabulary learning, and gradually formed a learning mode from teacher-guided learning to learner-independent learning.

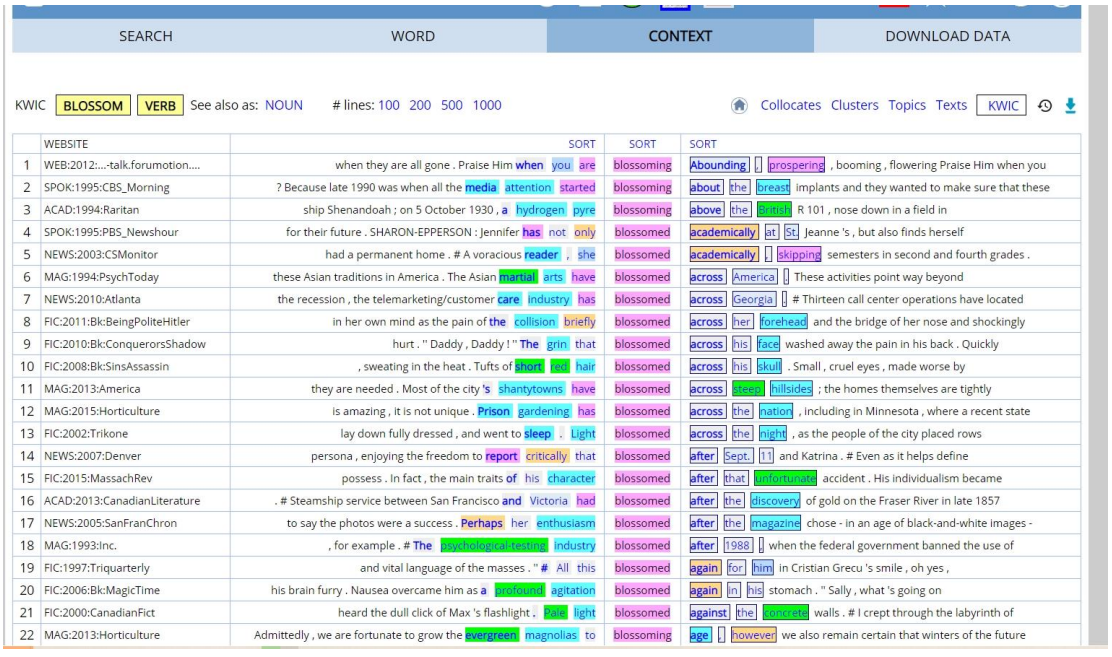
2.3 Teaching Practices

(1) Teacher Guidance

In addition to four times of centralized instruction, the teacher provides online and offline instruction at any time, so that students can discuss with the teacher whenever they have questions.

(2) Student Practice

The target vocabulary was determined by the students themselves: those learned words whose meaning was not well understood and whose usage was not accurately grasped. They used the self-built corpus to actively explore the forms, meanings, and correct usage of the target vocabulary in depth. At the same time, they learned some related natural language processing techniques. Some examples are showed in Figure1-8.



	WEBSITE	SORT	SORT	SORT
1	WEB:2012:...-talk.forumotion....	when they are all gone . Praise Him when you are	blossoming	Abounding , prospering , booming , flowering Praise Him when you
2	SPOK:1995:CBS_Morning	? Because late 1990 was when all the media attention started	blossoming	about the breast implants and they wanted to make sure that these
3	ACAD:1994:Raritan	ship Shenandoah ; on 5 October 1930 , a hydrogen pyre	blossoming	above the British R 101 , nose down in a field in
4	SPOK:1995:PBS_Newshour	for their future . SHARON-EPPERSON : Jennifer has not only	blossomed	academically at St. Jeanne 's , but also finds herself
5	NEWS:2003:CSMonitor	had a permanent home . # A voracious reader , she	blossomed	academically , skipping semesters in second and fourth grades .
6	MAG:1994:PsychToday	these Asian traditions in America . The Asian martial arts have	blossomed	across America . These activities point way beyond
7	NEWS:2010:Atlanta	the recession , the telemarketing/customer care industry has	blossomed	across Georgia . # Thirteen call center operations have located
8	FIC:2011:Bk:BeingPoliteHitler	in her own mind as the pain of the collision briefly	blossomed	across her forehead and the bridge of her nose and shockingly
9	FIC:2010:Bk:ConquerorsShadow	hurt . " Daddy , Daddy ! " The grin that	blossomed	across his face washed away the pain in his back . Quickly
10	FIC:2008:Bk:SinsAssassin	, sweating in the heat . Tufts of short red hair	blossomed	across his skull . Small , cruel eyes , made worse by
11	MAG:2013:America	they are needed . Most of the city 's shantytowns have	blossomed	across steep hillsides ; the homes themselves are tightly
12	MAG:2015:Horticulture	is amazing , it is not unique . Prison gardening has	blossomed	across the nation , including in Minnesota , where a recent state
13	FIC:2002:Trikone	lay down fully dressed , and went to sleep . Light	blossomed	across the night , as the people of the city placed rows
14	NEWS:2007:Denver	persona , enjoying the freedom to report critically that	blossomed	after Sept. 11 and Katrina . # Even as it helps define
15	FIC:2015:MassachRev	possess . In fact , the main traits of his character	blossomed	after that unfortunate accident . His individualism became
16	ACAD:2013:CanadianLiterature	. # Steamship service between San Francisco and Victoria had	blossomed	after the discovery of gold on the Fraser River in late 1857
17	NEWS:2005:SanFranChron	to say the photos were a success . Perhaps her enthusiasm	blossomed	after the magazine chose - in an age of black-and-white images -
18	MAG:1993:Inc.	, for example . # The psychological-testing industry	blossomed	after 1988 , when the federal government banned the use of
19	FIC:1997:Triquarterly	and vital language of the masses . " # All this	blossomed	again for him in Cristian Grecu 's smile , oh yes ,
20	FIC:2006:Bk:MagicTime	his brain furry . Nausea overcame him as a profound agitation	blossomed	again in his stomach . " Sally , what 's going on
21	FIC:2000:CanadianFict	heard the dull click of Max 's flashlight . Pale light	blossomed	against the concrete walls . # I crept through the labyrinth of
22	MAG:2013:Horticulture	Admittedly , we are fortunate to grow the evergreen magnolias to	blossoming	age , however we also remain certain that winters of the future

Figure 1. Screenshot of a specific operation example on COCA

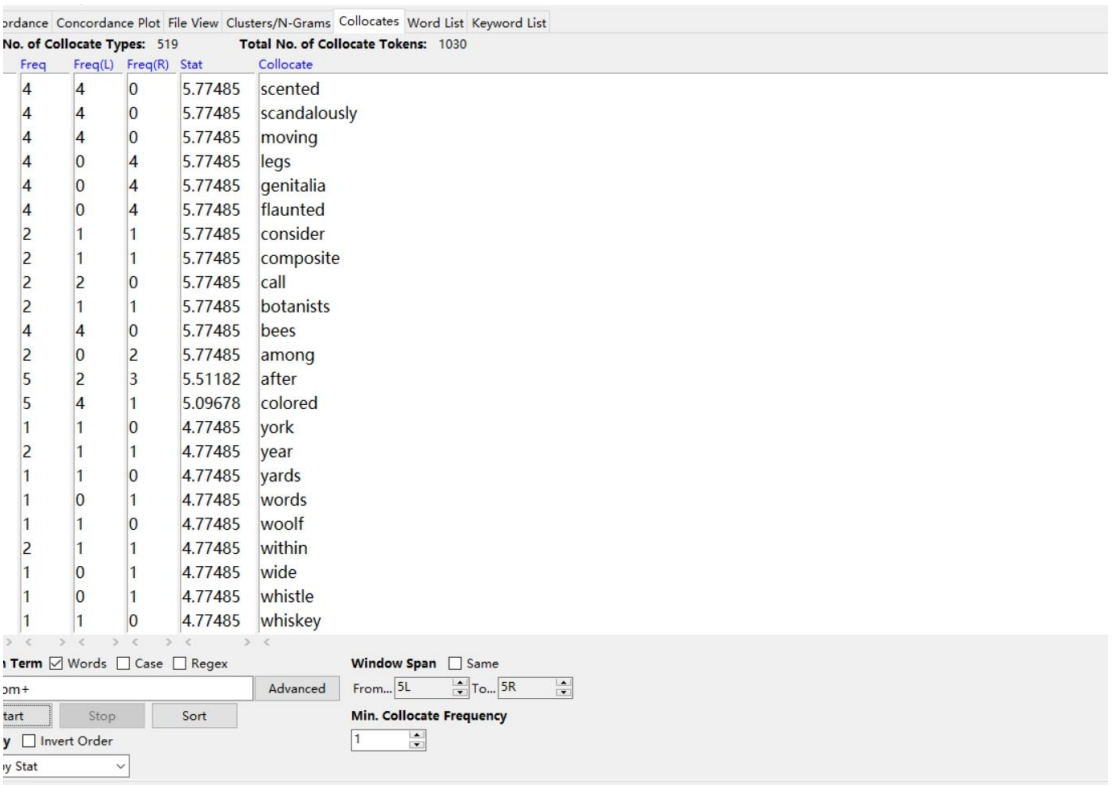
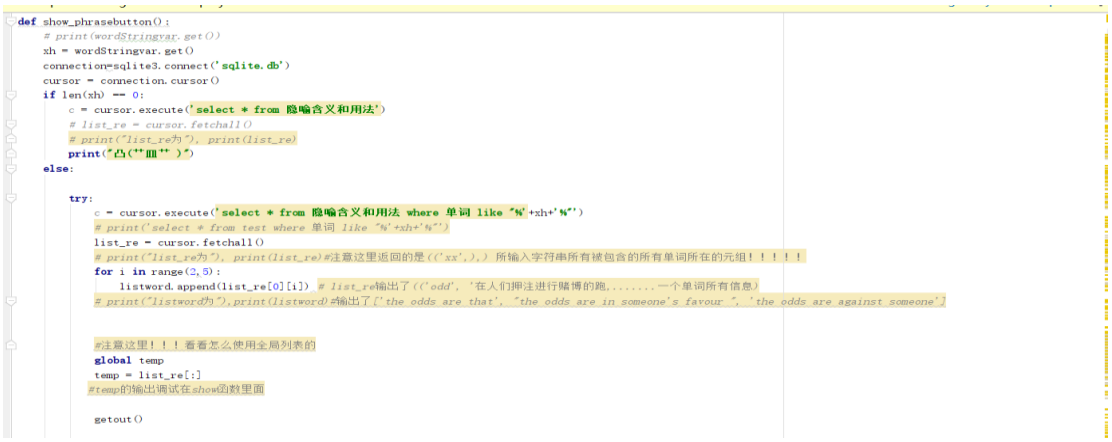


Figure 2. Screenshot of a specific operation example of using Antconc

Figure 3. Partial Table Structure of Self-built Corpus

Figure 4. Partial Table Structure of self-built corpus



```
def show_phrasebutton():
    # print(wordStringvar.get())
    xh = wordStringvar.get()
    connection=sqlite3.connect('sqlite.db')
    cursor = connection.cursor()
    if len(xh) == 0:
        c = cursor.execute('select * from 隐喻含义和用法')
        # list_re = cursor.fetchall()
        # print("list_re为", print(list_re)
        print("凸(艹皿艹 )凸")
    else:

        try:
            c = cursor.execute('select * from 隐喻含义和用法 where 单词 like "%"+xh+'%"')
            # print('select * from test where 单词 like "%'+xh+'%"')
            list_re = cursor.fetchall()
            # print("list_re为", print(list_re)#注意这里返回的是(('xx',),) 所输入字符串所有被包含的所有单词所在的元组！！！！！
            for i in range(2,5):
                listword.append(list_re[0][i]) # list_re输出了(('odd', '在人们押注进行赌博的跑.....一个单词所有信息)
            # print("listword为",print(listword)#输出了['the odds are that', "the odds are in someone's favour ", 'the odds are against someone']


            #注意这里！！！看看怎么使用全局列表的
            global temp
            temp = list_re[:]
            #temp的输出调试在show函数里面

            getout()
```

Figure 5. Partial Code of Electronic Dictionary Construction

```
lo Python interpreter configured for the project                    Configure Python interpreter
    Label(fun2, image=fun2_photo).pack()
    tk.Label(fun2,text='往字典里添加新单词时\n建议在别的地方整理好\n然后复制粘贴到输入框内',font=("楷体", 15),
          fg='green',width=30,height=5).place(x=170,y=380)

    WordLabel = tk.Label(fun2,text='要录入的单词',height=2).place(x=220)
    WordStringvar = tk.StringVar()
    WordEntry = tk.Entry(fun2, width=20,textvariable=WordStringvar, borderwidth=3).place(x=185,y=40)

    anyu_Label = tk.Label(fun2, text='录入单词的隐喻含义',height=2).place(x=380,y=20)
    anyu_Stringvar = tk.StringVar()
    anyu_Entry = tk.Entry(fun2, width=20, textvariable=anyu_Stringvar, borderwidth=3).place(x=365,y=60)

    dapei_1_Label = tk.Label(fun2, text='单词高频搭配1:').place(y=100)
    dapei_1_Stringvar = tk.StringVar()
    dapei_1_Entry = tk.Entry(fun2, width=20, textvariable=dapei_1_Stringvar, borderwidth=3).place(x=150,y=100)

    dapei_1_hanyi_Label = tk.Label(fun2, text='单词高频搭配的含义1:').place(y=120)
    dapei_1_hanyi_Stringvar = tk.StringVar()
    dapei_1_hanyi_Entry = tk.Entry(fun2, width=20, textvariable=dapei_1_hanyi_Stringvar, borderwidth=3).place(x=150,y=120)

    dapei_2_Label = tk.Label(fun2, text='单词高频搭配2:').place(y=170)
    dapei_2_Stringvar = tk.StringVar()
    dapei_2_Entry = tk.Entry(fun2, width=20, textvariable=dapei_2_Stringvar, borderwidth=3).place(x=150,y=170)

    dapei_2_hanyi_Label = tk.Label(fun2, text='单词高频搭配的含义2:').place(y=190)
    dapei_2_hanyi_Stringvar = tk.StringVar()
    dapei_2_hanyi_Entry = tk.Entry(fun2, width=20, textvariable=dapei_2_hanyi_Stringvar, borderwidth=3).place(x=150,y=190)

    dapei_3_Label = tk.Label(fun2, text='单词高频搭配3:').place(y=240)
    dapei_3_Stringvar = tk.StringVar()
```

Figure 6. Partial Code of Electronic Dictionary Construction

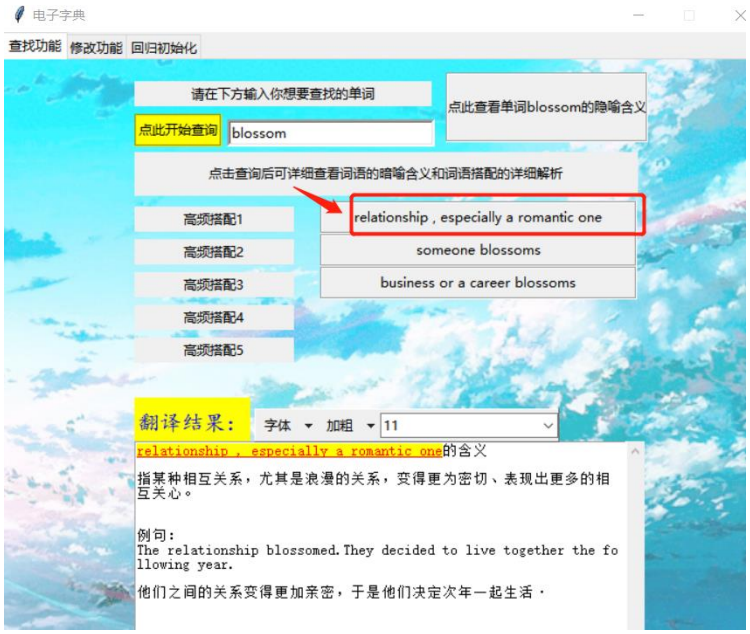


Figure 7. Part of the Electronic Dictionary Interface

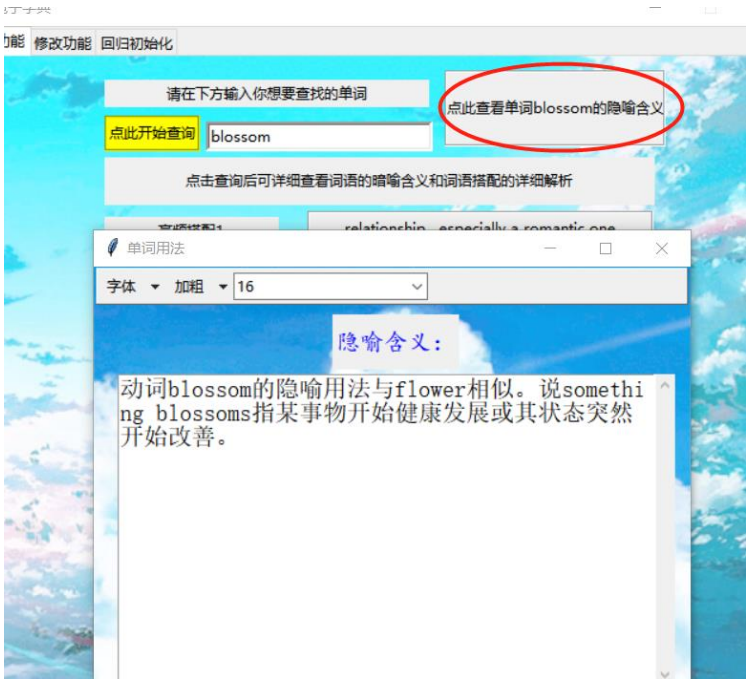


Figure 8. Part of the Electronic Dictionary Interface

3 Results and Analysis

3.1 Practice Results

(1) The DDL method was effective, not only in improving the overall cognitive level of vocabulary, but also in facilitating learners to accurately grasp the form, usage and meaning of vocabulary. (2) The electronic dictionary construction strategy can effectively promote students' active use of the DDL method to learn vocabulary, and while learning vocabulary, they have also mastered some modern natural language processing techniques, including the use of language processing tools and python programming techniques.

3. 2 Summary of Teaching and Learning

The students' written feedback revealed that the corpus helped students in many aspects of vocabulary learning. Many vocabulary learning questions that had been bothering them for a long time, such as which words are often used together with English high-frequency metaphorical verbs and what are the deep metaphorical meanings of these verbs, could be satisfactorily answered by exploring the corpus. At the same time, students also found it meaningful and interesting to construct their own electronic dictionaries. In the process of constructing dictionaries, they were motivated to learn vocabulary, to use corpus, and not only did they solve their long-standing confusion vocabulary problems, but they were able to exercise and improve their abilities in various aspects.

3.3 Teaching Implications

This study brings the following insights to vocabulary teaching:

(1) Applicable Objects of the Electronic Dictionary Construction Strategy

From this study we see that vocabulary learners, just as the object of this study, who have strong motivation to learn vocabulary in depth, have interest in learning more modern learning tools and technologies, have a strong subjective will to create new things and take the initiative to explore and research unknown things, can be the suitable target of this strategy.

(2) The Guarantee of the Electronic Dictionary Construction Strategy

During the whole process of the electronic dictionary construction strategy implementation, students should be provided with guidance, which are the prerequisites and guarantees for the success of it, including trainings related to the use of online corpus platform, natural language processing tools, corpus construction techniques, python programming techniques, etc.

(3) The Construction of Corpus

As an important resource for vocabulary teaching, various corpora are needed to be constructed. The number of corpora today is far from enough, and we need more people to participate in the corpus construction. Undergraduates can be involved in the design and construction of corpus in the future under the teachers' guidance. The process of constructing corpus is also the process of active and in-depth vocabulary learning for undergraduates.

4 Conclusion

There are many advantages of the corpus-based DDL vocabulary method, but how to make this method popular among vocabulary learners and how to make learners interested and active in adopting this method for vocabulary learning is a problem worth thinking and exploring. This study takes teaching English high-frequency metaphor words as an example and tries to practice a strategy to motivate students to actively adopt the DDL vocabulary method —developing an electronic dictionary strategy. By developing students' own visualized electronic dictionaries, students actively use corpus to explore the forms, meanings, and correct usage of the target vocabulary in depth and actively learn natural language processing techniques. The student-developed visual electronic dictionary is grounded in solving the practical difficulties encountered by vocabulary learners, so the study has some practical significance. The dictionary displays common collocations, semantic type, and metaphorical meanings of English high-frequency metaphorical verbs, co-occurrence frequency data of the collocations, and example sentences, which is innovative. The electronic dictionary construction method needs to construct its own high-frequency metaphor corpus, which can be applied to other fields of metaphor-related research or teaching.

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基于 BCCWJ 语料库的日语动词搭配词研究及其对教学的启示
——以“開ける”为例

李淼
大连外国语大学

1. 引言

日语中存在大量多义词，通过考察目标词的搭配词及其特点，厘清多义词的语义特征及语义框架，对于日语学习有着重要的意义。“開ける”是日语的基本动词之一，是日语学习的一个重要词汇。“開ける”具有多义性，与汉语的“（打）开”语义类似，同时又存在着明显的不同。本文以“開ける”为研究对象，通过语料库调查的方法，利用语料库获得的信息，抽取、整理、分析“開ける”的搭配词，探索多义词分析的方法，为语言教学提供参考。

2. 语料库调查结果与分析

本文所选用的语料库是日本国立国语研究所的“现代日语书面语均衡语料库 (Balanced Corpus of Comtemporary Written Japanese: BCCWJ)”[17]。以“開ける”为调查对象共检索出 7323 条语料，在“名词+助词+開ける”类型里，以“～を開ける”形式出现的频率最高，总计 5000 条。从“開ける”对ヲ格搭配词的依赖性也能看出其他动词性的特点。通过对ヲ格搭配词的整理与分析，可以获得对“開ける”进行语义分析的依据。

BCCWJ 语料库所收录的“開ける”ヲ格搭配词共计 419 种，其中出现频率超过 20 次的高频搭配词有ドア（958[18]）、戸（470）、目（377）、口（366）、窓（337）、穴（250）、ふた（169）、鍵（99）、箱（90）、【数字】（80）、幕（72）、ふすま（69）、引き出し（60）、カーテン（59）、玄関（49）、障子（47）、冷蔵庫（37）、引き戸（37）、門（35）、眼（33）、袋（33）、ケース（27）、道（27）、店（25）、包み（24）、封（22）、トランク（21）等。

笔者对“～を開ける”的 419 种ヲ格搭配词进行人工归类整理与分析。在逐一确认语料信息时，笔者发现了语料库中的一些错误的数据，在归类统计时予以剔除。比如，搭配词「グレー」，实际上是「目を開ける」的例子。「ゲージ」存在单词拼写的错误，应该是「ケージ」；「レン」是标记错误的搭配词，正确形式应该是「ドレン」。此外，也有一些搭配词的提取是不完整的，比如「ダンス」，实际应为「洋服ダンス」，「死に目」实际上是「必死に目」。又如，「内職」是一个俳句中的例子，搭配词分割出现错误，实际上搭配词是「窓」。

在剔除上述误例后，笔者根据搭配词的含义和性质，进行了分类。其中，表示门窗类含义的搭配词最多（ドア、戸、窓等），门窗类似物（幕、ふすま等）以及门窗的附属物（鍵、錠等）、附带门窗的家具类（引き出し、冷蔵庫等）词汇出现频率也较高。其次，表示密闭空间的名词（箱、袋、ケース、缶等）以及密闭空间内的东西（ワイン、ビール、手紙等）也是高频搭配词。再次，属于覆盖物类的名词（ふた、栓等）、“洞穴”（穴、隙間等）含义相关名词的出现频率也非常高。与表示身体部位的名词（目、口など）搭配也是“開ける”使用的显著特点。还有一些具有相对抽象含义的搭配词，比如电脑相关的词汇（サイト、メ

[17] 检索网址：https://nlb.ninjal.ac.jp/search/。调查日期为 2021 年 7 月 2 日。
[18] 数字表示搭配词出现的次数。

ール）、表空间含义的词汇（距離、スペース等）等等。

进而，笔者基于从语料库中提取的搭配词信息及语例对“開ける”进行自下而上的语义研究。在语义分析的过程中，判定“開ける”的典型语义为“打，打开（开启封闭的空间）”，并运用隐喻、转喻等认知语言学理论分析“鍵を開ける”、“金庫を開ける”、“目を開ける”“ワインを開ける”“店を開ける”等用法，讨论了“開ける”语义之间的内部关系，构建“開ける”的语义框架。这种基于语料库的定量统计，运用了搭配词分类分析的方法，使对“開ける”的多义性的考察变得容易。

3. 搭配词研究对词汇教学的启示

搭配词所体现的是词与词之间的含义、语法等方面的相关性。很多单词都是在语言表达的有限组合中使用的，掌握这些搭配词就是掌握语言知识，也就是掌握交际知识，进而能够更好的进行实际运用。通过考察搭配词，既可以把握词义产生的途径，也可以获取它与同义词区分使用的信息。

在词汇教学中指导多义词的时候，比起使用解词释义的方法，提供恰当的搭配词，将有助于学习者的学习，也可以减少某些单词的学习负荷。对于外语学习者而言，掌握搭配词也是便于和母语进行对比，促成母语知识正迁移的方法。如果能记住目标语言中的表达模式，清楚地掌握与母语表达的不同点，必然能够对学习起到促进作用。

基于语料库和数据驱动的日语教材编写——以日语使役表达教学为例

王潇潇
大连外国语大学

汉语母语日语学习者在学习日语使役表达的时候经常犯一些类似于“李先生は私を事務室へ資料を取りに行かせます”的语用学方面的错误。这很大程度上是因为日语的由动词变形而来的“せる・させる”句和汉语的“让”字句具有相似的意思用法。但是到目前为止的日语教育关于两者之间共同的意思功能的研究居多，另一方面关于两者之间究竟有着怎样的差异还有研究余地，尤其是在日语教育方面关于两者用法的区别的解释说明有些不足。由于汉语母语者在日常交际中经常使用“让”字句，日语如何与之相对应就显得尤为重要。本文以汉语使役表达的“让”字句相对应的日语使役表达作为例，基于语料库 CCL、BCCWJ、CSJ、BJSTC 和汉语母语日语学习者的使役表达习得数据，对日语教材这部分的编写进行提案。

按照使役者和被使役者的个人称之间的关系通过对语料库 CCL、BCCWJ、CSJ、BJSTC 的调查可以得知以下结果：以汉语为原文的“让”字句所对应的日语表达中动词变形产生的使役句的比例最高，但是以日语为原文的“让”字句所对应的表达则是直接引用句所占比例最高，并且他动词句、词汇型的使役动词句、授受表达句等也不少。此外，动词变形产生的使役句占比非常小。但是笔者通过问卷等形式对不同水平的汉语母语日语学习者的调查中发现，应该使用日语使役表达的时候使用率低，反而在不应该使用日语使役表达的时候误用率很高。因此，在国内现在主流的日语教材、参考书中经常用汉语的“让”字句对日语的使役表达进行说明是存在一定问题的,通过和语料库的数据进行对比可以归纳为以下几点:①语法说明和练习中出现的动词多为作为使役形式很少出现的例子；②将语法构式的标志助词“に”和“を”的区分作为重点，但是在语用论方面的说明有些匮乏；③把“强制的使役表达”和“许可的使役表达”进行同等对待；④关于使用语境的说明不够，很难掌握实际使用；⑤例句多为陈述形式的单句；⑥关于动词变形和句型熟练度的练习很多，均没有使用场景的说明；⑦没有关于使役者和被使役者的人称关系而产生的使役表达的使用变化的说明；⑧经常将日语使役表达翻译成汉语“让”字句，但是关于两者适用范围等的不同的补充说明不够。

为了解决以上这些教材中出现的问题，基于语料库的数据可以根据人称关系将汉语“让”字句所对应的日语表达分成“语法表达”和“词汇表达”，分别加以说明。因为日语母语者的语言背景知识和汉语母语学习者的不一样，直接将日语使役表达作为日语学上的语法对学习者进行指导很容易引起语用学的问题。为了防止这种情况的出现，在日语教材编写的过程中使用语料库中出现过的日语母语者日常生活中实际使用的情景进行上下文的补充说明，并且将日语母语者实际生活中几乎不可能使用的例句应当进行剔除。

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基于 iWeb 语料库对“兼爱”一词英译的传播研究

王秀文 袁丽钦
南京航空航天大学

摘要：人类命运共同体理念是习近平新时代中国特色社会主义外交思想的重要内容，是针对全球治理提出的中国方案和智慧。“兼爱”是墨子身处乱世提出的救世主张，是根除天下霍乱建立美好社会的希冀。本研究立足当下，基于 iWeb 语料库，探究“兼爱”8 种常见译法在 iWeb 语料库中的传播，通过频数差异，国别，语域三个方面进行分析，探究“兼爱”的历史意义及其与“人类共同体”的深刻联系，进而探寻其当代意义，为典籍翻译传播研究提供参考。

关键词：人类命运共同体；兼爱；iWeb 语料库；传播研究

Abstract: The concept of community with a shared future for mankind is an essential element of Xi Jinping’s Thought on Diplomacy of Socialism with Chinese Characteristics for a New Era. It is China’s plan and wisdom for global governance. “Universal love” is the idea of saving the world put forward by Mozi in his times. It is also the hope of eradicating chaos and building a beautiful society. Based on iWeb corpus, this study explores the dissemination of eight common English translations of “universal love” in English world, and examines the historical and contemporary significance of “universal love” from three aspects of frequency difference, country and register, so as to provide practical implications and references for the translation and dissemination of classic books.

Key words: community with a shared future for mankind; Universal love. iWeb Corpus; dissemination

一、引言

战国初期，承续春秋乱世，社会更加动荡。诸侯国七雄争霸，新兴势力与旧贵族实力争斗更加激烈。生逢乱世，墨子提出主张“兼爱”的救世良方。他认为，只要国与国、家与家、人与人之间都能做到“兼相爱”，这一切混乱与不协调都将不复存在。（郑杰文,张倩，2008）当今世界面临着百年未有之大变局，政治多极化、经济全球化、文化多样化和社会信息化潮流不可逆转，各国间的联系和依存日益加深，但也面临诸多共同挑战。2013 年习近平主席首次提出构建人类命运共同体，该理念强调人类只有一个地球，共处于这个家园之中的世界各国，应当且必须在追求本国利益的同时兼顾他国利益，在谋求本国发展中促进各国共同发展，从而实现互利共赢。（李包庚，2021：01）

可见，“兼爱天下”与“人类命运共同体”这一主张不谋而合。对于“兼爱”一词，学者各执己见，意见不一，目前文献记载共有 8 种常见译法。本研究立足于当下，基于 iWeb（the intelligent Web-based Corpus）语料库，通过对兼爱 8 种译名的频数差异，国别，语域三个方面具体分析，探究“兼爱”在 iWeb 语料库中的传播情况，同时结合“人类命运共同体”，探究“兼爱”的现实意义与当代价值。

二、兼爱翻译之争

2.1 墨子的“兼爱”主要思想

“兼爱”是墨子政治思想的核心。墨子讲的爱不是普通意义上的爱，他宣扬的爱是天地间的至爱，是包容一切的博爱，没有差别平等的爱，因而叫做“兼爱”。“兼爱”是墨家哲学的核心概念，古往今来，不同专家学者对此进行了不遗余力地分析和研究，理解也各有不同。“兼”字从古文形体上看原是一只手拿着两颗稻谷，引申为同时进行几件事或顾及事物的几个方面。（郑杰文，张倩，2008：61）在《墨经》中，“兼”表示“整体”、“全部”的意思，“兼爱”强调的是广泛的爱，要“兼爱天下之人”。

墨子的“兼爱”思想是春秋战国之际特定历史条件下的产物。他认为社会之所以失范，在于人与人之间不相爱，最根本的原因是天下人的人们各怀私心不能相互关爱。在当时旧宗法政治秩序日趋崩溃，社会结构及政治、经济关系发生变化的情况下，墨子提出了“兼爱”论，他指出“是故诸侯不相爱则必野战，家主不相爱则必相篡，人与人不相爱则必相贼，君臣不相爱则不惠中，父子不相爱则不慈孝，兄弟不相爱则不和调。天下之人皆不相爱，强必执弱，富必辱贫，贵必傲贱，诈必欺愚。凡天下祸篡悔恨其所以起者，以不相爱生也。”孙诒让（2001）在《墨子间诂》一书前言中指出：“‘兼爱’即一视同仁地爱一切人”。黄勃认为墨子的“兼爱”同孔子的“仁者爱人”在含义上有极大的差别。这种爱是一种不分亲疏、不分贵贱、爱人如己、一视同仁的爱。墨子认为，天下大乱的症结在于人与人之间不能相互关爱。爱是维系社会和谐的根本，可阻止人们相互悔恨，劝导人人互利，是根除天下祸乱建立美好社会的要务。

2.2 “兼爱”译名之争

对于“兼爱”一词，学者们各执一词，凭借对“兼爱”不同理解，译名纷繁多样，国内外尚未形成统一标准。笔者搜集现有材料，将“兼爱”现有译名及其翻译情况整理于表 1。对于“兼爱”一词，梅贻宝、华兹生、陈荣捷等六人，统一将“兼爱”译为“universal love”，即“平等地爱每一个人”。“兼爱”在墨子看来就是父子、弟兄、君臣、诸侯、家主之间彼此相爱；国与国、家与家、人与人彼此相爱。所以，“兼爱”首先应该包含“彼此相互”之意，确切地说是指“天下之人皆相爱，任意一个人都爱其他人”。（周志荣，2009：20）。

相反，葛瑞汉认为，梅氏华氏等人对“兼爱”的翻译虽较为便利，但使人颇多误解。“universal love”一词不仅十分模糊（“兼”暗示“每个”而非“全体”），而且富有感情色彩（墨子的爱是利民远害而不动情感的愿望）。在葛氏看来，墨者是性情冷峻之人，他们倾听正义的呼声，而非诉求于爱心。因此，葛氏将其翻译为“concern for everyone”。方克涛（Chris Fraser）将“兼爱”译作“inclusive care”。他认为“兼”为“一起，共同”，包含社会每一个成员的意味，“爱”和英文“care”一样，其含义复杂、含糊，因为它可能指一系列的态度，从强烈的喜爱（strong affection）到不带感情的超然关怀（detached concern）。（丁四新、董红涛、阎利春，2010：199）。冯友兰在《中国哲学简史》中，将兼爱译为“All-embracing Love”。而 Philip J. Ivanhoe& Brayan Van Norden（艾文贺、万白安）在著作 Readings in Classical Chinese Philosophy《中国古典哲学读本》中，把兼爱译为“Impartial caring”。Carine Defoort & Nicolar Standaert（戴卡琳、钟鸣旦）在其著作《早期中国思想中的不同声音：<墨子>作为一种变化中的文本》中，采用最直接的方法，用汉语拼音“Jian ai”来表示“兼爱”。此外，还有学者把“兼爱”译为“indiscriminate concern for each”(Kwong-loi Shun，1996)，和“co-love”（Heiner Roetz，1993）等。笔者将所查到的有关“兼爱”的常见译法整理如下（见表 1）。

表 1 “兼爱”的译名及其翻译情况

序号	译名	译者	英译本	出版社	出版时间
1	Universal love	1) Y.P.Mei (梅贻宝)	The Ethical and Political Works of Motse 《墨子的伦理及政治论著》	London: Arthur Probsthain	1929 年
		2)Burton Watson (华兹生)	Basic Writings of Mozi 《墨子入门》	The Columbia University Press	1963 年
		3)Wing-Tsit Chan(陈荣捷)	A Source Book in Chinese Philosophy 《中国哲学文献选编》	Princeton University Press	1963 年
		4)李约瑟	Science And Civilization in China Volume II History of Scientific Thought 《中国科学技术史》第二卷 科学思想史	The Syndics of the Cambridge	1980 年
		5)James Legge （理雅各）	The Chinese Classics with a translation, critical and exegetical, notes, prolegomena, and copious indexes	Clarendon Press	1895 年
		6)Ian Johnston （艾乔恩）	The Mozi: A Complete Translation 《墨子全译》	The Chinese University Press	2010 年
2	Concern for everyone	葛瑞汉	Later Mohist Logic, Ethics, and Science 《后期墨家的逻辑、伦理和科学》	1) The Chinese University Press 2) 中国社会科学出版社	1978 年
3	Inclusive Care	Chris Fraser （方克涛）	The Stanford Encyclopedia of Philosophy ：“Mohism”, “Mohist” and “Canons” 斯坦福哲学百科全书“墨家”“墨经”	The Stanford University Press	1) Mohism: 2003; 2) Mohist Canons: 2005
4	All-embracing Love	冯友兰	A Short History of Chinese Philosophy(Derk Boddc 编) 《中国哲学简史》（汉又光译）	The Macmillan Uonipniiy	1948 年
5	Impartial caring	Philip J. Ivanhoe& Brayan Van Norden (艾文贺、万白安)	Readings in Classical Chinese Philosophy 《中国古典哲学读本》	Seven Bridges Press	2001 年

6	Jian ai	Carine Defoort & Nicolar Standaert（戴卡琳、钟鸣旦）	The Mozi as an Evolving Text：Different Voices in Early Chinese Thought《早期中国思想中的不同声音：<墨子>作为一种变化中的文本》	Bill（布里尔学术出版社）	2013 年
7	indiscriminate concern for each	Kwong-loi Shun	Mencius and Early Chinese Thought	Stanford University Press	1996 年
8	Co-love	Heiner Roetz.	Confucian Ethics of the Axial Age	State University of New York	1993 年

三、基于 iWeb 语料库的量化研究

3.1. “兼爱”翻译研究现状

在中国知网（CNKI）中将“兼爱”、“universal love”、“翻译”同时列为关键词，对现有期刊数据库进行全文搜索，收集到涉及“兼爱”翻译的文献仅有四篇，这些文献对于典籍翻译，深度翻译，翻译方法等方面进行了非常有益的探讨。但从研究方法来看，鲜有文章使用量化研究方法，针对“兼爱”一词翻译问题进行探究，实际上，这些文献观点主要来自于文献研究与定性分析。此外，对于“兼爱”一词的传播研究，文献更是寥寥无几。他山之石可以攻玉，在研究时，不能忽视受众的选择和实践对理论的检验作用。鉴于此，本文依托当代 iWeb（the intelligent Web-based Corpus）语料库，对“兼爱”一词的 8 种常见译法进行了定量研究与分析，探究“兼爱”译名在 iWeb 语料库中的传播情况，同时结合“人类命运共同体”的深刻内涵，思考兼爱的现实意义与当代价值，以进一步促进中国传统文化传播。

3.2. iWeb 语料库简介

iWeb（the intelligent Web-based Corpus）语料库，是由美国当代英语语料库（COCA）开发者 Mark Davis 教授创立的，库容高达 140 亿词，约是 COCA 的 25 倍、英语国家语料库（BNC）的 140 倍，成为目前世界上最大的免费在线英语语料库。iWeb 博采众长，除了库容大，还有许多特色，其中一个独特功能是“前 60000 个高频词的详览功能，可以浏览这些高频词极其丰富详细的信息”，包括单词发音、视频、图片，查阅该词可跳转页面，显示出该词在其他语言中的对应翻译。

3.3 研究问题

本研究文依托 iWeb 语料库，对“兼爱”一词的多种译名进行了检索与分析，以考察它们在英语世界的传播情况，主要回答以下三个问题：

1. 从频数差异来看，“兼爱”的 8 个常见译名在 iWeb 语料库中是是如何分布的，有何不同？

2. 从国别方面来看，“兼爱”的 8 个常见译名在 iWeb 语料库中是如何分布的，有何不同？

3. 从分布语域来看，“兼爱”的 8 个常见译名在 iWeb 语料库的是如何分布的？有何不同？

3.4 研究方法

本研究搜集了目前关于“兼爱”的 8 种常见译名，基于 iWeb 语料库，搜索其在 iWeb 语料库中的分布情况。首先借助语料库中“List”功能，在搜索栏依次搜索“兼爱”的 8 个译名，根据检索结果，排除频率为 0 的“All-embracing Love”、“Co-love”以及“Indiscriminate concern for each”3 个译名。再次使用“List”功能，对剩下的 5 个译名进行逐一检索，分析其所在例句以及网站类型，对其语域和国别进行区分整理，结合数据分析“兼爱”5 种译名在 iWeb 语料库中的分布与传播情况。此外，根据所得结果，进一步研究“兼爱”历史意义与深切内涵，探究其与“人类共同体”当代意义之间的深刻联系，从而探究出“兼爱”的当代意义与价值。

四、检索结果及分析

4.1 “兼爱”译名在 iWeb 语料库中的频数差异

进入 iWeb 网站，在“List”检索页面，分别输入“Universal love”，“Concern for everyone”，“Inclusive Care”等“兼爱”的 8 个常见译名，可得出这些词在 iWeb 中的频数分布，如表 2。

表 2 “兼爱”多个译名在 iWeb 语料库中的频数差异

序号	译名	频率
1	Universal love	1191
2	Inclusive Care	135
3	Concern for everyone	17
4	Jian ai	6
5	Impartial caring	5
6	All-embracing Love	0
7	Co-love	0
8	Indiscriminate concern for each	0

由表 2 可以看出，“兼爱”译作“universal love”在 iWeb 中出现频率最高，具有压倒性优势，为 1191 次。其次是“inclusive care”，正如方克涛所言，“兼爱”包含对社会整体中每一个成员的喜爱与关怀，其在 iWeb 语料库中分布也较为广泛。然后是“Concern for everyone”,频数为 17 次，戴氏与艾氏所译的“Jian ai”和“Impartial caring”频率相当，分别为 6 次与 5 次。“All-embracing Love”、“Co-love”以及“Indiscriminate concern for each”未在 iWeb 语料库中出现，频数为 0，下文中不再多述。

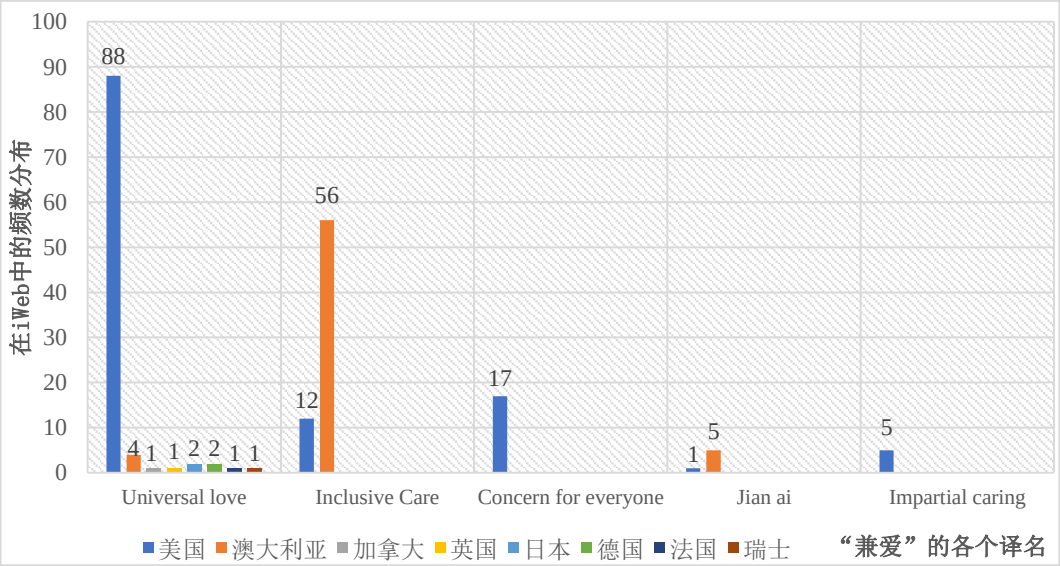
4.2 “兼爱”译名在 iWeb 语料库中的具体分布

iWeb 语料库拥有其他语料库所无法企及的语料容量，收录了 140 亿个单词，2200 万个网页，95000 个网站，这些网站以系统化的方式进行选择，每个网站抽取 240 个网页，每个网页抽取 145,000 个词。其语料资源庞大且样本来源的丰富多样性。鉴于此，笔者在整理数据时发现，有些译名比如“Inclusive care”含有除“兼爱”之外的其他含义，例如“全纳医疗”“全方位照顾”等其他含义：“All Inclusive Care for the Elderly (PACE)”含有“全方位照顾老人”的含义。因此，笔者对 iWeb 语料库的内容进一步筛选，将符合“兼爱”之义的数据记录下来，同时，出于篇幅考虑，笔者随机挑选 100 个“Universal love”的样本进行研究，并从国别分布和语域分布两个方面进行具体分析。

4.2.1 “兼爱”在 iWeb 语料库中的国别分布

进入 iWeb 网站，在“list”检索页面，分别输入“Universal love”，“Concern for everyone”，“Inclusive Care”等 iWeb 语料库中出现的 5 个“兼爱”常见译名，在“frequency”界面点击“text”可以获悉相关译名频率以及对应的例句和网站。笔者对于符合“兼爱”含义的词汇进行筛选定位，查找其对应网址所在地，探究“兼爱”各个译名在不同国家的分布情况，并整理出其相应频数及频率（见表 3）。

表 3 “兼爱”在 iWeb 语料库中的国别分布



从图中可以看出，美国，澳大利亚，加拿大，英国，日本，德国，法国，瑞士这八个国家，都对“兼爱”及其译名有所研究。经分析可知，在 iWeb 语料库中，美国和澳大利亚这两个国家中，“兼爱”的译名出现的频数最多，对“兼爱”的研究也最为频繁。其中，出现频率最高的“Universal love”，其国家分布也最广，美国，澳大利亚，加拿大，英国，日本，德国，法国，瑞士，这八个国家都有出现，其中在美国出现频率最高，达 88%，其次是加拿大，日本，德国，最后为加拿大，英国，法国，瑞士。而译名“Impartial caring”和“Concern for everyone”仅仅分布在美国，换句话说，其他国家尚未展开对于二者的讨论与研究。此外，“Inclusive Care”和“Jian ai”仅分布在美国和澳大利亚，并且二者均在澳大利亚出现频数最高，频率也远超美国。由此可见，“Universal love”在 iWeb 语料库中，国别分布最广。并且，美国对“兼爱”的研究最为广泛，而澳大利亚对“兼爱”有着不同的理解，将其译为“Impartial caring”和“Concern for everyone”，研究也较为丰富。可见，不同国家对“兼爱”的理解也并不相同，“兼爱”的影响范围也不尽相同。

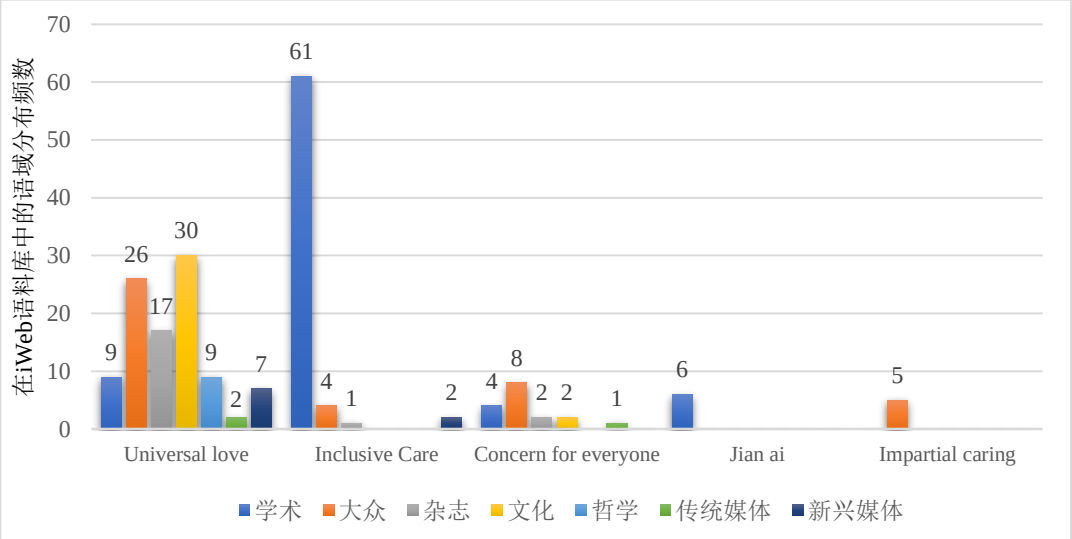
4.2.2. “兼爱”在 iWeb 语料库中的语域分布

语域（register）指的是语言因其使用的语境不同而出现的语言变体，它与语言的使用者、语境及语言的正式程度有密切的关系。语域作为一个重要的语言学概念，广泛使用于语言研究之中。英国语言学家韩礼德（M. A. K. Halliday）认为语言的变体可以依照其使用情况来划分语域且有三个变量会影响到语言，分别是语场（field）、语旨（tenor）、语式（mode）。划分语域的种类有很多，例如：新闻、演讲、学术、广告、媒体等。

进入 iWeb 网站，在“list”检索页面，分别输入“Universal love”，“Concern for everyone”，“Inclusive Care”等 5 个 iWeb 语料库中出现的“兼爱”译名，在“frequency”界面点击“text”可以

获悉相关译名对应的例句以及网站，笔者将符合“兼爱”之义词汇进行筛选辨析，分析例句以及网站类型，将“兼爱”出现的所有语域进行区别划分，并整理出各个译名相应的频数和语域分布情况（如表 4）。

表 4“兼爱”在 iWeb 语料库中的语域分布



需要说明的是，在搜集资料时，笔者发现在“媒体”这一语域中，“兼爱”5 个译名在传统媒体与新兴媒体分布也有很大差异，故将二者分开统计。由表 4 可知，“兼爱”的 5 个译名在 iWeb 语料库中主要有学术，大众，杂志，文化，哲学，传统媒体，新兴媒体共七种语域。其中，“Universal love”在 iWeb 语料库中分布最广，语域涵盖范围最广，涵盖以上七种语域。笔者发现，“Universal love”广泛出现于文化、大众网站，频率分别为 30%和 26%。同时，在学术、哲学网站分布频率相当，均为 9%。此外，在新兴媒体之中，“Universal love”也有所分布，主要表现为音频、视频以及相关话题评论之中。笔者选取传统杂志网站 fictionpress.com 与新兴娱乐论坛网站 aeon.co，将“Universal love”在两种媒体中的分布以及例句整理如下。(详情见表 5)

表 5 “Universal love”在新兴媒体和传统媒体中的分布

类别	**传统媒体**	**新兴媒体**
网站	fictionpress.com	aeon.co
名称	小说出版社	永旺网站
例句	Despite Dostoevsky’s conviction that faith and **universal love** is the only answer to society’s disharmony.	Among all the people in the world, they are enough to prove that this **universal love** is fake. This is rarely the case with secular universal morality, if not voluntary.
句意	尽管陀思妥耶夫斯基坚信信仰和博爱是解决社会不和谐的唯一办法。	在世界上，人们足以证明这种普遍的爱是假的。世俗的普遍道德，如果不是自愿的，这种情况很少。

“Concern for everyone”分布范围次之，主要分布在学术、大众、杂志、文化、传统媒体五个语域，其中大众语域中出现频率最高，达 47.1%，学术语域次之，频率为 23.5%，杂志、文化语域中出现频数相当，频率均为 11.7%，传统媒体出现次数最少，频率为 6%。“Inclusive Care”在 iWeb 语料库中涵盖范围也十分广泛，其中学术网站占比最大，频率为 89.5%，主要分布在大学网站和学术论坛语域之中。同时，在大众、杂志和新兴媒体也有所分布，频率分别为 6%、1.5%和 3%。然而，“Jian ai”和“Impartial caring”在 iWeb 语料库中都只分布于一个语域中，前者为学术，即“Jian ai”出现在学术网站例如高校网站之中。而后者出现在大众语域之中，即非学术的场景之中，例如论坛网站，购物网站等等。

4.2.3 小结

综合来看，“兼爱”的 8 个常见译名中，“Universal love”、“Inclusive Care”、“Concern for everyone”、“Jian ai”和“Impartial caring”5 个译名在 iWeb 语料库中广泛分布，出现频率较高。其中，出现频率最高，分布最为广泛的为“Universal love”，频率高达 1191 次。与此同时，各个译名的分布范围也十分广泛，不仅涵盖美国，澳大利亚，加拿大，英国，日本，德国，法国，瑞士这八个国家，还包括学术，大众，杂志，文化，哲学，传统媒体，新兴媒体七种语域。其中在美国对“兼爱”的研究最为广泛深刻，在 iWeb 语料库中，“兼爱”的 5 个译名都有所出现，且频率较高。其次是澳大利亚，该国对“兼爱”研究也较为广泛，“Universal love”、“Inclusive Care”和“Jian ai”3 个译名出现频数较高，研究范围较为广泛，备受关注。此外，加拿大，英国，日本，德国，法国，瑞士这几个国家对“兼爱”研究较少，仅有“Universal love”一种译名出现，分布较为单一，仍存在较大研究空间。

从语域分布来看，学术语域分布范围最广，“Universal love”、“Inclusive Care”、“Concern for everyone”、“Jian ai”4 个译名广泛分布在学术语域之中，主要表现为研讨会和大学网站，例如“拉坎研讨会（lacan.com）”，“悉尼大学（https://www.sydney.edu.au）”、“斯坦福大学（https://www.stanford.edu）”“悉尼大学（usyd.edu.au）”、“圣克拉拉大学（scu.edu）”等。其次，“Universal love”、“Inclusive Care”、“Concern for everyone”3 个译名广泛分布在大众网站和杂志网站中，可见“兼爱天下”的思想已经深入到大众文化之中，不断影响人们生活。与此同时，较传统媒体而言，“兼爱”一词在新兴媒体中传播更为广泛，可见，网络的快速发展也进一步推动了兼爱思想的传播，社交媒体，视频网站中也出现了“兼爱”的身影此外，“兼爱”的身影也出现在了哲学和文化网站之中，也体现出“兼爱”思想传播之广泛，用中国传统文化中的独特智慧，进一步呼吁全世界的人民“兼相爱，交相利”，无差别、无国界地爱天下众生，善待他人，传播温暖。

五、基于 iWeb 语料库“兼爱”译名量化研究对人类命运共同体理念传播的启示

“国与国、家与家、人与人彼此相爱，天下之人皆相爱，任意一个人都爱其他人”的“兼爱”思想内涵与“每个民族、每个国家的前途命运都紧紧联系在一起，应该风雨同舟，荣辱与共”的“人类命运共同体”深切含义，不谋而合。因此，基于 iWeb 语料库“兼爱”译名传播研究对于传播人类命运共同体的理念具有一定的启示意义与借鉴作用，在学术领域表现尤为明显，笔者以高校网站为例，将“兼爱”在学术领域分布情况出来。（见表 6）

网址	**lacan.com**	**stanford.edu**	**usyd.edu.au**	**scu.edu**
名称	圣何塞州立大学	斯坦福大学	悉尼大学	圣克拉拉大学
国别	美国	美国	澳大利亚	美国
例句	He proposed that the problems of humans could be solved by universal love. If everyone loved everyone then disputes could not exist.	the Annals depicts him citing the Mohist principle of "**inclusive care** "(jian ai) to King Hui.	their ethics is that people should have an attitude of "**jian ai**" toward others and in their interactions seek to benefit each	Ethical leaders will command that trust because he or she builds it daily through actions that demonstrate **concern for everyone**.
句意	他提出人类的问题可以通过**普爱众生**来解决。如果每个人都爱每个人，那么争端就不可能存在。	《史记》描述了他给梁惠王引用墨家的"**普惠关怀**"（兼爱）原则	他们的道德观是，人们应该对他人持"**包容关怀**"（兼爱）的态度，并在互动中寻求彼此的利益。	道德领袖会获得这种信任，因为他或她每天都通过表现出**关心每一个人**来建立这种信任。

可见，在 iWeb 语料库种，"兼爱"的四个译名"Universal love"、"Inclusive Care"、"Jian ai"和"Concern for everyone"在学术领域中颇受关注，主要集中在北美与大洋洲的各高校网站之中，其对"兼爱"也有着多种解释，由此可见中国传统智慧影响范围之广。

例如，在美国圣何塞州立大学网站中，将"兼爱"看作是"普爱众生"，认为人人互爱互利，那么争端则不复存在。在政治外交中，只有将各个国家的利益结合起来，风雨同舟，荣辱与共，才能实现互惠互利，进而世界各国人民对美好生活的向往。正如习主席所言"就是每个民族、每个国家的前途命运都紧紧联系在一起，应该风雨同舟，荣辱与共，努力把我们生手斯长于斯的星球建成一个和谐的大家庭，把世界各国人民对美好生活的向往变成现实"。（2017：5）

美国斯坦福大学将"兼爱"译为"inclusive care"，认为"兼爱"是"普惠众生"，即为尽自己努力帮助全世界有需要有困难的人民。新冠疫情这一"国际关注的突发公共卫生事件"，带来的后果成为各个国家面临的最紧急、共同性的任务。在人类与病毒的对抗中，中国在守护本国人民生命键康的同时，践行"人类命运共同体"的深切理念，担当起对世界的责任，积极推动国际抗疫合作，为全球各地疫情人民提供援助物资，与各国人民一起携手并进，齐心协力，共同克服疫情，同时将"人类命运共同体"理念深入人心。

澳大利亚悉尼大学则将"兼爱"音译作"jian ai"，直接明了地传递对他人的爱，进一步传播当代"兼爱"智慧。美国圣克拉拉大学则将"兼爱"译作"concern for everyone"，即关怀世界上每一个人，每一个民族，每一个国家。在全球化的今天，人类命运共同体思想的提出使国际社会日益成为一个你中有我、我中有你的"命运共同体"。随着全球化浪潮的不断推进，任何国家都不可能孤立发展，国家之间互相关怀，互利互惠，建立起相互合作互利的关系，从而实现利益最大化，实现双赢多赢的理想结果。

正如墨子所言，"爱是维持社会和谐的根本，劝导人人互利，是根除霍乱建立美好社会的要务"。面对当前世界"百年未有之大变局"，在"兼爱"的哲学思想基础上，习近平提出了"人

类命运共同体”，呼吁世界各地人民团结合作、携手共进，共同战胜疫情，共同发展，构建人民心中的美好生活。可以说，“人类命运共同体”理念是在中国传统文化智慧“兼爱”的思想上不断发展深化而来的，是“兼爱天下”思想的当代表现与进一步延申，同时也为进一步传播了中国传统文化与智慧。正如中国政法大学解启杨教攖指出，“在全球一体化的今天面对目益盛行的极端个人主义和狭隘民族主义或国家至上主义，重新诠释墨家‘兼爱伦理精神，在哲学、政治学、社会学等诸多领域均具有重要意义”。

六、结束语

经典永不过时。本文通过研究发现，在 iWeb 语料库中“兼爱”分布较为广泛，但国外对于“兼爱”一词的研究并不深入，只有少数国家例如美国、澳大利亚在学术领域有所探究，分析中国哲学与智慧。与此同时，“人来命运共同体”可以看作为“兼爱”的当代智慧与表现，对当今世界的和平与发展有着深远影响。作为传统文化的继承者与传播者，只有将对于“兼爱”与“人类命运共同体”结合起来，才能讲好中国故事，传播中国智慧，实现最高理想。

需要指出的是，目前一词的翻译争议仍然较大，在今后“兼爱”术语标准化、国际化的进程中，如何翻译“兼爱”更能传达出“无差别、无国界的爱”值得进一步探讨。此外，本文限于篇幅，只进行了量化研究，后续研究可以结合具体语料，以及相关语言学或翻译理论，有选择地进行案例分析和质性研究，以便全面考查“兼爱”译名的传播情况。

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Language MOOCs

信息技术与课程建设

A study on the learning-analytics-based MOOCs enhancement mechanisms in the big data age

LU Kai, LIANG Xiaoqian, MO Yiyun
Xiangsihu College of Guangxi University for Nationalities

Abstract: In the big data age, MOOCs have been developing rapidly and have achieved in great number of courses, especially in China, which tops the world with its largest number of MOOCs. But many problems have also occurred in the process, such as high drop-out rate, low completion rate and unsatisfactory learning efficiency. Therefore, enhancement on MOOCs is desperately needed for the long-term development of MOOCs. Learning Analysis, defined as the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs, has attracted wide attention since its emergence in the past decade. By means of reviewing literature and making explorative hypothesis, this study proposes the learning-analytics-based MOOCs enhancement mechanisms, including a learning-mechanism for MOOCs learners, a teaching-mechanism for MOOCs teachers, and a system-mechanism for MOOCs builders. With the help of learning analytics technology, the learning-mechanism can collect and analyze MOOCs learners' data to provide timely feedback to the learners, so as to help them adjust their learning. By means of learning analytics technology, the teaching-mechanism can collect and analyze MOOCs learners' data to provide teachers with detailed report of each learner, so as to help teachers personalize their teaching to individual learner. With the aid of learning analytics technology, the system-mechanism can collect MOOCs learners' data and analyze their behavior to provide MOOCs builders with efficiency report of MOOCs structure and content, so as to help them optimize MOOCs system. Based on learning analytics, the above three dimensions of mechanism can jointly function in enhancing MOOCs in an all-round and multi-level way and provide reference for the further development of MOOCs in the big data age.

Key words: big data age, learning analytics; MOOCs; enhancement mechanism

1. Introduction

In recent years, with the rapid development of computer information technology, large-scale data has emerged in large quantities, announcing to the world the arrival of the age of big data. A product of computer information technology in the big data age, MOOCs has now entered the second phase of providing learning with design and intervention. The scale of MOOCs has increased globally in recent years, particularly in China, which offers the largest number of MOOCs courses in the world by far. MOOCs has also made a significant impact on contemporary education. During the COVID-19 pandemic, MOOCs has been an important guarantee for keeping students up with the normal learning progress without leaving home. However, some problems emerged along with the increasing quantity of MOOCs. One of the main problems is that the

overall quality of teaching and learning is not so high-graded, with low passing rates and high dropout rates, resulting in unsatisfactory overall teaching effect. Therefore, how to enhance the teaching quality of MOOCs has become a crucial project in influencing the scientific development of MOOCs.

Among the educational applications of big data , the rapidly emerging discipline of Learning Analytics (LA), which analyses big data to improve the quality of teaching and learning, has received widespread attention and exploration from different researchers all over the world. According to the 1st International Conference on Learning Analytics and Knowledge, "Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purpose of understanding and optimizing learning and the environments in which it occurs." (Banff and Alberta, 2011). Chatti et al. (2012) enhanced the LAK definition, referring to LA as "a generic all-encompassing term to describe a TEL [Technology-Enhanced Learning] research area that focuses on the development of methods for analyzing and detecting patterns within data collected from educational settings, and leverages those methods to support the learning experience" (p. 5). The Learning Analytics covers a wide range of academic fields in science, technology and social sciences, including computer science, sociology, learning science, machine learning, statistics, and "big data". Siemens (2013) believes LA is emerging as a new discipline. LA has been described as a new wave of information technology in education and has become a current hot topic in the field of integration of information technology and teaching.

2. Learning analytics in MOOCs

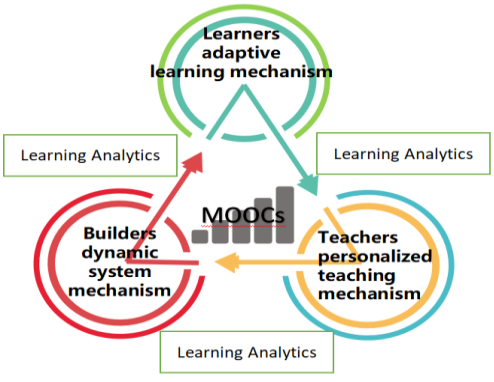
MOOCs and LA are both the products of the computer information technology development in the big data age. The vast amount of data generated in the process of MOOCs learning requires appropriate analytics to interpret the successes and shortcomings of the teaching in order to provide recommendations for improving the quality of teaching and learning. And LA is the exact technology satisfying this demand. Therefore, application of LA in MOOCs has become a major area in the field of MOOCs study in recent years. For example, Drachsler and Kalz (2016) proposed a conceptual framework to cover existing research on the integration of MOOCs and LA, which is based on three levels: micro, meso and macro. Kovanovic et al. (2017) attempted to design a MOOCs analytics technology platform that aims to enable teachers with little technical background to use and analyse MOOCs data to better understand student learning. Cinganotto & Cuccurullo (2019) aimed at reporting and commenting on some significant Learning Analytics collected from a MOOC on language awareness, addressed to teachers, trainers and educators from all over the world. Shukor & Abdullah (2019) make an exploratory study to evaluate the potential of using learning analytics to improve instructional design in MOOC. Youngs (2021) describes a (LA) visualization tool that provides actionable data for early intervention with students, and actionable data highlighting odd patterns in student responses, thus allowing instructors to make full use of their teaching skill set in the online environment as they would in a traditional classroom.

A review of past research shows that it is possible and effective to apply LA in MOOCs, but much of the existing research has focused on analyzing the behaviour of MOOC learners. Admittedly, learners are one of the important shareholders in the educational process, but it is not the whole story and it requires the combined efforts of MOOCs teachers and builders to form a complete teaching and learning loop. The teaching quality of MOOCs needs to be enhanced in all aspects including students, teachers and builders in order to cover the complete MOOCs teaching process and to achieve an overall enhancement in the quality of MOOCs teaching. Based on learning analytics, this study analyses the position and roles of MOOCs students, MOOCs teachers and MOOCs builders, and examines how these three groups can form a scientific and efficient ecological cycle of teaching and learning, so as to establish an effective mechanism for enhancing the quality of MOOC teaching and learning.

3. Learning-analytics-based MOOCs enhancement mechanisms

The complete teaching chain of MOOCs includes students, teachers and builders, so the quality of MOOCs teaching needs to be improved from these three aspects. The quality enhancement mechanisms include adaptive learning mechanism for students, personalized teaching mechanism for teachers and dynamic system optimization mechanism for builders (see Figure 1 for the specific mechanism flow), which can enhance the quality of MOOCs teaching in a comprehensive and multilevel way. Learning analytics can help students engage in adaptive learning, help teachers personalize their teaching, and help builders evaluate and optimize their MOOCs. The three enhancement mechanisms can operate on their own and are interlinked with each other to form a learning analytics-based mechanism for enhancing the quality of teaching and learning in MOOC. The three mechanisms are described as below in Figure 1.

Figure 1 Learning-analytics-based MOOCs enhancement mechanisms



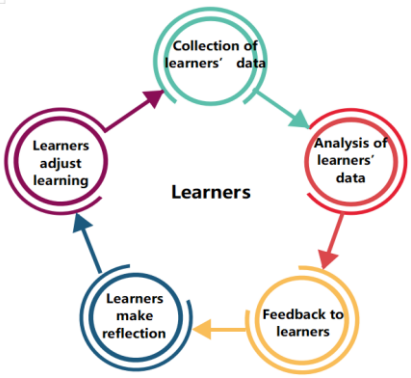
3.1 Adaptive learning mechanism for MOOCs learners

According to the difference of learning content and learning strategy, human learning can be divided into three types, namely, rote learning, demonstration learning and adaptive learning. What differentiates adaptive learning from rote learning and demonstration learning is the full play of students' autonomous initiative. Adaptive learning is a way of learning in which learners discover, summarize and reflect on their own learning, and finally form the theory of

learning and solve problems on their own. Compared with the traditional way of learning, adaptive learning is more in accordance with the needs of education in contemporary society. Adaptive learning is more personalized, can satisfy the individual needs of each student, and is one of the most effective forms of education. Learning analysis technology can analyze, evaluate and predict learners' learning behavior, drive learners to carry out self-reflection, and take appropriate measures to improve learning strategy, so as to promote self-adaptive learning.

Learners produce mass data in the process of MOOCs learning, including learners' login data (registration user name, login time, duration, etc.), learners' learning behavior data (browsing, searching, clicking, favorites, likes, etc.), learners' interactive data with peers and systems (comments, posts, responses in the online discussion boards of MOOCs, etc.). The development of learning analytics technology provides technical support for the collection, analysis and reporting of MOOCs learners' data. Learning analytics technology can collect MOOCs learners' learning data and analyze them by means of clustering, prediction, relationship mining, content analysis, discourse analysis, social network analysis and visual representation. Subsequently, the analysis results could be fed back to learners and help them understand their own learning weaknesses and deficiencies more clearly, so as to prompt learners to reflect on their learning behavior and adjust their learning timely. The modified learning input of learners can produce more plentiful and more complete learning data constantly, and learners continue to enter the circular mechanism of "collection--analysis--feedback--reflection--adjustment", so as to achieve the sound development of learning and constantly improve its quality. The specific mechanism of the process is shown in Figure 2.

Figure 2 Learners adaptive learning mechanism



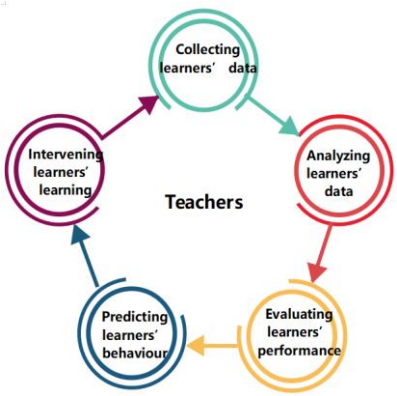
3.2 Personalized teaching mechanism for MOOCs teachers

Personalized teaching refers to the teaching paradigm which is based on learners' personality differences and emphasizes that the learning process should adopt appropriate teaching methods, means, strategies, content, process, evaluation and so on according to their personality characteristics and development potential. Personalized teaching paradigm enables learners to develop fully and freely in all aspects and aims to promote the development of learners' personality. As the core content of present education reform and development, personalized

teaching has become an important development trend of the information society. Learning analytics can promote personalized teaching into a normalization development stage by creating an "Internet+" learning environment of teacher-student interaction, student-student interaction, human-computer interaction and resource sharing.

The number of learners who register and take MOOCs online usually amounts to hundreds. Some of the popular MOOCs courses even attract tens of thousands of learners from all over the world. The learning basis and learning styles of these learners vary greatly while MOOCs teachers are quite limited in number. Consequently, it is difficult to give personalized guidance to all the learners and teach them in accordance with their aptitude. However, by the use of learning analytics tools, MOOCs teachers can collect and analyze the learning performance (input in MOOCs learning practice, frequency of interaction with MOOCs resources, test performance of MOOCs courses, etc.), self-learning path, and influencing factors of online learning environment, so as to understand MOOCs learners' learning style, learning needs, learning progress and other learning status. On the basis of this, MOOCs teachers can accurately evaluate the learning situation, predict the rationality of the current teaching interactive activities and teaching strategies, thus adjust accordingly and make intervention on the learners. The intervened learners continue to produce more learning data, and teachers reenter the circular mechanism of "collection--analysis--evaluation--prediction--intervention" to provide each student with the most suitable personalized teaching. The specific mechanism of the process is shown in Figure 3.

Figure 3 Teachers personalized teaching mechanism



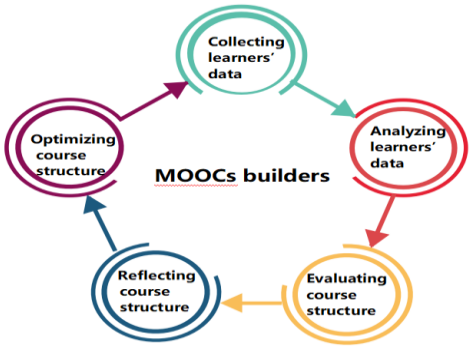
3.3 Dynamic system optimization mechanism for MOOCs builders

The optimization principle refers to the selection, design or adjustment of the constituent factors and their relations of the standard system according to specific objectives, under certain limited conditions, and on the basis of comprehensive achievements of science, technology and practical experience, so as to optimize the system. System optimization is a dynamic process, which requires people to dynamically select, design, evaluate, compare and make decisions on the basis of the combination of quantitative and qualitative analysis, so as to optimize the system continuously. Each MOOCs course is a complex system and the completion of it requires the construction team to carefully plan and design the structure of each part and connect them into a smooth system. And after the course begins, the construction team also needs to evaluate the

course according to learning data analysis and feedback, and optimize the structure through spiral dynamic adjustment. Learning analytics technology can help MOOCs builders understand the rationality and effectiveness of each part of the curriculum system, evaluate the scientific nature of the curriculum structure, maintain dynamic optimization of the structure, and achieve a better teaching effect.

Generally, each MOOCs course consists of several sections, such as course notice, teacher information, teaching video, learning resources, discussion area, assignment submission and grade release, self-test exercise database, personal work display, opinions and suggestions, related links and so on. Whether each part of the MOOCs course is designed reasonably, whether it has played its due role and what level of teaching effect it has achieved can only be confirmed through learners' personal experience and feedback. MOOCs builders use the learning analytics technology to analyze the behavior characteristics of the students in the process of MOOCs learning, such as their learning time and hopping path in different parts of the course, the frequency of attention learners paying to the resource module, the degree of interest learners holding in each chapter content. All this can evaluate the rationality and scientific nature of the structure and content of the MOOCs course, so as to optimize it. After the optimization of MOOCs course, more learner data continue to be produced, and the builders once again enter the circular mechanism of "collection--analysis--evaluation--reflection--optimization" to dynamically optimize the structure of the course, setting it to the ideal direction. The specific mechanism of the process is shown in Figure 4.

Figure 4 Builders Dynamic system mechanism



4. Conclusion

MOOCs have been developing rapidly in the quantity of courses, but the average teaching quality has lagged behind. The scientific development of MOOCs can only be ensured by continuously enhancing its teaching quality, which requires the joint efforts of MOOCs learners, teachers and MOOCs builders. Based on learning analytics, the study proposes three modes of MOOCs enhancement mechanisms, including the self-adaptive learning mechanism for MOOCs learners, the personalized teaching mechanism for MOOCs teachers, and the dynamic system optimization mechanism for MOOCs builders. These three mechanisms are interrelated and jointly contribute to enhancing the teaching quality of MOOCs. However, these mechanisms are limited

to theoretical exploration by far. Therefore, they need to be verified by teaching practice of its reliability and validity, and be constantly adjusted and optimized to achieve the ideal effect.

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数字化时代德国慕课建设与发展研究

朱赫羽

北京理工大学

随着数字化教学进程深入推进，“慕课”作为在线教育 3.0 时代的重要载体愈发受到重视。相较于英语国家在慕课建设方面的强劲势头，德国对此仍有待探索。本文对德国慕课建设情况进行研究，旨在增加当前国内德语教学领域对德国数字化教育方面的认识，以德国为镜，为辅助国内数字化德语教学提供建设性参考。

一、理论基础

自 E-Learning 2.0 时代以来，为满足用户日趋多样化、个性化的学习需求，MOOC 应运而生。MOOC（Massive Open Online Course，大规模开放式在线课程）音译为“慕课”，是基于网络和智能技术发布课程资源，将学习管理系统与更多的开放网络资源综合起来的课程模式。通常用于高等教育和成人教育，由于不设置课程访问限制，往往能吸引大规模的学习者。

根据教学形式差异，慕课主要分为 xMOOC，cMOOC 和 P4PMOOC。xMOOC 模式以行为主义理论为基础，接近传统堂授课程结构和教学流程，侧重知识的传播，通过录制学习者易于接受的时间单位内的教学视频进行授课，采用文本、测试、家庭作业等媒介，以掌握教师传授的学习内容为目的。cMOOC 模式基于关联主义理论，以学习内容为起点，通过资源共享与交互进行拓展学习，侧重知识建构与创造，采用文本、音频、视频等多样化学习手段，以共享和创造知识为目的。P4PMOOC，即 Peer for Peer MOOC 模式，则是建立在混合型学习理论的基础上，是“从学习者到学习者”的网络课程，由学习者自行建立，将线上公共教育资源与个人所提供的独家资源结合起来，打造出个性化的慕课。

二、德国慕课的建设与发展

（一）德国慕课平台

2011 年 5 月 2 日，德国首门本土慕课诞生——OpenCourse 2011，简称 opco11。它由法兰克福大学组织建设，采取 cMOOC 形式，用议程表（Agenda）的方式帮助教学活动顺利开展。

此后，越来越多的高校采用慕课形式组织课程建设。不仅发布在英语主流慕课平台 Coursera 和 edX 上，也开设于德国本土 MOOC 平台 iversity。部分高校还自建慕课平台，如波茨坦大学软件工程专业哈索·普拉特纳研究所建立了 openHPI 平台、吕讷堡的吕法纳大学建立了 Digital School。

目前，欧洲最大的 MOOC 供应商是来自英国的 FutureLearn，德国最为知名的几大 MOOC 平台包括：

(1) iversity (https://iversity.org)

(2) OpenCourseWorld (https://www.opencourseworld.de)

(3) openHPI (https://open.hpi.de/courses)

(4) mooin / oncampus (https://www.oncampus.global)

(5)iMooX (https://imoox.at/mooc/)

(6)OPEN vhb (https://open.vhb.org)

慕课建设采用高等院校与科技公司“产学结合”的运营模式，学科范围广，除 openHPI 和 iMooX 平台外，课程无特定专业限制；授课语言以德语母语和英语为主；所有课程免费，入学门槛呈现受众友好型特点。

（二）慕课课程建设

通过考察德国主要慕课平台发现，教育全球化背景下德国理工学科慕课的影响力远超人文学科，教学形式具有模式化、系统化特征。与此同时，慕课与高校学分兑换体系对接率较低，参与者学习效果极差较大。

1. 课程分类

全球慕课信息权威网站 www.classcentral.com 的统计数据显示，2011 至 2019 年，德国只有慕尼黑工业大学开设的英语授课课程“Six Sigma: Define and Measure”登上 *Top 100 Free Online Courses Of All Time* 榜单。由此可见，德国慕课在全球的影响力主要来源于计算机和信息技术领域。

德国慕课信息检索平台 www.edukatico.org 发布的数据显示，目前德国慕课主题多样，种类繁多，但高质量、大规模的课程集中在电子信息、计算机科学、编程及经济金融领域。就课程模式而言，绝大多数为 xMOOC 或 cMOOC，P4P MOOC 数量较为有限。

2. 教学形式

德国慕课在教学形式方面具有跨平台的共性特征。就授课形式而言，教师团队乐于使用视频教学，课程按单元划分，附带知识点梳理提纲和拓展阅读材料，并且开设练习及测验环节。就学习形式而言，表现为自主学习或分组学习，开设讨论区，方便答疑及反馈。

3. 结业证书及学分兑换

对于大多数慕课平台而言，学习者如满足课程学习要求并通过考试，即具备申请结课证书资格。但结课证书均为付费项目。目前，慕课结课证书被视为同等条件下个人知识水平和学习能力的补充证明，在就业市场的认可度逐渐提升，同时也逐步纳入网络个人简历体系。

然而，当前德国慕课在学分兑换效力方面仍存在缺失。除吕贝克应用科技大学和下萨克森州的奥斯纳布吕克大学以外，其余高校均未将 MOOC 纳入学分兑换体系。

4. 学习效果

慕课学习自主性、灵活性强，但约束力较弱、后续辅导力度不足，受学习者动机影响较大，高出勤率无法确保高质量的学习，德国慕课同样如此。此外，学习规模与个性化辅导方面呈现反相关态势，课程规模越大，有限的教师团队分配给每位课程参与者个性化的学习资源就越难以保证。

三、德国慕课现状分析与建设性意见

考察发现，目前德国慕课仍保持独有优势，同时也需要时间来克服现存弊病。

（一）优势与不足

德国慕课逐渐发展成为传统教学活动的重要补充形式。慕课在教学辅导、预备课程方面发挥显著作用：在正式开学前，准新生如能利用慕课填补学科背景知识空白，将很大程度上缩短入学适应期，提升学习效率。不少德国慕课开发者也在尝试进军职业培训领域，这将很

有可能影响职业市场格局。

与之相比，有待建设的方面同样不容小觑。首先，慕课学科覆盖较为有限，课程建设多样性不足。这包括双层含义：一是自然科学和应用技术类慕课数量远大于人文社科；二是人文社科中，经济金融学科一家独大。其次，结业认证及学分兑换体系有待完善。慕课建设未能与大多数高校就学分兑换达成一致，其结业证书的高校认可度和社会接受度均处于较低水平。而最严重的问题在于，教师与学生之间缺乏有效互动。

（二）原因分析

以上种种问题，背后都存在一定的个体和社会原因，主要集中在三个方面：高校、课程参与者及社会环境。首先，与英美国家相比，作为慕课建设主要力量的德国高校仍低估了其在教育方面的作用；其次，在德国，民众普遍缺乏使用慕课进行自主学习的动力；此外，德国慕课发展仍缺乏全方位协调发展的社会环境。

（三）发展意见及启示

透过以上分析，可以以德国为镜，获取我们自身在慕课建设方面的启示。从宏观角度来讲，慕课形式若想取得长足进步，其开发者必然要树立学习意识，在课程建设方面汲取优秀慕课的成功经验，弥补自身不足；拓展个性化学习模式，通过适当的付费项目，满足不同层次学习者需求；此外，须增强高校、课程提供者、就业市场等多方的联系与合作。

就课程模式而言，应加大对慕课“线上集智学习”特点的应用力度，坚持“学生中心，教师导学”模式，进行课堂翻转，充分调动学生学习积极性，在观看视频、完成作业和测试这类内向性自我学习的基础上，通过同伴互评来实现外向性的知识应用过程。

四、结语

综上所述，本文通过分析数字化和后疫情时代背景下德国慕课的建设和发展情况，认识到德国慕课课程主题多样，种类繁多，但质量高、规模大的课程集中在信息技术和经济金融领域；课程模式以 xMOOC 和 cMOOC 为主，P4P MOOC 数量有限。慕课作为传统教学活动的重要补充形式，在高等教育和进修培训方面发挥显著作用；同时，也存在课程分布不均衡，学分转换体系不完善，缺乏互动交流等问题。今后德国在慕课建设方面应立足实际，着力拓展个性化学习辅导，开发在线学位模式，增强师生互动联系。我国慕课教育尤其是德语语言教学，亦可以此为参考，在在线教育发展方面不断实现自我更新，取得长足进步。

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Technology and Language Education

技术和语言教育

The application of quantitative indices in assessing vocabulary knowledge

GAO Jie
Fudan University

1. Introduction

Measuring the productive use of vocabulary is connected with approaches in understanding a series of terminologies: lexical diversity, lexical sophistication, lexical density and lexical richness. Daller, Milton and Treffers-Daller (2007) defines lexical richness as an umbrella term covering the other three. Lexical diversity is described as "the variety of active vocabulary deployed by a speaker or writer" (Malvern & Richards, 2002). Lexical sophistication refers to the use of low-frequency words, and lexical density refers to the ratio of content words to function words.

More information about operationalizing lexical diversity, as discussed in Jarvis (2013), is related with the repetition rate of words. High lexical diversity is represented by a low repetition rate. Indicated by the use of infrequent words, lexical sophistication reflects more advanced level of lexical knowledge. Lexical richness, having been interpreted as a synonym of lexical diversity, is more often used in a hypernym way that includes all constructs related with vocabulary usage.

In this paper, lexical richness is explained as a general term inclusive of diverse measures of productive vocabulary. Being a representation of complexity, which is situated in the CAF (Complexity, Accuracy, Fluency) framework in second language acquisition and measurement, lexical usage constitutes an integral part in assessing overall language proficiency. Various indices have been applied in quantifying lexical richness and related domains. The reasons in support of their usage, however, are usually implicit and not completely explicated. The following questions are formulated in this paper, which investigate the functioning mechanisms of quantitative linguistic measures and their empirical application:

a. How is lexical richness interpreted in lexical proficiency development models? How is lexical richness quantified in the measurement of vocabulary knowledge?
b. What are the most commonly used measurement indices for evaluating the subcategories of lexical richness?
c. How are these indices explained in terms of calculation mechanisms? In what contexts are quantified lexical richness indices used?

2. Lexical Proficiency Development Models

Theories of lexical proficiency development have expanded from "breadth and depth of word knowledge" (Anderson & Freebody, 1981) to the "receptive-productive lexical proficiency model" (Nation, 2001). Along with the addition of fluency as a dimension, Daller, Milton and Treffers-Daller (2007) proposes a three-dimensional space to evaluate language learners' vocabulary knowledge. The amount of words a learner knows is measured by breadth. Depth is defined by learner's confound understanding of a specific word. Fluency is connected with the level of automaticity when a learner uses the word.

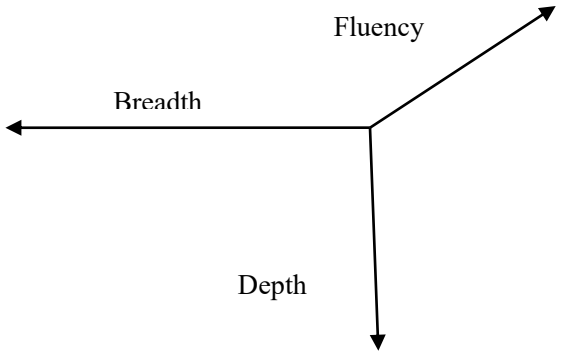

Figure 1. The lexical space: dimensions of word knowledge and ability (Daller, Milton & Treffers-Daller, 2007: 8)

You (2014) proposed the Cube as a new three-dimensional model for lexical proficiency measurement, synthesizing and combining theories about lexical proficiency development. Starting from the point where a learner's lexical space grows, the Cube has three axes demonstrating breadth, depth and fluency. The model establishes sides between every two axes, representing evolving dimensions in vocabulary proficiency development. Variety in production is located between the two axes of breadth and fluency. Sophistication in production grows out of fluency and depth, while reception is a dimension established by depth and breadth.

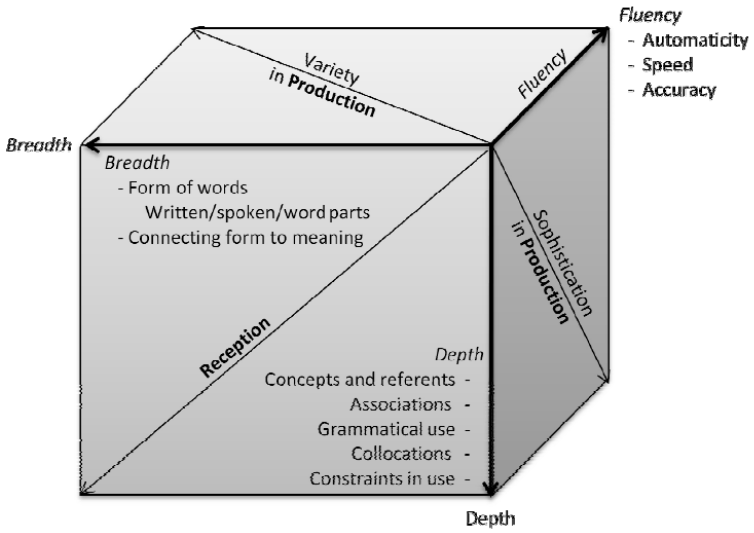

Figure 2. The Cube (from You, 2014: 15)

The Cube helps facilitate a combined measurement use of both lexical diversity and lexical proficiency profile in L2 oral English, which suggests that lexical diversity alone is insufficient to represent a complete picture of lexical usage. While lexical diversity calculates the relationship between word type and token, lexical proficiency profile emphasizes word frequency. An example as "The bishop observed the actress" was used by Schmitt (2010) to further explicate the relationship between the two. Sharing the same type-token analysis results with "The man saw the woman", the first sentence is exhibiting a completely different degree of sophistication. The

expansion of lexical proficiency development models have confirmed that lexical richness is multifaceted, and lexical diversity remains an important index in assessing language learners' vocabulary knowledge. Estimates applied for evaluating lexical diversity and other measures will be further explored in this paper. In the next section, previous studies that applied quantified measures will be closely categorized and examined. More connection will be established between lexical factor and other linguistic profiling information of L2 English speakers, along with possible variations caused by different experimental contexts.

3. References of Lexical Richness Measures

Lexical richness, as encompassing as it is in the lexical proficiency models, are disintegrated into quite a few aspects when applied in vocabulary measurement. Previous literatures are investigated in this section of paper, where measurement constructs are defined with calculation and evaluation. Detailed information of the studies can be found in the Appendix. In general, lexical richness is interpreted as: a) lexical diversity, or the variation of words; b) lexical sophistication, or the use of words at an advanced level; c) lexical density, or the ratio between content words and function words.

Among the various empirical studies surveyed, I code the quantification indices with the following four categories regarding the measured constructs: lexical richness, lexical density, lexical diversity, and lexical density. Researchers usually measured multiple constructs in their studies, which result in a simultaneous appearance of several indices. I also divide the references based on their research context. Measurement of oral and written vocabulary proficiency development takes place in both L1 and L2 settings. A more detailed coding framework is composed of L1 K-12/Speaking, L1 K-12/Writing, L2 K-12/Speaking, L2 K-12/Writing, L2 Adult/Speaking, L2 Adult/Writing. The last two categories, L2 Adult/Speaking and L2 Adult/Writing, include studies conducted in higher education institutes where adult second language learners are participants.

Annotations for each study also includes explanation for the calculation of the indices (as is shown in the Appendix), as well as evaluation of their functioning efficiency. The purpose of building an inventory of lexical measures is two-fold. First, researchers can identify the essential facets to cover when establishing a profile of language learners' use of vocabulary. Second, the use of quantified indices for each lexical measure can be selected based on more detailed explanation and solid justification. While some indices function more efficiently within certain research setting, others may be inflicted with inaccuracies and flaws.

A number of themes are identified from the research that applies lexical measures, which can be concluded as summary answers for the research questions of this paper. First, lexical richness tends to be a more general term covering all other related constructs. Among the quantitative measures of lexical richness, lexical diversity remains a critical aspect and is highly ratio-based. As a genuine form of ratio between type and token, TTR is the foundation where a series of other lexical diversity measures are proposed, such as Malvern and Richard's $\mathcal{D}$. In

addition, lexical diversity is interpreted and operationalized from a micro level. This developmental trend is exemplified by the calculation of Rare Word Diversity (Malvern & Richards, 2009) and lexical diversity of separate functional word categories (Treffers-Daller, 2009). Thirdly, the functioning mechanisms behind lexical diversity calculation is integrating probability-based approaches rather than being confined to ratio-based explanations. Lexical diversity measures derived from TTR will be discussed in the next section, where probability-driven methods in measuring lexical proficiency are illustrated.

4. Quantitative Measures of Lexical Diversity—a Brief Review

In research related with L2 writing, lexical diversity could be representing the same measure with lexical variation and lexical variety (Engber, 1995). Been considered as a type of linguistic complexity that reflects learners' "vocabulary knowledge as well as their language proficiency" (Jarvis, 2013), lexical diversity is often described through a relation between token and type. Within the terminological system of lexical measurement, token refers to "the total number of words in a text or corpus" while type means "the number of different words" (Daller, Milton & Treffers-Daller, 2007). Type Token Ratio (TTR), which was proposed by Johnson (1933, 1934) as an attempt to address sample-size dependency problem, is "calculated from a standard number of tokens from each text (for example the first 200 words)" (Jarvis, 2013). An alternative is referred to as Mean Segmental Type-Token Ratio (MSTTR), which is the average of TTR from multiple and equally-sized subsamples of a text.

TTR is still not functioning satisfactorily or convincingly for its sensitivity to text length. The chance for a new word to appear drops lower as the text length increases, which results in its instability in measuring lexical richness (Daller et al., 2003). As a mathematical model describing Type Token Ratio (TTR), D-measurement, or Malvern and Richard's $\mathcal{D}$ introduced in Malvern et al. (1997, 2004) sets up a plot of TTR (y-axis) against token N (x-axis). It measures lexical diversity by "matching the graph derived from a real language sample to the ideal curves of this model". Based on the work of Sichel (1971) in search of a formulation of the ideal curve, Malvern et al. (2004) developed a mathematical expression that applies for a small sample approximation: $\mathrm{TTR} = \frac{\mathcal{D}}{\mathrm{N}}[\left(1 + 2\frac{\mathrm{N}}{\mathcal{D}}\right)^{\frac{1}{2}}\text{-}1]$. A larger $\mathcal{D}$ coefficient is accompanied by a higher curve, which signifies greater lexical diversity.

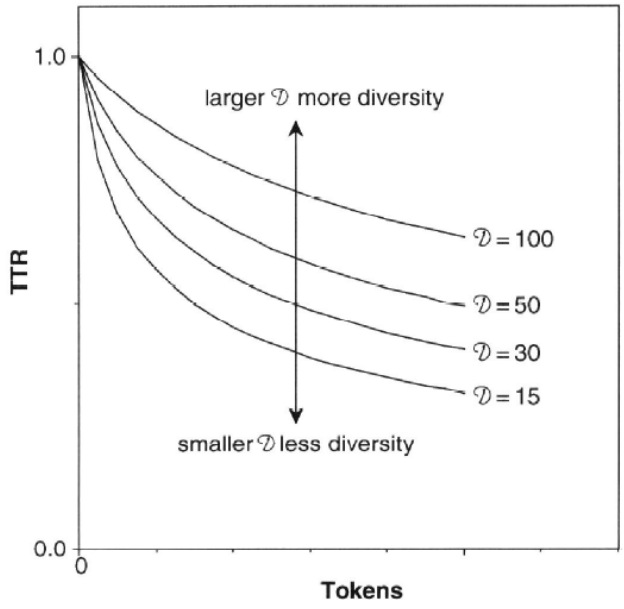

Figure 3. Ideal TTR versus Token Curves (from Malvern et al., 2004: 52)

The calculation mechanism within D-measurement could be conducted through the program vocd (Malvern et al., 2004; McCarthy & Jarvis, 2007). Written in the language of C, vocd is currently available on the Child Language Data Exchange System (CHILDES) website. However, a more accessible version named D_Tool could be accessed on the _lognostics website http://www.lognostics.co.uk/tools/, which accepts .txt files or direct text input (Meara and Miralpex, accessed 2008b; Schmitt, 2010).

Mirroring Simpson (1949)'s production of a precise probability of randomly choosing two individuals in the same category (the same word type) twice in succession, the coefficient of $\mathcal{D}$ provides the best curve after random sampling without replacement. As McCarthy and Jarvis (2010) explained, the procedure starts with taking 100 random samples of 35 tokens and calculating a mean TTR. Followed by repeating the procedure for 36 tokens and all up to 50, vocd helps plot a random sampling TTR curve for the text. The theoretical curve is produced by using the formula in Malvern et al. (2004), $\mathrm{TTR} = \frac{\mathcal{D}}{\mathrm{N}}[\left(1 + 2\frac{\mathrm{N}}{\mathcal{D}}\right)^{\frac{1}{2}}\text{-}1]$, providing the best fit between theoretical curve and the randomly-sampling TTR.

It is not difficult to hypothesize that limitation in language output is possibly incurred by issues with vocabulary usage. Or, language learners of different L1 backgrounds and experience may showcase varied lexical characteristics accordingly. By analyzing data from a local English proficiency test, You (2014) found that Mandarin speakers created greater lexical diversity and produced more words as compared with other groups (Indian and Korean), in both token and type. This phenomenon of divergent lexical profile was assumed to result from possible special training received by Mandarin speakers. You's dissertation also examined a series of indices that help explain the relationship between lexical factors and examinees' final test results. Among the correlation outcomes between Oral English Proficiency Test score and lexical measurement

indications, type (r = 0.32) and D-measurement (r = 0.35) have shown moderately strong results and are more prominent in comparison with other estimates.

The full functionality of D-Measurement, which is expected to efficiently tackle the problem of sample-size dependency and thus presenting a robust index, is doubted by McCarthy and Jarvis (2007). In the calculation procedure for D-Measurement, N stands for the number of tokens and the estimate for constancy. Malvern et al. (2004) points out that "$\mathcal{D}$ is a particular value for best-fit between the ideal curves and those derived from real transcripts over the standard range of points of the TTR versus N curve drawn by a standardized procedure." McCarthy and Jarvis (2007), however, argued that the value presented by vocd is highly correlated with the average TTR for all possible combinations of certain words, with the sum of probabilities (SOP) of each word being the essence for measurement. The coefficient $\mathcal{D}$ ended up converting lexical diversity to a new scale—changing probability to TTR and then generating a $\mathcal{D}$ coefficient value. An overcompensation of TTR with the text length appears to be the case, which leaves probabilities and the text-length dependency again at the core of problem.

A following validation study (McCarthy & Jarvis, 2010) looked into the Measure of Textual Lexical Diversity (MTLD), which is a sequentially (both forwardly and reversely) evaluated index for lexical diversity. It is calculated "as the mean length of sequential word string in a text that maintains a given TTR value (0.72)." Each word is evaluated sequentially for its TTR first. Factor count is conducted as the second step, which increases by 1 if a word has met the cutoff TTR value of 0.72. A partial factor count is also provided for the remainder of a lexical item, which is calculated as the range covered between 1.00 to 0.72. The ultimate calculation of MTLD result is fulfilled by having the total number of words divided by the total factor count.

The use of MTLD is supported with arguments that no remaining data would be discarded, meanwhile fully substantiating the concept of theme saturation. The gist is calculating the number of words it takes to reach an area, which is located prior to a point of stabilization. It is a point where neither repetition or new type strings would affect the TTR trajectory. Validation results also show that there is no correlation between MTLD and text length, which helps prove its internal validity. A brief history of index development would benefit research of the next phase: comparing the functional efficiency of different measures when variables such as L1 background or language task type are involved.

5. Concluding Remarks

This paper focuses on unfolding the key constructs when measuring lexical proficiency development. Although a combination of different measures are preferred for a more comprehensive understanding of learners' lexical performance, lexical diversity still remains to be a fundamental facet in identifying language learners' lexical profile information. Review of previous studies has shown that lexical diversity and lexical richness measures have been applied to both spoken and written texts, where participants are on a broad scale of language background and proficiency. The functioning of lexical diversity measures, which are experiencing changes

from ratio-based to probability-based, await to be examined when learners of the same proficiency level are involved. It is hypothesized that L2 learners with different L1 backgrounds may show dissimilar vocabulary profiles in L2 speech production. The status and influence of vocabulary usage, when placed on a holistic scale to assess speakers' overall language proficiency, are also worth further investigation.

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Research on the Application of Virtual Reality Technology in English Interpretation Teaching

LI Xi, JIANG Qing
Chengdu Normal University

Abstract: Virtual reality technology can solve the dilemma of lack of real scenes in the teaching of College English interpretation. Based on this, this paper first introduces the constructivist learning theory and virtual reality technology; Then, it constructs the interpretation teaching mode and teaching space based on virtual reality technology, which enables the virtual reality technology to energize the educational environment, improve the personalized learning experience, and make the teaching of College English interpretation conform to the needs of the information age, the artificial intelligence era and the 5G era.
Key words: artificial intelligence; virtual reality technology; teaching of English interpretation

Introduction

In 2021, the Ministry of Education issued the "medium- and long-term development plan for education informatization (2021 to 2035)" and " 14th Five-Year plan for the education informatization", which proposed that the 2.0 Action Plans for education informatization should be implemented in depth, so as to accelerate the development of education informatization and the" Internet plus education ". Under the background of 5G and artificial intelligence, under the guideline of education informatization promoting education modernization, driven by computer science and technology, internet, internet of things, big data, cloud computing, deep learning, neural network, speech recognition, machine translation, virtual reality, augmented reality, hybrid reality and other technologies, the language service and language teaching industry has undergone structural changes, and the transformation from traditional classroom to smart classroom has become an inevitable trend.

The paradigm of foreign language teaching in the information age needs to be reconstructed (Chen Jianlin et al., 2019). The development of information technology brings opportunities and challenges to the teaching and research of foreign language innovation (Xu Jinfen et al., 2019). Dai Chaohui (2019) proposed that the teaching of English interpretation should integrate learners, teachers and learning resources, and construct intelligent learning environment and wisdom teaching paradigm; Ma Wulin et al. (2020) analyzed the advantages and challenges of virtual reality technology in English teaching; Lu Xinchao (2020) took the course of simultaneous interpretation of Beijing Foreign Studies University as an example, and carried out the remote simultaneous interpretation teaching based on video conference platform; Zhang Ailing (2021) discussed the anti-epidemic background of remote professional interpretation teaching. It can be seen that foreign language scholars are trying to apply information technology to foreign language teaching, and there has not been any research on applying virtual reality technology to English interpretation teaching.

This paper aims to design an English interpretation teaching mode supported by virtual reality technology in combination with the notice on the construction of demonstrative virtual simulation teaching project 2017-2020 issued by the Ministry of education, so that learners can adopt online autonomous learning and offline cooperative learning, exploratory learning and heuristic learning in the combination of virtual and reality environment, so as to realize the interactivity, immersion, multimodality and human creativity of English interpretation teaching, and to enable educational information technology to support college English interpretation teaching and learning.

Current Situation of Teaching of Interpretation

According to the "College English Professional Curriculum" promulgated by the Ministry of Education, the “Curriculum of CET-8 Oral Examination for College English majors” aims to check whether the learner's English interpretation level meets the requirements stipulated in the Curriculum, emphasizing the importance and necessity of interpretation course in the senior year curriculum of college English major.

Teaching Materials

The teaching materials of English interpretation are lack of effectiveness, cross-culture and current politics related topics, and the relevant themes, skills, knowledge and culture are not integrated. There are few three-dimensional and multimodal teaching materials integrating audio-visual and micro class online learning resources.

Teaching Methods

The teaching method is a one-to-many traditional classroom mode, which is relatively single, boring and lack of interaction. In the traditional classroom of the teaching of English interpretation, teachers are just the transferors of knowledge and the learners are passive learners. There is a lack of learner-centered teaching method, so that it is difficult for learners to convert their knowledge of interpretation into interpreting ability.

Evaluation Method

The evaluation method is only a final examination, which lacks process evaluation, and it is difficult to stimulate the learner's enthusiasm and self-confidence.

Research Foundation

Theoretical Basis

Constructivism Learning Theory

The Swiss philosopher and psychologist Jean Piaget first proposed constructivism, emphasizing that cognition is a kind of knowledge and practice based on the existing knowledge of the subject. Learning in the age of artificial intelligence is a process of continuous reconstruction of fragmented knowledge. Jonathan's constructivist learning environment design model explains the learning environment supported by technology (see Figure 1). Constructivists believe that the process of cognitive information processing is the process of construction. students themselves should combine with their own experience background through the specific situation of learning activities to truly master knowledge. Learning is not a process in which teachers instill knowledge, but a process in which students construct knowledge on their own initiative. Constructivists advocate social and situational teaching. Knowledge is constructed by language in society. Everyone has different social experience. The construction of knowledge is a process of social language. Students promote their learning through a variety of experiences, and build knowledge through a society that uses language. Constructivism holds that learners' knowledge is acquired through the construction of meaning in a certain situation, with the help of others, such as cooperation, communication, the use of necessary information and so on. An ideal learning environment should include questions, relevant examples, information resources, cognitive tools, conversation and assistance, and social context support (Jonathan, 2002). Based on the constructivist learning theory, it can be seen that simulating the real language learning environment (i.e. context) is of great importance to language learning.

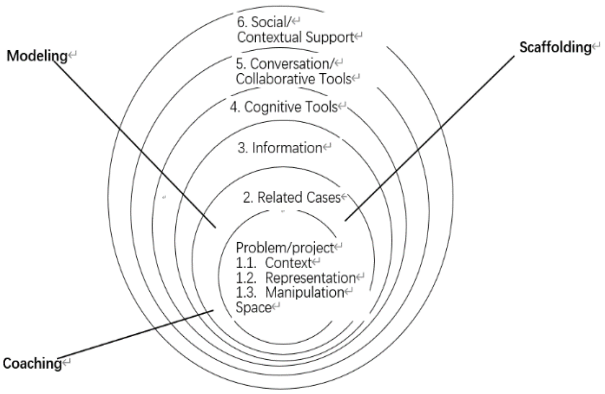

Figure 1: Jonathan's CLEs model (Jonathan, 2002)

Embodied Cognitive Theory

Classical cognitive theory holds that cognition is only a matter for the brain. The theory of physical cognition is a new program for interpreting and reconstructing human cognitive activities, which holds that human cognition, whether online or offline, is the product of physical, environmental, and physical interaction with the environment (see Figure 2, Killeen-Glenberg, 2010; see Jiang Meng, 2015). Cognition is contextual. The natural physical environment and socio-cultural environment shape cognition. People in the environment does not accept information passively. Action leads to perception, and perception produces action. The body controls the perception of the environment, and the human cognition is shaped by the body. Physical cognition theory is widely used in artificial intelligence, robotics, cognitive psychology, developmental psychology, social psychology and other fields.

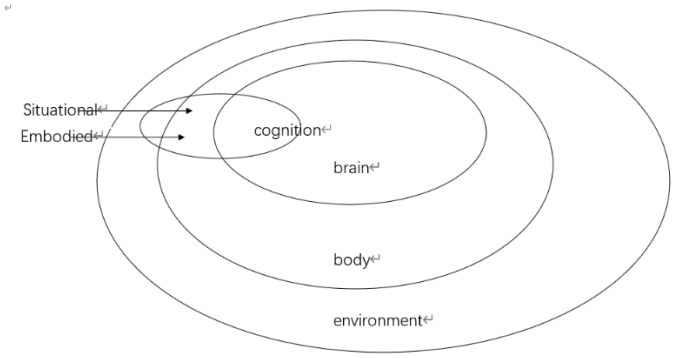

Figure 2: "individual brain centrism" position of embodied cognition theory on cognition (cited from Killeen & glenberg, 2010:68; (see Jiang Meng, 2015:70)

Information Processing Model

Information processing is to form sensory memory and short-term memory through environmental stimulation such as vision, hearing, touch, taste, smell, etc., and then form long-term memory through planning and strategy (see Figure 3, Carroll, 1997). The premise of interpretation is sensory memory. The key is short-term memory and the basis is long-term memory. The learning effect of language learners is influenced by environment, language perception and emotional factors. Virtual reality technology can create virtual interpretation environment, provide learners with enough environment, perception and emotional stimulation,

which is conducive to the formation of plot memory (i.e. specific personal experience at a certain time and place) and procedural memory (automatic and cognitive skills), and promote the teaching and learning of interpretation.

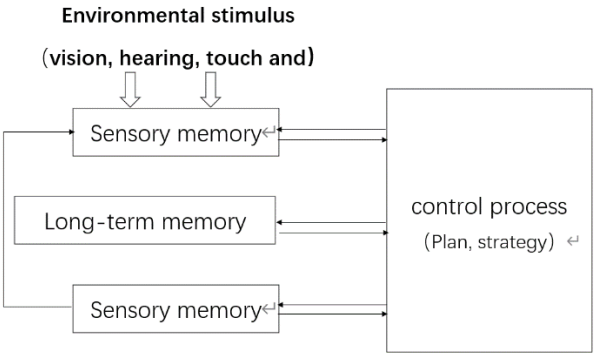

Figure 3: information processing model (see Figure 3, Carroll, 1997)

Technology Foundation: Virtual Reality Technology

2016 is known as the "first year of virtual reality in China". Virtual reality technology integrates technologies in many fields. As an interactive simulation technology of multi-source information fusion, it creates real-time simulation of virtual reality fusion and synchronous presentation of multi-channel perception (vision, listening, smell, taste and touch) in teaching environment, expands users' perception space, and makes users feel as if they are experiencing the situation. It can be used to create learning scenes, enhance learning experience and promote teaching innovation. Virtual reality technology has entered the 3.0 era, and is widely used in various fields, such as commerce, transportation, geography, medical treatment, entertainment and so on.

Application of Virtual Reality Technology in the Teaching of English Interpretation

The Characteristics of Virtual Reality Teaching Mode of English Interpretation

The application of virtual reality technology in the teaching of English interpretation has characteristics of interactivity, immersion, multimodality and creativity. It can break through the limitations of traditional teaching environment, promote learning experience, stimulate learning enthusiasm and motivation, and provide guarantee for effective teaching and learning of English interpretation.

Interactivity

In the three-dimensional interactive teaching environment of English interpretation based on virtual reality technology, learners can interact with the characters in the virtual scene to realize the blended learning of autonomous learning, human-computer interaction and human-to-human interaction.

Immersion

The real scene of language use is very important for language teaching and learning. Virtual reality technology can create highly simulated situations and teaching ecological scenes (such as business scenes, exhibition scenes, conference scenes, etc.) and weaken the interference of external factors on classroom teaching. Learners can immerse themselves in the real language scene, trigger the embodied experience, mobilize the learners' hearing, vision and touch, improve the learning efficiency of interpretation, and promote the practical application of English.

Multimodality

Virtual reality technology transforms modular English knowledge into dynamic virtual scene, and stores the real scene materials of interpretation in the cloud in multimodal form (documents, pictures, courseware, audio and video, etc.) to present teachers and students with three-dimensional interpretation teaching and training materials. Learners' interpreting activities

are not plane, static and single, but three-dimensional, dynamic and pluralistic. The ever-changing communication scene will stimulate learners' communication motivation and improve their interpretation and communication skills.

Creativity

English majors have different English proficiency and different needs for English interpretation. In the teaching mode of English interpretation based on virtual reality, learners can carry out individualized learning independently according to their own needs. Virtual reality technology can create a virtual situation and stimulate the imagination and creativity of teachers and learners.

The Content of Teaching Mode of English Interpretation Based on Virtual Reality Technology

Based on virtual reality technology, a personalized and effective English Interpretation Teaching Model (EITM) is designed. This EITM covers all the stages of interpreting teaching for English majors, which are closely related to each other. As shown in Figure 2.

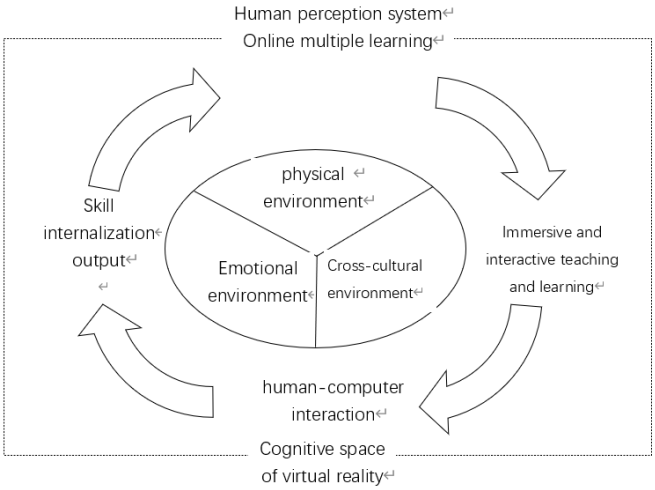

Figure 3: teaching mode of English interpretation based on Virtual Reality Technology

EITM is a simulated physical environment, emotional environment and cross-cultural environment for interpretation based on constructivism theory and virtual reality technology . Combined with learners' perception system (i.e. acquisition of knowledge through sense of hearing, vision and touch). EITM uses four links: Online multiple learning, immersive interactive teaching and learning, human-computer interaction and multiple feedback, skill internalization and output, to achieve efficient teaching and learning of English interpretation.

In the online multiple learning stage, learners use the mobile terminal to learn the micro lesson of interpretation, live audio and video of interpretation, interpretation documents (such as background knowledge, related expressions of various topics) made by teachers, and complete the learning of declarative knowledge independently. In the stage of immersive interactive teaching and learning, teachers and learners wear virtual simulation glasses in the virtual simulation experimental classroom, immerse themselves in the real interpretation environment, carry out interpretation practice, and internalize the declarative knowledge learned online. In the stage of human-computer interaction and multiple feedback, learners can interact with virtual characters in the virtual environment, and get feedback from teachers, peers and teaching system, so as to realize the internalization and output of interpretation skills.

Application of Virtual Reality Technology in the Teaching of English Interpretation

Research Methods

In order to test the effect of this teaching mode, two classes (30 students in the control class and 30 students in the experimental class) of grade three English Majors in Chengdu Normal University were randomly selected for a one-year comparative teaching experiment. Before the experiment, the two classes handed in the materials of English-Chinese translation of CET-8 oral test, which proved that the two classes had the same level of English interpretation before the experiment. Then the traditional teaching of interpretation is carried out in the control class, and the teaching of English interpretation based on virtual reality technology is carried out in the experimental class. One year later, the author conducted a questionnaire survey on the students' interpretation level in the experimental class and tested the interpretation level of the students in both classes. The source of materials, scoring criteria and scoring methods were the same as before. The pretest and posttest data of the two classes were analyzed by SPSS 22.0.

Research results

Survey Results

In order to test the effectiveness of the teaching mode, a questionnaire survey was conducted among 30 students in the experimental class one year later, and 29 valid questionnaires were received, with a recovery rate of 97%. The results are shown in Table 1.

Items	Strongly agree	agree	uncertain	disagree	Strongly disagree
1. This teaching mode enables me to master the skills of note-taking in interpretation through micro lecture	53%	34%	2%	7%	4%
2. The teaching mode enables me to expand the background knowledge by learning micro class	54%	30%	4%	8%	4%
3. The teaching mode gives me more opportunities to practice	65%	22%	10%	1%	2%
4. The teaching mode enables me to feel the real interpretation environment	55%	27%	6%	5%	7%
5. The virtual interpretation scene in the teaching mode improves my intercultural communication ability	62%	17%	6%	12%	3%
6. The teaching mode has improved my on-the-spot adaptability.	61%	27%	3%	6%	3%
7. The teaching mode enables me to interact with teachers and classmates more easily	68%	17%	5%	6%	4%
8. The virtual reality technology of the teaching mode stimulated my interest in learning	60%	23%	7%	6%	4%
9. The multiple evaluation method of the teaching mode stimulated my learning enthusiasm	58%	30%	5%	5%	2%
10. The improvement of my interpreting performance is directly related to this teaching mode	45%	33%	10%	11%	1%

Table 1 results of questionnaire

It can be seen from table 1 that items 1-3 of the 34questionnaire, from the perspective of teaching content, show that learners mastered interpreting skills, note-taking and other skills in

class, expanded background knowledge and gain more practice in class by learning micro course before class. From the perspective of teaching environment, items 4-7 of the questionnaire show that using virtual reality technology, learners can feel the real language environment, which is helpful for learners to apply what they have learned and improve their on-the-spot adaptability. From the perspective of teaching effect, items 8-10 of the questionnaire show that the teaching mode can stimulate learners' interest and enthusiasm in learning interpretation, so as to improve their interpretation performance.

Results of Performance Data

The independent sample t-test showed that there was no significant difference in the pre-test scores between the control class and the experimental class ($P = 0.45 > 0.05$). One year later, a posttest was conducted on the interpreting proficiency of the two groups. Independent sample t-test shows that the average score of the experimental class is 6.5 points higher than that of the control class, and there is a significant difference between the experimental class and the control class ($P = 0.002 < 0.05$), which indicates that after one year's implementation of the teaching mode of English interpretation based on virtual reality technology, the English interpretation level of the experimental class is higher than that of the control class. It can be seen that this teaching mode has a positive effect on improving students' English interpretation level.

Conclusion

The application of virtual reality technology in the teaching of English interpretation promotes the construction of offline virtual simulation course and realizes a new mode of personalized and intelligent foreign language experimental teaching; It promotes the deep integration of information technology and foreign language teaching of higher education, and promotes the informatization and modernization of foreign language teaching; In the context of public health emergencies (e.g. the outbreak of the covid-19), it can continue learning despite the fact that classes are suspended. How to use 5G network to ensure the high-speed operation of the network, how to configure more humanized and collaborative virtual reality equipment to ensure classroom interaction, how to build virtual reality teaching resources and other issues need further to be researched.

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An eye movement experimental study on English majors' micro-cognition in second language reading

PENG Huan

Nanjing University of Aeronautics and Astronautics

Abstract: Through eye movement experiment, this study aims at investigating the English majors' micro-cognitive processing differences and the development of reading ability. The research adopts eye-movement experiments and an interview survey covering a total of 65 English Majors of NUAA. And all subjects are junior and senior students. Eye movement experiments were conducted to collect relevant data, and Data Viewer and SPSS were used to analyse the acquired data. The results show that: (1) Some eye movement indexes of the senior English majors subjects were all better than those junior English majors. The comparisons of their mean values respectively among different grades further revealed that for two different English majors. (2) There was significant difference in the reading comprehension rate of the participants between different grades. The reading speed, reading time and reading speed of the senior English majors are better than those of junior English majors. Therefore, this study can not only expand the research dimension and understand the changes in the development of the reading ability of English learners, but also provides a basis for studying the role of cross-language activation in more complex semantic processing, even finding the real reason of inefficient foreign language teaching.

1. Introduction

Reading is the basis of learning all subjects, which is important way to master a foreign language (Yao & Pan, 2004). Eyes are always moving between different positions of the text to extract relevant text information. People integrate various parts of information to understand the content of the entire text (Bai, Li & Yan, 2015). Researchers can obtain a variety of eye movement indicators related to the reading process, including fixation duration, fixation count, average fixation duration, saccade count and so on (Yan & Wang, 2010). The researcher can obtain the eye movement data of the subjects when they read the text and understand the cognitive process of readers' reading through the analysis of eye movement data (Rayner, 1998).

This study tries to summarize the reading microcosmic ability and explore its development. Urquahart and Weir argued that reading is essentially a cognitive activity in which a reader uses a variety of skills and strategies to achieve the cognitive process of understanding text (Urquahart-Weir, 1998). Reading cognitive ability is a comprehensive ability, which refers to the psychological process of individual's understanding, the storage, retrieval and use of knowledge of the main learning experience. Read macro-cognitive abilities mean processing the passages of the chapter cognitively, and read microcosmic abilities mean processing words. Therefore, reading microcosmic ability refers to the cognitive processing of learners at the word level in foreign

language reading. The study can better explore how the reading ability of English majors continues to develop with the increase of grades through the eye movement data difference.

2. Methodology

2.1. Research Questions

(1) What is the current situation of English majors' reading micro cognitive ability?

(2) Is there any difference in reading micro cognitive ability between junior and senior college students? If the answer is yes, what might be reflected specifically?

(3) What are the differences in the reading micro-cognitive development in different grades? Why?

2.2. Experimental Participants

A total of 65 college students majoring in English from Nanjing University of Aeronautics and Astronautics were selected as participants. The students were divided into two groups. There are 32 sophomores and 33 seniors. Their native language is Chinese and their second language is English. The subjects do not have severe astigmatism, amblyopia or colour blindness.

2.3. Data Analysis

Data analysis software such as Experiment Builder, Data Viewer software and SPSS statistical software were used to collect and analyse data. Descriptive statistics and correlations for all indexes are reported in the following section.

3. Results and discussion

3.1. Fixation

3.1.1 Total fixation duration

Total fixation duration refers to the total time required for the subject to complete the reading, whose unit is second.

Table 1The Independent Samples T-Test of Total Fixation Duration

	Lenene's test for equality of variances		T-test for equal of means						
Equal variances	F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference upper	
								lower	upper
assumed	2.943	.092	2.776	57	007	72.48873	26.11525	20.19385	124.78361
not assumed			2.751	44.161	.009	72.48873	26.34560	19.39812	125.57933

T-test shows that in terms of total fixation duration, T value is 2.943, P value is less than 0.05, indicating significant difference in English majors' reading between different grades. The average total fixation time length for sophomore is 528.13 seconds, and that for senior student is 455.64

seconds. The independent T test verifies that sophomore participants take more time to finish English reading.

3.1.2 The Number of Fixation

The number of fixation points refers to the number of fixation points left by the participants on each piece of material. As the number of fixation is reflective of the reading processing, the larger the number is, the more difficulty points existing in the reading materials.

Table 2 The Independent Samples T-Test of the Number of Fixation

	Lenene's test for equality of variances		**T-test for equal of means**						
Equal variances	*F*	*Sig.*	*T*	*df*	*Sig. (2-tailed)*	*Mean difference*	*Std. error difference*	*95% confidence interval of the difference upper*	
								lower	*upper*
assumed	.495	.485	2.136	57	.037	216.35747	101.28165	13.54447	419.17048
not assumed			2.132	55.594	.037	216.35747	101.49989	12.99600	419.71894

T test shows that the T value of fixation is 2.136, P value is less than 0.05, indicating a significant difference in English majors' reading among different grades. Therefore, for the same content reading material, sophomore significantly involve more fixation times, which reveals

3.1.3 Fixation Map

Fixation map is created with paragraphs and questions as background image to visually identify the informative parts of the reading materials. Our experimental hypothesis is that there are differences in the cognitive processing characteristics for English majors of sophomore and senior student. English reading is a multi-level cognitive process, which is influenced by word regularity and syntactic structure. It is speculated that in sophomore reading, the area of interest mainly focuses on the level of words, while in senior student reading more attention is paid to the level of phrases and sentences. The experimental results show that the above prediction is accurate. The subjects of sophomore tend to skip with ellipsis and focus on the nouns, verbs and adjectives that affect the meaning of the text. The heat map showed multiple yellow areas in the noun-verb-adjective part, while there were few red areas in the text body, indicating that the subjects did not focus on one place for a long time.

In addition, the heat map of English reading covers a wide range of topics, covering almost all articles, indicating that non-native people even English majors still need to read in detail and pay attention to every word. Although there are some blank spaces, the blind spots in English reading are mainly meaningless function words such as "the" and "a", which indicates that English major students have certain automatic reading ability in English reading, but their reading ability is inadequate compared with native speaker reading ability. However, different grades have different reading ability and processing skill. There are some green parts in the senior student reading heat map, which involve nouns, verbs, adjectives and other content words that affect the

meaning of the article, but do not affect the fluency of the article reading. It shows that the brain of senior student of English majors will automatically process and skip these parts in reading, and the reading ability is relatively high and developed.

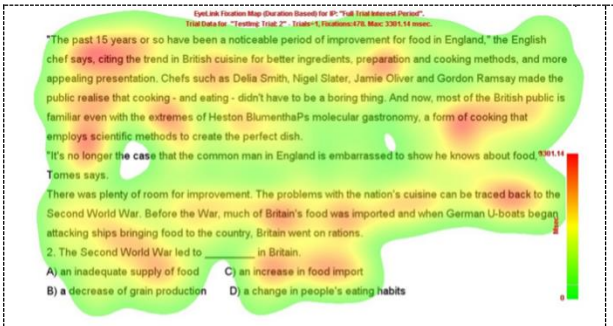

Figure 1. Subject Sophomore Reading Material

Figure 2. Subject Senior Reading Material

3.2. Comprehensive Reading Index

3.2.1 Reading Rate

The reading rate is a derivative index of the total length of fixation, which is obtained by dividing the number of words by the reading time. The subjects read the number of words in a minute, so the unit of reading rate is words/minute. It can more intuitively show the number of words read per minute and the speed of reading.

Table 3 The Independent Samples T-Test of Reading Rate

	Lenene's test for equality of variances		**T-test for equal of means**						
Equal variances	*F*	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean difference*	*Std. error difference*	*95% confidence interval of the difference upper*	
								lower	*upper*
assumed	.509	.478	-2.112	57	.039	-19.32433	9.15184	-37.65057	-.99809
not assumed			-2.097	48.135	.041	-19.32433	9.21478	-37.85055	-.79812

T test shows that in the reading rate, T value is -2.112, P value is less than 0.05, , indicating significant difference between different grades. The material is 1320 words.

The average reading speed of sophomore is 159 words per minute and that of senior student is 178 words per minute. The reading speed in senior student is higher than that of sophomore.

3.2.2 The Rate of Reading Comprehension

The rate of reading comprehension refers to the comprehension degree of each article by the subjects, which is obtained by dividing the number of correct answer by the total number of questions.

Table 4 The Independent Samples T-Test of The Rate of Reading Comprehension

	Lenene's test for equality of variances	**T-test for equal of means**

Equal variances	*F*	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean difference*	*Std. error difference*	*95% confidence interval of the difference upper*	
								lower	*upper*
assumed	4.423	.040	-2.098	57	.040	-8.34155	3.97588	-16.30310	-.38000
not assumed			-2.083	47.890	.043	-8.34155	4.00371	-16.39203	-.29107

T test shows that in the rate of reading comprehension, T value is -2.098, P value is 0.05, indicating significant difference between different grades. The mean rate of reading comprehension is all over 75%. Thus, the rate of reading comprehension for sophomore is 78% and for senior student is 87%. This shows that when different grades are given the same content of reading material, senior student's comprehension ability were better than that for sophomore in terms of accuracy.

4. Conclusion

The eye movement measures related to fixation differed significantly between sophomore student and senior student. The fixation times and fixation times of the senior English majors subjects were all better than those junior English majors And the comparisons of their mean values respectively among different grades further revealed that for two different English majors, when given English versions of the same content, junior students had more difficulty processing information and had a terrible psychological load during reading rather than senior students.

This study aims at adding to the still paltry collection of research that looks at different grades English majors. There was significant difference in the reading comprehension rate of the participants between different grades. The reading speed, reading time and reading speed of the senior English majors are better than those of junior English majors, and the reading ability of Chinese is better than that of English reading.

Therefore, this study is beneficial to solve the mystery of the reading differences in language processing in the second language use, applying to the learning process of second language learners and even second language teaching.

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Exploring L2 English NT-clause construction patterns: Evidence from Chinese students' interlanguage

SUN Mingchen
Beijing Foreign Studies University

Abstract: NT-clause is the formal description of the structural relationship between clauses. At present, some research findings have been achieved, preliminary revealing the characteristics of NT-clause in Chinese and English respectively, which provides theoretical and model support for exploring the relationship between clauses. Currently, most of the existing interlanguage studies are limited to the sentence level or below the sentence level, nevertheless, few studies focus on the relationship between clauses. To fill the void, this study delved into interlanguage in terms of four main NT-clause construction patterns based on the existed researches, namely the Stack Pattern, the New Branch Pattern, the Back Position Pattern and the Influx Pattern, aiming to investigate 1) the distributions of NT-clause construction patterns in interlanguage in relation to students' proficiency 2) the NT-clause acquisition sequence of interlanguage compared with English, and the motivation inducing such trajectory. This empirical research adopted a corpus-based approach by annotating four NT-clause construction patterns of students' compositions (n=50) at different English level (middle school, CET-4, CET-6, TEM-4, TEM-8) from Chinese Learner English Corpus (CLEC). A Python-driven automatic statistical tool of NT-clause construction patterns was designed and applied to appraise the quantitative data collected from the annotations. What the results showed was presented as follows. 1) The distribution of NT-clause construction patterns closely correlated with EFL learners' English proficiency level and the combinations of NT-clause constructions patterns became diversified with the increase of English proficiency level. 2) EFL middle school students did not excel in the usage of the Back Position Pattern. 3) Chinese-English interlanguage had some NT-clause universals and the combinations of NT-clause constructions patterns followed the Long Tail Effect and Zipf's law. (4) NT-clause group fossilization was detected in Chinese-English interlanguage, and it was caused by students' cognitively fixed combinations of NT-clause construction patterns. This paper expands the scope of interlanguage research, renders a novel perspective of NT-clause theory, and sheds important light on the future pedagogical studies.

Keywords: Naming-Telling clause; NT-clause construction patterns; interlanguage

1. Introduction and Literature Review

Naming-Telling clause (NT-clause) is the clause constructed with naming and telling, more specifically, constructed with the referential component and the description or modification that predicates or explains the referential component (Ge & Song, 2016; Song & Ge, 2015; Zhang, Jiang, Mao & Zhang, 2020). NT-clause can be classified as the Self-topic-sufficient Clause with completed components of naming and telling, and the clause that is not self-topic-sufficient

because of the missing naming. Moreover, the latter clause needs the naming sharing structure from other clauses to supplement the missing naming (Ge & Song, 2020; Song, Ge, Shang & Lu, 2017). There are four main construction patterns of NT-clause in Chinese and English, namely the Stack Pattern, the New Branch Pattern, the Back Position Pattern and the Influx Pattern (Ge & Song, 2016; Song, 2008, 2013). The notion of NT-clause was first proposed in 2013 (Song, 2013) and gained great momentum in the current studies thanks to NT-clause analysis' conspicuous advantages over functional grammar to analyze the clauses' cohesion and coherence at the level of clause complexity (Ge & Song, 2020).

Interlanguage is a language variety between learners' first language and target language. Furthermore, interlanguage study is indispensable for understanding the human second language acquisition process (Chen & Xu, 2019; Selinker, 1972; Selinker, Swain & Dumas, 1975). It is believed that corpus-based interlanguage studies have obtained considerable attention in recent years and learner corpus has been increasingly integrated into the related empirical researches (Boulton & Cobb, 2017; Godwin-Jones, 2017; Lei & Liu, 2019) Different approaches based on learner corpus have been adopted in the interlanguage studies, such as the contrastive corpus analysis, the dependency treebank analysis, Zip's law analysis and linguistic topology analysis (Chen & Xu, 2019; Huang, 2019; Jiang, Ouyang & Liu, 2019; Seog & Choi, 2018). As for the syntactical interlanguage study, the metrics of dependency distance, mediated by dependency treebank corpus, were introduced to explore how syntactical complexity related to students' language level (Jiang et al., 2019; Li & Yan, 2020; Ouyang & Jiang, 2018).

Here is the research gap. Current studies evinced that it was unclear whether Chinese-English interlanguage was comprised of the identical NT-clause construction patterns. On the other hand, most of interlanguage studies emphasized on the treebank-based calculation of syntactical complexity through dependency distance. Nevertheless, there is no study of interlanguage disintegrated through NT-clause analysis. As a consequence, this study aims to explore NT-clause construction patterns in Chinese-English interlanguage, through annotating and calculating the construction patterns of the compositions from Chinese Learner English Corpus (CLEC). To this end, this study will address the following research questions:

RQ1: What is the usage pattern of NT-clause construction in Chinese-English interlanguage in relation to students' proficiency?

RQ2: What is the acquisition sequence of NT-clause construction patterns in Chinese-English interlanguage compared with English, and the motivation inducing such acquisition sequence?

2. Methodology

Combining the quantitative and qualitative approaches, this study was conducted through corpus-based content analysis. 10 compositions (n=50 in total) were extracted from each CLEC sections that were classified in accordance with learners' language proficiency levels (middle school, CET-4, CET-6, TEM-4, TEM-8). Later, 50 compositions in total were annotated manually, using Newline-Indent Schema to annotate naming-telling relationship among clauses and using

the tag of "SP, NBP, BPP, IP" (i.e. the acronym of four main patterns) to annotate four NT-clause construction patterns (Stack Pattern, New Branch Pattern, Back Position pattern and Influx pattern). In the end, a statistical model designed and operated by Python, was applied to automatically recognize the annotations, as well as calculate and analyze the annotation data.

3. Results

3.1. The **Usage** Pattern of the NT-clause Construction in Chinese-English Interlanguage

This study aimed to explore the NT-clause construction and its usage pattern in Chinese-English interlanguage. The findings of the first research question could be summarized as follows.

1) The distribution of NT-clause construction patterns closely correlated with EFL learners' language proficiency level. With EFL learners' language proficiency augmenting, the Self-topic-sufficient Sentences diminished, as well as the New Branch pattern increased and the Stack Pattern remained steady.

2) Data showed that middle school students did not excel in the usage of the Back Position Pattern.

3) Also noted was that the combinations of NT-clause construction patterns became diversified with the increase of language proficiency level, indicating an abundance of the emerging combinations within certain levels.

4) Chinese-English interlanguage had some NT-clause universals. Five rudimentary combinations of NT-clause construction patterns were detected at every language proficiency level, and others were mostly formed through adding the Stack Pattern and the New Branch Pattern at the end of these five rudimentary combinations. Furthermore, The combinations at every language proficiency level followed the Long Tail Effect and Zipf's law, and the Self-topic-sufficient Sentences, the New Branch pattern and the Stack Pattern were the major components for Chinese-English Interlanguage at every level.

3.2 The NT-**clause** Acquisition Sequence in Chinese-English Interlanguage

The second research question asked what is the acquisition sequence of NT-clause construction patterns in Chinese-English interlanguage compared with English. It was found that the NT-clause group fossilization was detected in Chinese-English interlanguage in its acquisition sequence. Also noted was that the period of the group fossilization was pinpointed from the level of CET-4 to TEM-4, after which students could palpably surmount the impediments of fossilization with better language performance, as such group fossilization was temporary. Furthermore, the advent of the group fossilization should be ascribed to the cognitive-linguistic factors that students of CET-4 level and TEM-4 level inclined to apply fixed combinations of NT-clause construction patterns.

4. Discussion

The findings of this study are discussed as follows. This study extended the previous studies

on L2 performance across proficiency levels by showing that Chinese EFL learners' NT-clause performance varied in accordance with their English proficiency from middle school level to TEM-8 level (Yoon, 2017; Yu 2020). Furthermore, this study extended Yoon (2017) and Yu (2020)'s researches, indicating that with language proficiency level augmenting, the New Branch patterns of NT-clause increased, the Self-topic-sufficient sentence diminished and the Stack Pattern remained steady. Such phenomenon was caused by the NT-clause language transfer (Ge & Song, 2016; Song & Ge, 2015; Zhang et al., 2020). More importantly, refuting Yoon (2017)'s findings which suggested that there were no significant changes across proficiency levels in clause-level measure, this study explained that NT-clause level variation was immensely evident, especially in the types of NT-clause construction combinations, which became increasingly diversified (Lu, Song & Shang, 2014). This study also extended Lu et al. (2014)'s perspectives that the Back Position Pattern was cognitively sophisticated in Chinese, by showing that the Back Position Pattern only made up a small portion of NT-clauses altogether in the Chinese-English interlanguage at every level. The Chinese-English interlanguage has NT-clause universals. Deviated from previous literature (Wang & Hu, 2017; Zhang, Guo, Wu & Zhang, 2017) that focused on the difference of L2 performance in varied language, this study focused on the NT-clause universals, which evinced that the combinations of NT-clause construction patterns in Chinese-English interlanguage were in line with Zipf's (1949) Long Tail Effect. As a consequence, this study attested the hypothesis that Chinese EFL learners confronted the Principle of Least Effort in the acquisition of NT-clause, and bore the cognitive workload of NT-clause construction patterns. The group fossilization was detected in the NT-clause acquisition sequence. This study echoed the previous literature that the NT-clause group fossilization did exist in the acquisition sequence of Chinese-English interlanguage (Selinker, 1972; Wei, 2008). Nevertheless, this study extended the previous research by pinpointing the time of occurrence of NT-clause group fossilization, namely when Chinese EFL learners reached the level of CET-6 and TEM-4.

5. Conclusion, Implications and Future Directions

To fill the paucity of the NT-clause analysis in interlanguage, which is unclear whether Chinese-English interlanguage is comprised of the identical NT-clause construction patterns shared by English and Chinese, this study delved into Chinese-English interlanguage in terms of four main NT-clause construction patterns and explored the relationship between the NT-clause construction patterns, Chinese EFL learners' language proficiency level, and the target language English. This study is imbued with pedagogical implications, which can provide valuable instructions for pre-service teachers under the framework of NT-clause.

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自然语言处理方法在计算机辅助翻译教学中的应用研究

张鹏华 [1] 潘一 [2]
1 西安电子科技大学, 2 西安交通大学

摘要：人工智能的迅猛发展使计算机辅助翻译面临巨大的机遇和挑战。如何才能培养出适应时代发展的人才是急需解决的问题。计算机辅助翻译课程的培养目标、教学方法和内容亟需改变才能满足社会发展及市场需求。本文探讨使用 Python 自然语言处理方法改善计算辅助翻译教学，提出改善计算机辅助翻译培养目标、教学内容和方法。实践证明，改善的教学内容和方法能更好地提高学生计算机辅助翻译能力、处理自然语言能力和计算机编程能力，有助于培养学生从使用翻译工具向改善、研发翻译工具过渡，满足就业多元化的需求。本研究对其它同类院校的计算机辅助翻译课程教学有一定的示范作用。

关键词：计算机辅助翻译；Python 自然语言处理；培养目标；教学内容；教学方法

1. 研究背景

近年来 MTI 学生的就业情况说明 MTI 硕士应不仅仅着眼于翻译实践，目前就业趋于多元化。结合目前社会发展需要，翻译管理、语言服务，软件编程、自然语言处理、本地化服务等方向均可能成为翻译硕士的就业需要。但目前的翻译硕士培养目标定位、教材内容和教学方法远不能满足学生将来的就业需求，因此，改变培养目标定位、合理选择教授内容、改进教学方法势在必然。

2. 文献回顾

通过使用 CiteSpace（V5.7R2）(g-index,k=25;LRF=3.0)对 CNKI 上 1989-2020 年计算机辅助翻译的 628 篇文献分析发现，计算机辅助翻译、机器翻译、翻译教学、翻译记忆和计算机辅助翻译软件是频率最高的热点研究方向。LLR 算法聚类研究表明 2017-2019 年共同代表性词汇包括机器翻译、翻译教学、翻译记忆和戏剧翻译。

王华树等（2018）调查显示，计算机辅助翻译课程设置教学目标为“了解计算机基本的编程语言与 NLP(Natural Language Process，自然语言处理)相关知识”占比最少，为 4.8%。计算机辅助翻译中创建语料库、记忆库等都与自然语言处理密切相关，但目前为止，利用自然语言处理方法丰富计算机辅助翻译教学内容，教学方法的研究很少。因此，本文探讨使用 Python 自然语言处理方法丰富、改善计算机辅助翻译教学内容、方法。

3. 实施内容及方法

3.1 计算机辅助翻译课程培养目标

使用 Python 编程能够解决软件使用版权问题。在课程中增加自然语言处理内容具有一定的便捷性和通用性，既可用于翻译实践，也可用于翻译研究、语言学研究和文本处理。因此，计算机辅助翻译课程培养目标更新为：

本课程的目标在于帮助学生了解更多翻译途径，提高翻译实践能力和语言处理、管理能力，了解自然语言处理方法基本常识，学会利用 NLTK 语料库资源，使用 NLTK 工具处理文本，建立术语库、记忆库，掌握机器辅助翻译工具的用法，利用自然语言处理方法评估翻

译质量，管理项目、调用在线翻译工具和构建翻译工具；熟悉 Python 编程语言并具有一定的软件研发能力。旨在提高翻译操作技能、研究水平，为从事自然语言处理、语言服务和语言资产管理奠定基础，使学生成为宽口径、复合型人才，从而拓宽学生就业面，满足学生多层次的就业需求。

3.2 教学内容

目前课程设置教学内容中创建语料库、术语库、记忆库和翻译工具有多种软件，使用自然语言处理方法能够取代大部分软件，同时也可培养学生的编程能力，具体教学内容及课时安排如下：

(1) Python 安装与编译器配置（2 课时）；

(2) NLTK 语料资源调用（2 课时）；

(3) NLTK 文本处理，包括分句、分词、词干提取、词形还原、标注等（4 课时）；

(4) 爬取网页获取资源（2 课时）；

(5) 正则表达式提取特定特征文本（4 课时）；

(6) 翻译材料预处理，包括格式转换、难度评估、术语提取、文本拆分等（4 课时）；

(7) 语料库，包括语料库创建、检索及其应用（4 课时）；

(8) 翻译质量保证与 BLEU 评估译文质量（2 课时）；

(9) Python 调用在线翻译工具（2 课时）；

(10) Python 构建神经网络翻译系统（4 课时）。

由于 Python 自然语言处理内容较多，根据实际讲授情况，原课时不足以保证完成设计的教学内容，因此，许多设计中的内容需要提前安排学生在课下完成。

教学内容设计的实施效果取决于实验室软硬件环境、教学平台、学生计算机基础等许多因素，但很大程度上也取决于教师的教学、科研水平、讲授经验和方法。根据授课的经验，总结本课程教学方法如下。

3.3 教学方法

计算机辅助翻译课程总体上理论问题较少，主要是要通过实践熟悉操作过程，了解相关原理。无论是任务型教学、问题导向教学、项目案例教学，还是混合式学习，都需要动手操作。部分教学内容可以通过学习 MOOC 等方式进行，也可以采用线下与线上结合的方式教学。近年来，我校采用的翻转课堂汇报如下。

翻转课堂主要采取课前报告和课前任务两种方式开展。课前任务主要需要学生提前安装好程序包或软件，准备好不同格式的语言处理材料。每次上课前安排好下次课程内容，明确要求需要安装的程序包。其次，需要要求学生阅读相关教学内容的文献，并总结、比较文献，记录文献阅读中遇到的问题或想法。通常要求学生每周阅读 3 篇相关论文，并以表格形式记录研究者、研究时间、研究类型等信息。考查方式分为课堂随时抽查和期末考查。期末考查要求学生上交至少 20 条文献记录，课堂抽查和期末考查均计入总评成绩。

实践证明该方法确实能最大程度上调动学生主动学习的积极性，绝大部分学生都能认真按照要求完成。实施过程中也发现有个别学生直接拷贝网上内容，不深入探索学习。若要避免发生这种情况，首先需要严格要求，明确告知学生抄袭的后果，同时也需要教师通晓本领域的研究文献、翻译工具、软件等，培养自身敏锐的甄别能力。

4. 结论

面临人工智能的迅猛发展，必须及时有效地调整计算机辅助翻译培养目标、内容和教学方法才能与社会发展同步，避免培养目标、教学内容滞后于时代需求及翻译市场需求。利用自然语言处理方法改进计算机辅助翻译教学内容和方法可以实现由使用翻译工具向开发、改进翻译工具过渡，实现翻译实践与语言学研究相结合、计算机与外语结合，体现交叉学科的优势；可以利用更加丰富的教学资源，培养学生的自然语言处理能力和计算机软件编程能力，从而拓宽学生的就业面。本研究总结、设计的利用自然语言处理方法改进计算机辅助翻译教学内容及方式可供相关院校参考借鉴。希望本研究可以为计算机辅助翻译师生及从业者拓宽思路，为人工智能与计算机辅助翻译更好地结合提前做好准备。

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基于 iWrite 的学生互评培训行动研究

张新颖 林月

深圳大学

摘要：本研究聚焦自动写作评测系统辅助下的生生互评培训，在 47 名本科一年级学生中进行为期 10 周、三篇议论文写作的行动研究，关注议论文写作中连贯性与一致性的结构逻辑，通过课上讲解、示范，叠加课下小组讨论的模式进行互评培训，进而使用配对 T 检验对比前后测的互评评语数据，同时通过问卷、反思日志、半结构化访谈多维度质性数据辅助，探索是否互评培训能够提升学习者评语撰写的读者意识及社交情感连接。研究发现跨时 10 周的互评培训帮助学生更多使用了同伴语气，但是对连贯性与一致性的结构逻辑的关注、合作态度的体现、社交情感连接使用的数量并没有发生显著变化，但是质性数据显示学生有强烈意愿学习并提升自己的互评能力，但是学生经常无力完成全文互评、在互评过程中会受到对方态度的干扰、同伴身份与权威身份会频繁转换。最后，文章针对本研究出现的互评培训模式的不足，提出了相应的改进建议，以期为未来提升同伴互评培训模式提供参考。

关键词：同伴互评；读者意识；社交情感；过程写作法

1. 引言

自 20 世纪 70 年代起，英语写作教学研究关注点发生了从传统的成果写作法（product approach）向过程写作法（process approach）的转换。同伴互评即为写作过程中一个交互环节，它是学生相互交换阅读作文并提出修改建议的写作教学活动（Mangelsdorf，1992）。

网络平台为合作学习提供了巨大的空间和可能性，而智能技术通过自然语言处理，辅助教师写作评阅，但是国内目前非英语专业大学英语课程的高师生比，限制了教师对学生的反馈频率和数量，因此同伴互评的实践成为写作评测的有力辅助。近年有学者提出同伴互评培训的理念(Min, 2005; Wang, 2007)，并且认为实施同伴互评培训并开展相应研究能够让我们更加清楚地了解它是如何促进外语写作教学的。本行动研究将探索互评培训是否能够提升学生写作互评中的读者意识和社交情感连接。

2. 读者意识与社交情感连接

写作中的读者意识指的是作者理解自己与读者的关系，能够“去中心”抽离自己出来，想象对方的观点、需求和视角，从而使得自己的写作更具备交际功能(Flower & Hayes, 1981; Min, 2003) 。本研究关注互评评语产生的读者意识，这些评语尤其重要，因为他们会对同伴产生具体帮助，甚至完成下一步写作修改。

其次，情感作用（affectivity）指的是共情，彼此感同身受，读者和作者互相赞赏(Villamil & De Guerrero, 1996)，同伴互评不仅是语言、认知活动，也是社交情感层面的不同尝试。

3. 行动研究

本研究采用行动研究法，针对《大学英语》课程中写作技能训练中出现的高师生比、反馈质量受限的问题，采取以下研究方案：

①先导研究（pilot study）：学生在 iWrite 平台提交作文，课堂中进行同伴互评的培训，然后展开同伴互评；②收集互评评语、问卷，反思日志数据进行分析；③反思先导研究结果并查找总结问题；④改进培训模式并制定正式行动计划；⑤ 实施 10 周的行动计划；⑥线上问卷及半结构化访谈；⑦收集并分析评语文本数据、问卷数据、访谈数据及反思日志数据；⑧反思总结培训模式。

47 名深圳大学本科一年级学生参加了本次研究，过程跨度 10 周，共完成三篇议论文写作，具体行动方案见下表：

表 1 行动方案实施进度表

周次 内容	1 周	2 周	3 周	4 周	5 周	6 周	7 周	8 周	9 周	10 周
议论文写作 1	✓									
修改机评错误+互评		✓								
师评+收集前测数据			✓							
互评课上培训 1				✓						
互评课上培训 2				✓						
议论文写作 2					✓					
修改机评错误+互评						✓				
师评+互评课上培训 3							✓			
课下小组培训								✓		
议论文写作 3									✓	
修改机评错误+互评+收集后测数据										✓

4. 结论

本行动研究采用课上讲授加课下辅导相结合的培训模式，强调培训内容中对读者意识和社交情感的关注，聚焦写作中最具挑战性且智能测评系统不能完成的一致性、连贯性内容学习，探索提升互评能力的培训实践。47 名高校新生 A 级学生参加了本研究，在 10 周内提交 3 篇议论文写作并完成互评，经历了三轮写作周期：提交作文-修改机评意见-互评-修改作文-师评。三次课上讲授和一次课下辅导互评培训穿插其中，互评培训前后的评语文本、3 次反思日志、培训后的问卷，培训后的访谈共同构成数据来源，分析学生在培训前后的读者意识与社交情感是否发生变化，从而探索如何提升学生互评能力。

评语本身数据呈现不显著变化，但问卷、反思日志和访谈的数据从互评者主观的视角给出他们对互评实践本身的正面评价，以及自己在此过程中的能力提升，学生们认同互评培训的价值，逐渐反思自己不同角色的扮演和穿插，认知读者意识在评语中如何体现，如何让自己的评语满足被评者的修改作文的需求等。

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Virtual reality in language education: A systematic review of research in the past decade

ZHENG Chunping, LIU Hanyong, GAO Mengya
Beijing University of Posts and Telecomunications

Abstract: Virtual Reality (VR) has been noted as an emerging innovative technology for promoting learners' language acquisition and academic performance. This paper reviewed a total of 59 empirical studies published in six influential journals in the field of computer-assisted language learning: *Computers & Education, Computer-assisted Language Learning, Language Learning & Technology, ReCALL, System,* and *the CALICO Journal.* We reviewed articles on the application of VR to language education, from 2010 to 2020. A coding framework for systematic review was formulated and a number of findings were revealed based on the content analyses of the general research trend, research methodologies, research themes, and promises and challenges of applying VR into language education.

1. Introduction

Virtual Reality (VR) have been recognized as promising arenas for language education and their potential benefits for second language acquisitions (SLA) have been explored by a number of studies in the past decade. VR brings real-life objects into close proximity and encouraged active learning, it can really pique participants' interest during learning and motivate students to explore new ideas, and thus engage them in learning (Xie, Chen & Ryder, 2019). Since the early 2000s, VR-supported environments have been employed for designing language learning programs with its ability to simulate real worlds where users may explore and navigate at will and receive multimodal input via visual, textual, and acoustic media (Tseng, Liou, & Chu, 2020).

This study adopts the method of systemic review to comprehensively map the current status and picture the future trend of VR-supported environments for language learning. The research is mainly guided by the following four research questions (RQ):

RQ1. What is the general research trend (including yearly publications, target languages, authors' geographic distribution, research sites, research settings and types of VR) indicated by the publications?

RQ2. What are the main research methodologies (including research approaches, research designs, types of data sources and ways of data analysis) employed in the publications?

RQ3. What are the main research themes of the publications?

RQ4. What are the promises and challenges of VR for language learning revealed by the publications?

2. Methodology

2.1 Articles selection

We selected six representative journals in the field of technology-enhanced language education, including *Computers & Education (C&E), Computer Assisted Language Learning (CALL), Language Learning & Technology (LLT), the Journal of EUROCALL (ReCALL), the*

CALICO Journal (CALICO), and *System (the International Journal of Educational Technology and Applied Linguistics)*. After the six journals were identified, we manually screened the literature published by the above journals from 2010 to 2020 based on the titles, abstracts and key words issued by the official websites. The terms: virtual reality, virtual worlds, virtual environments, language learning, language teaching, etc. were employed for article filtering. Finally, 59 empirical studies were eventually included due to their relevance to our research purpose.

2.2 Data coding and data analyses

Nvivo 11.0 was used to code and analyze the articles. We employed this software for annotating the key words, phrases or sentences and making further categorizations. During the coding and categorizing, we referred to the analytical scheme proposed by Chai, Koh and Tsai (2013), the analytical framework summarized by Macaro, Handley and Walter (2012), and the categorization of research topics about VR by Lin, Lan and Kan (2015). Four main aspects as follow are analyzed: general research trend, research methodologies, research themes, and promises and challenges of VR in language education.

3. Results and Discussions

3.1 General publication trends

3.1.1 Number of empirical studies

A total of 59 empirical studies were selected in the six journals during 2010 to 2020. In the past eleven years, *Computers & Education (C&E)* and *Computer Assisted Language Learning (CALL)* published the largest number of related studies. The year of 2019 and 2020 witnessed the largest number of publications, which implying the boost of applying VR technologies into language learning in recent years.

Table 1. Numbers of empirical studies published by six journals

Journals	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
C & E	1	2	0	1	1	0	1	2	1	2	4	15
CALL	1	2	2	2	0	0	1	0	1	5	3	17
LLT	0	1	0	0	1	3	2	0	0	1	0	8
ReCALL	1	0	2	2	0	0	0	2	4	1	2	14
System	0	0	0	0	1	0	0	0	0	0	2	3
CALICO	0	0	0	0	0	1	1	0	0	0	0	2
Total	3	5	4	5	3	4	5	4	6	9	11	59

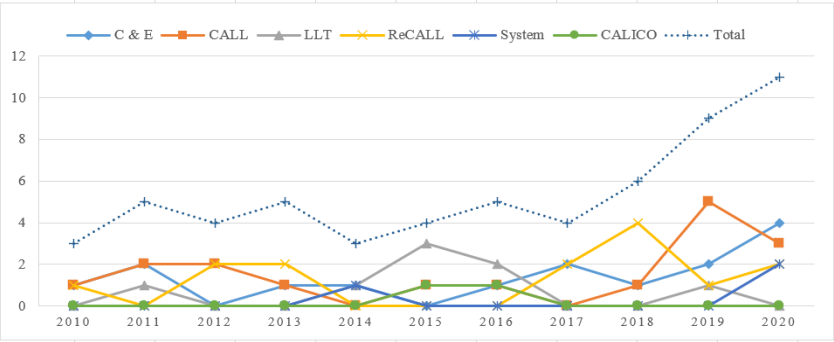

Figure 1. Trend of empirical studies published by six journals

3.1.2 Regions of the first author, research sites, research settings, and target languages

Figure 2, 3, 4 and 5 present the regions of the first author, research sites, research settings. Researchers from Taiwan China, the US, and Australia are the most active in exploring the application of VR in language learning. Most of the studies were conducted in high education settings, indicating the relatively popular use of the VR among adult language learners. English is the dominant target language studied in the reviewed articles, and how to learn English effectively with VR technologies will remain as the central topic in this research field.

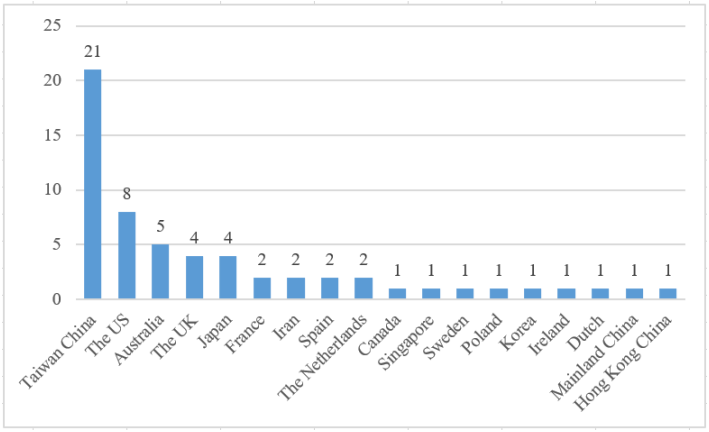

Figure 2. The regions of the first author

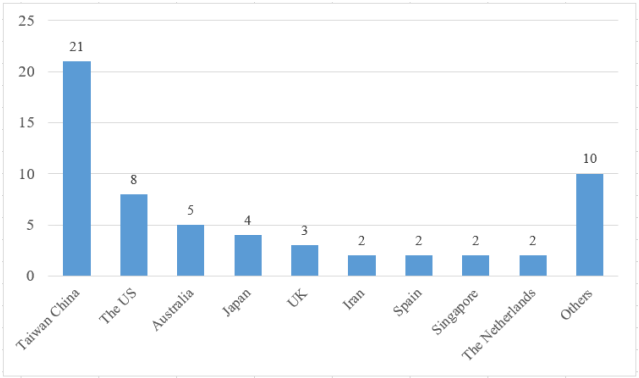

Figure 3. The research sites of the empirical studies

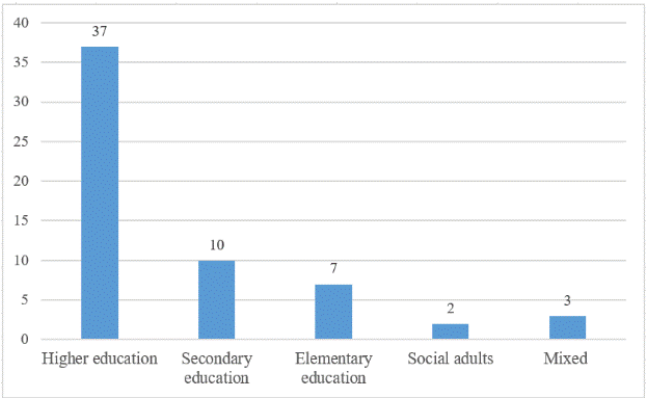

Figure 4. The research settings of the empirical studies

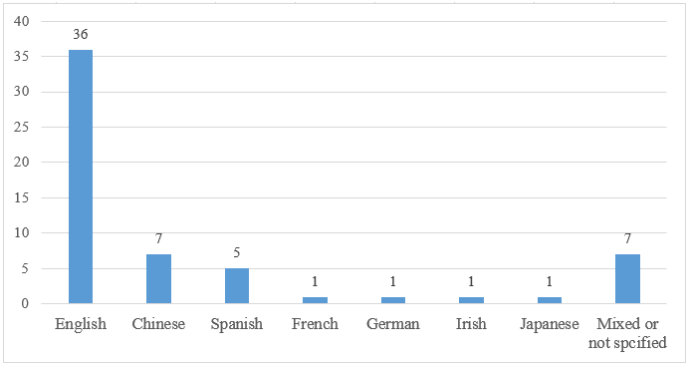

Figure 5. The target language of the empirical studies

3.1.6 Types of VR employed

Among the articles we reviewed, 56 studies specified the 3D immersive and simulated technologies employed. Second Life and augment reality (AR) are mostly used to support learners' language learning in 3D virtual world. Moreover, the emergence of several self-designed VR environments adds to the diversity of users' experiences in VR environments.

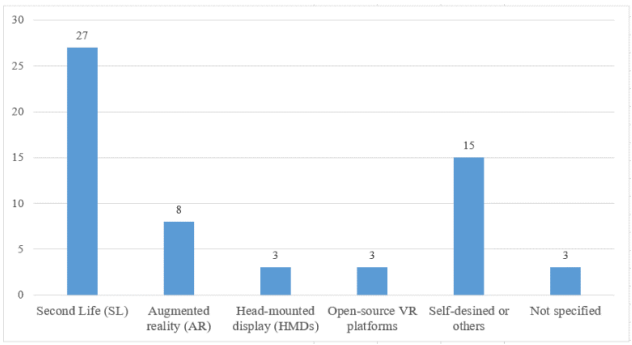

Figure 6. Types of VR employed in VR learning environments

3.2 Research design

3.2.1 Research approaches

Based on Creswell's (2009) framework, we identified three research approaches and six main types of research designs in this review, including qualitative, quantitative, and mix-methods approach for data collection and data analysis. The possible reason for a wide use of mixed-method is due to the complex nature of learner interactions in the VR learning environments.

Table 3. Research approaches and research designs of the reviewed studies

Research Approaches	Research Designs	Number of Studies
Qualitative research	Case studies	10
	Grounded theory	1
Quantitative research	Corpus analysis	3
	Experimental research	12
Mixed research	Action research	3
	Other mixed methods	30

3.2.2 Ways of data collection

As indicated in Figure 7, the reviewed studies employed a variety of data sources. Although data collection took a variety of forms, the most frequently used way for data collection is through

surveys or questionnaires, interviews, testing, corpus, and observation for collecting data when learners are engaged in VR environments. 21 studies used comparative groups in their research design, setting experimental groups and control groups to determine the factors influencing learning outcomes.

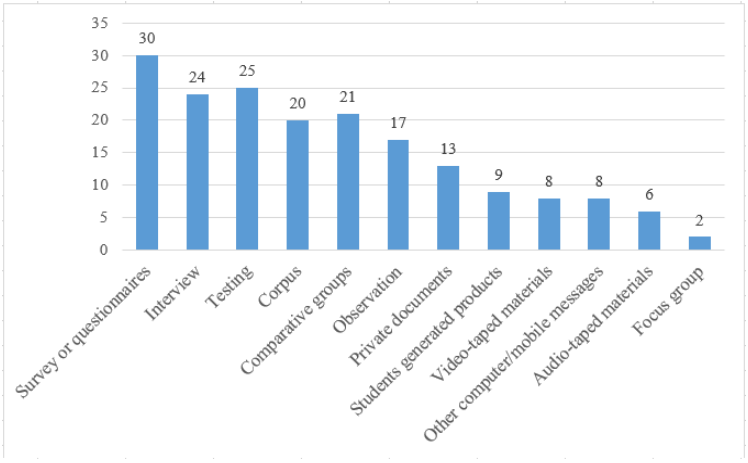

Figure 7. Frequency of different data collection approaches

3.2.3 Data analysis

Reviewed studies also employed varying quantitative and qualitative ways of data analysis. Qualitative data analysis includes the corpus analysis, qualitative summaries, thematic analysis and others. Concerning the quantitative data analysis, descriptive quantitative analysis is mostly used, such as the frequency, means, deviations or comparisons of means based on survey responses. T-tests, ANOVA/ANCOVA were also frequently used for enhancing the validity and reliability of the research.

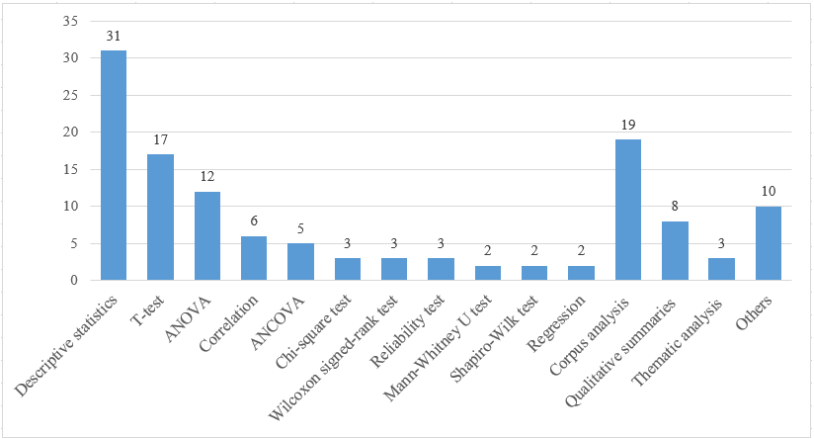

Figure 8. Frequency of data analysis approaches

3.3 Research themes

Our analysis extracted three research themes related to the investigations of VR in the field of language education, including affordance of VR for improving linguistic knowledge and skills, non-linguistic knowledge and skills, and language learner characteristics in VR environments.

Table 4 Research themes of the empirical studies

Category	Sub-categories	Number of Studies
1. Affordances of VR environments for linguistic knowledge and skills (38 studies)	Listening	1
	Speaking	9
	Writing	5
	Vocabulary retention	6
	Overall language proficiency	17
2. Affordances of VR environments for non-linguistic knowledge and skills (22 studies)	Critical Thinking	2
	Cognitive attainments	3
	Content knowledge	2
	Communicative Skills	12
	Collaborative learning skills	5
3. Language learner characteristics in VR environments (52 studies)	Learner Perceptions/attitudes	16
	Learner Motivation	12
	Learner Autonomy	2
	Learner Engagement	5
	Learner Anxiety	7
	Self-efficacy	5
	Learning Styles	1
	Self-regulation	1
	Boredom	1
	Flow State	2

3.3.1 Affordance for linguistic knowledge and skills

Among the reviewed articles, we found 38 studies focusing on the affordance of VR for improving language learners' linguistic knowledge and skills, with most of them explored the potential benefits of the VR environments for enhancing language learners' overall language proficiency. Others dealt with specific linguistic skills such as speaking, vocabulary retention, writing, and listening.

Table 5. Affordances of VR for linguistic skills

Linguistic affordances	Number	Examples
Overall proficiency	17	Lan (2014); Shih (2015); Dalton & Devitt (2016); Hsu (2017); Xie, Chen, & Ryder (2019); Ebadi & Ebadijalal (2020)
Speaking	9	Marton & Jack (2010); Lan et al. (2016); van Ginkel et al. (2019); Chien, Hwang, & Jong (2020); Chen (2020)
Vocabulary retention	6	Franciosi et al. (2016); Wu (2019); Tai, Chen & Todd, 2020; Alfadil (2020); Tseng, Liou, & Chu (2020)
Writing	5	Collentine (2011); Wang (2017); Lee & Park (2019); Chen, Smith, York, & Mayall (2019); Lan, Lyu,, & Chin (2019)
Listening	1	Levak & Son (2017)

3.3.2 Affordance for non-linguistic knowledge and skills

22 studies were identified as to explore the affordance for non-linguistic knowledge and skills. A variety of aspects concerning their non-linguistic knowledge and skills were discussed, among which, a majority of studies centered on fostering language learners' communicative skills/ strategies, focusing on social cultural interactions in VR environments.

Table 6. Affordances of VR for non-linguistic skills

Non-linguistic affordances	Number	Examples
Communicative skills/strategies	12	Peterson (2010); Shih (2014); Mroz (2015); Tang et al. (2016); Lee & Park (2019); Chen (2020)
Cognitive attainments	3	Chen & Tsai (2014); Hsu (2017); Park (2018)
Collaborative learning	3	Ho et al. (2011); Kozlova & Priven (2015); Doumanis, Economou, Sim, & Porter (2019)
Critical thinking	2	Mroz (2015); Chien, Hwang, & Jong (2020)
Content knowledge	2	Xie, Chen, & Ryder (2019); Ebadi & Ebadijalal (2020)

3.3.3 Language learners' psychological characteristics

Many researchers explored how VR tools improve language learners' learning outcomes by influencing their psychological characteristics. Among these studies, the highly investigated topics are language learners' perceptions/attitudes towards their learning experience, motivation, anxiety, engagement, and self-efficacy of language learners in VR environments.

Table 7. Language learners' psychological characteristics

Psychological characteristics	Number	Examples
Learner Perceptions/attitudes	16	Chien, 2020; Tai, 2020; Wu, 2019
Learner Motivation	12	Julian ChengChiang Chen, 2020
Learner Engagement	5	Yan Chen, 2019; Yu-Li Chen, 2020
Learner Anxiety	7	Hsu, 2017; Melchor-Couto, 2018
Self-efficacy	5	Melchor-Couto, 2018
Learning Styles	1	Hsu, 2017
Self-regulation	1	Chen & Hsu, 2020
Boredom	1	Kruk, 2019
Flow State	2	Yu-Li Chen, 2020
Learner Autonomy	2	Collentine, 2011; Tseng, Liou, & Chu, 2020

3.4 Promises and challenges of learning in VR environments

The first advantage of VR environments is that it immerses language learners in exotic and intriguing surroundings where learners can create their own virtual characters (Peterson, 2010), improve their enjoyment in participation (e.g., Lan, 2014), and enhance their motivation to learn the target language (e.g., Morton & Jack, 2010). Secondly, avatars enable language learners to be anonymous. Due to the anonymity provided by the use of avatars in Second Life, learners were empowered and will not experience embarrassment, which thus can maximize learners' engagement, build their confidence, boost motivation, avoiding social anxiety, and empower learners via avatar anonymity (Chen, 2020; Melchor-Couto, 2017; Peterson, 2016). The third advantage involves the synchronously interactive CMC environments. Instead of employing singular mode of communication, learners in VR environments are equipped with multimodal modes of communication, integrating audio, visual, and textual modes for both synchronous and asynchronous interactions (Chen, 2016).

As for challenges, the internet connections for the effective use of VR for language learning, including the unstable connection caused by limited bandwidth (e.g., Chen, 2016; Levak & Son, 2017) and the obstacles due to the firewall (e.g., Peterson, 2010), is the first challenge. Secondly, due to the operational complexity of VR environments (e.g., Kozlova & Priven, 2015;), it requires

both teachers and learners to have a relatively high level of technological savvy. Making the VR easy to use, and more recently, with the technology of artificial intelligence, making these environments more intelligent to navigate would become two important issues (e.g., Chen, 2016; Morton & Jack, 2010).

4. Conclusion

The current study conducted a systemic review of the educational applications of virtual reality environments for language learning. VR hold series of promises for language education and also encountered a variety of difficulties. We are still at the dawn of applying the VR to language education in the digital age. Both technological and pedagogical innovations were called for to further maximize the potential of VR for altering the status quo of language education.

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Technology and Well-being in Education

教育技术与立德树人

Discussion on the relationship between people and things in Intelligent Education

SHAO Tiejun
Capital Normal University

Abstract: Intelligent Education (IE) uses AI technology as a means in the education ecology to promote the automation and intelligence of education and teaching. It reshapes the education ecology, adds intelligent things to the traditional education ecology that dominated by human teachers and students. We discuss the goal and connotation of Intelligent Education, discussed the relationship between students and intelligent things in IE from the perspective of people and things, and put forward people-oriented and personalized development of students as the core goal; at the same time the emotional, ethical and technical issues in IE are also been discussed, and make countermeasures from the perspective of IE and supervision and management, and finally propose a dual-teacher collaborative IE and a general framework for IE.
Keywords: Artificial Intelligence; Intelligent Education; ITS

1. Introduction

On the China Artificial Intelligence Conference in 2019, it was mentioned that the greatest value of artificial intelligence lies in empowerment. By combining with various application scenarios and related industries, artificial intelligence will bring changes in the industrial field. Among many fields, education will be one of the first areas where artificial intelligence technology is applied. The empowerment of artificial intelligence technology can solve some inherent problems in the education field to a large extent, and greatly promote the reform and innovation of education. Achieve fair, high-quality teaching and lifelong learning opportunities for all.

2. Intelligent education and Examples of applications

Intelligent Education (Intelligent Education, IE) refers to the integration of artificial intelligence technology into the education ecology, using artificial intelligence technology as a means and tool to promote the automation and intelligence of the education and teaching process, to improve the efficiency of education and teaching, and to enhance the effect of education and teaching. The main application forms of intelligent education are Intelligent Assessment System, Intelligent Tutoring System, Virtual Simulation Experiment System, Interactive Educational Robots, etc. Several specific application forms are listed as below.

2.1 Intelligent composition correction

The intelligent composition correction system combines artificial intelligence, language intelligence, big data, deep learning and other technologies, as well as algorithms such as keyword extraction and topic aggregation calculations to realize automatic correction of compositions. The automatic correction of composition to teachers saves a lot of correction workload. At the same

time, the intelligent correction system can also collect statistics on students' grades. Teachers can obtain students' learning trajectory through the submission of students' composition information to facilitate personalized guidance to students. Intelligent correction can realize the real-time submission of students' composition and real-time modification opinions. Students can practice and improve on the modification opinions in time.

2.2 Intelligent oral teaching system

The intelligent oral language teaching system is supported by artificial intelligence technology and comprehensively utilizes speech generation, speech recognition, speech analysis, deep neural networks, etc., to change the singularity and one-sidedness of teaching resources, teaching evaluation in traditional spoken language teaching. The intelligent spoken language teaching system can analyze and locate each phoneme in the students' spoken language, and compare it with its built-in standard speech library or teacher's voice. It can teach and evaluate from four aspects of speech, intonation, fluency and stress, so that students can Use fragmented time to learn and practice oral English.

2.3 Intelligent test system

A large amount of test data is left unused in the traditional test. The intelligent test system based on artificial intelligence can mine the weak knowledge points of the students through the test data, so as to accurately locate the weak points of the students. Teachers can adjust the focus of teaching according to the results of data mining through the intelligent test system; students can optimize their own learning path through the weak point feedback of the intelligent test system, and improve the learning efficiency and the degree of knowledge mastery.

3. The relationship between people and things in Intelligent Education

In intelligent education, artificial intelligence technology appears in the form of hardware or software, such as simulated teaching robots, intelligent correction systems, and intelligent teaching management systems. These are all man-made products, and these man-made objects form a relationship between man and man-made objects with students in the teaching process. Man-made objects refer to all objects made by humans, such as buildings, roads, computer chips, and computer software. The evolution of man-made objects in human history has gone through three stages: handmade natural objects, machine-made objects, and intelligent objects. AI technology-related products belong to the intelligent objects manufactured by humans. Intelligent things have a certain degree of imitation in their functions, which is specifically manifested in their ability to imitate, replace and optimize part of human physical, intellectual and organ functions.

In the process of human use of man-made objects, the question of "who is the first" inevitably arises, that is, the problem of the relationship between man and man-made objects. This problem can be divided into humanism and materialism. Humanism advocates the first nature of human beings, the second nature of man-made things, and that man is the foundation of things, that is, people are the root; Materialism advocates the first nature of things, the second nature of

humans, and that things are the foundation of human beings, that is, things are the foundation. Different relationships between people and things correspond to different values, which is more valuable. Humanism believes that the value of man-made objects is bestowed by man and is the embodiment of man's value. The value of a thing lies in the degree to which it satisfies human needs, that is, the degree of "humanization" of objects; the value of man-made objects is the value given by things depends on what and how many things he owns, that is, the degree of "materialization" of human beings.

In the actual teaching scene, the manifestation of intelligent education can be a virtual system or a physical robot, regardless of its specific form; it is the product of human intelligence, that is, an intelligent thing. Participants in intelligent education mainly include teachers, students, and intelligent things. Teachers and students are teacher-student relationships. There are also human-things relationships with teacher-student relationships, that is, teacher-intelligent thing relationships and student-intelligent thing relationships.

3.1 The relationship between teachers and intelligent things

Teachers are an important part of smart education. The relationship between teachers and smart things in smart education is mainly reflected in two processes: the teaching process and the teaching management process. In the teaching process, smart objects provide teachers with teaching aids, and in the process of teaching management, smart objects provide teachers with management assistance. In teaching, intelligent things use AI technology to prepare richer and more vivid teaching demonstrations for teachers, making teaching content easier to understand and absorb by students. In teaching management, intelligent objects use technologies such as databases to realize the intelligent management of teaching data and educational materials, and collect and analyze data such as students' academic performance and learning status. No matter in the process of teaching or teaching management, intelligent things provide teachers with auxiliary work, and their roles are similar to teaching assistants and teaching administrators. But unlike human teaching assistants and teaching administrators, intelligent things do not have the initiative on the conscious level in their interaction with teachers. The interaction of human teachers in the process of teaching and management is active. Active collaboration from inner consciousness. Although intelligent objects have achieved part of the writing with human teachers, they have no initiative in writing fundamentally. Therefore, in the teaching and management process, the relationship between human teachers and intelligent machines is a kind of like collaborative relationship.

3.2 The relationship between students and intelligent things

The core goal of intelligent education is to achieve the individualized development of students, that is, to focus on students. Therefore, in intelligent education, we should adhere to the humanistic philosophy to analyze the relationship between students and intelligent things, and we should not shake the main position of people in the development and application of intelligent education. The stance of doctrine must be people-oriented and student development-oriented. In intelligent education, intelligent objects realize part of the extension and extension of teachers'

functions, that is, breaking the constraints of space and time to extend teachers' teaching, explanation, and correction functions. Students can receive education anytime and anywhere outside of school and classroom. Intelligent machines realize the process of teaching, students realize the process of learning, and intelligent objects form a teacher-student relationship between teaching and learning.

The traditional teacher-student relationship includes educational relationship, psychological relationship and ethical relationship. The education relationship in the teacher-student relationship is the most basic and core. It is produced by teachers and students based on the completion of teaching tasks. Teachers are the organizers and providers of teaching content, and students are participants and learners. This educational relationship is objective. Exist in the teaching process. Psychological relationship is the psychological and emotional communication that occurs when teachers and students complete teaching tasks together, which connects teachers and students in a certain emotional atmosphere and relationship. The teaching effect and the psychological relationship between teachers and students promote each other, and a good teaching effect will promote the formation of harmonious and harmonious psychological emotions between teachers and students. A healthy emotional relationship between teachers and students is the psychological background for the smooth development of teaching activities. The psychological relationship between teachers and students can even have a great impact on the formation of students' world outlook and values. The ethical relationship, the traditional teacher-student relationship is the relationship between teachers and students, the relationship between people, a special social relationship, and a unique ethical relationship. In the traditional education model, most of the moral thoughts and ethical norms of students are obtained from teachers, and teachers assume the responsibility of preaching, teaching, and solving puzzles.

The current artificial intelligence technology is still far away from the intelligent simulation of human emotions and psychology. In intelligent education, intelligent objects cannot actively communicate and interact with each other as human teachers do, and cannot realize timely and timely changes in the subtle emotional changes of students. Effective communications and resolutions. Intelligent education is more of a simulation of knowledge education. Therefore, the basic educational relationship formed between intelligent machines and students is not a complete teacher-student relationship. Therefore, intelligent objects and students are a kind of like teacher-student relationship in intelligent education. .

4. Conclusions and prospects

The development of technology has changed the way of human life, and the integration of artificial intelligence technology is reshaping the form of education. Intelligent education has enriched the traditional education ecology, but it has not changed the dominant position of teachers and students in education. The main relationship in education is the teacher-student relationship. In the future development of intelligent education, people will still be the main body of education. As new technologies and new means, intelligent things will form an education

ecology that coexists with human teachers and students. In the new education ecology, people-oriented, inheriting culture and creating knowledge should be adhered to. The educational nature of cultivating talents.

The application and development of intelligent education are inseparable from the support of intelligent technology. The future of intelligent education and the development of intelligent technology are inseparable, and the technologies that are closely related to it are mainly:

(1) Human-computer interaction: The more efficient, smooth and natural communication between students and intelligent things in intelligent education depends on the improvement of human-computer interaction technology. Human communication is based on natural language and revolves around semantics, while machine communication is data-based and loyal to data. Human-computer interaction technology should build semantic-based interaction, focusing on digital processing of semantics carried by text symbols and voice signals.

(2) Emotional perception and calculation: People are different from intelligent things. People have emotions, they understand emotions, they need emotions, and people can respond to emotions. It is difficult for people to fully mechanize knowledge exchange without emotions. Through emotional perception and computing technology, human-computer interaction in intelligent education can be handled humanely, a good learning atmosphere can be built, and teaching efficiency can be improved.

(3) Big data technology: Big data technology can help characterize students' individual learning plans, but it will also bring about the security of students' personal information. At the same time, personalized push based on big data can easily lead to the emergence of blind spots in learning information. These problems need to be comprehensively considered while applying technology.

In intelligent education, intelligent things can replace part of the teacher’s functions, but they cannot replace the existence of teachers. Intelligent things can be called AI Teachers, and teachers can be called Human Teachers. Intelligent education requires collaboration and complementarity between two teachers. This kind of collaboration is embodied in the two links of teaching and management. Human teachers can make full use of the advantages of emotional cognition, moral feelings, and humanistic literacy to provide creative guidance and emotional care to students in teaching; they can take the initiative to supplement the functions of artificial intelligence teachers in teaching management.

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Using Artificial Intelligence in Education

人工智能在教育领域的应用

语言智能驱动的模型思维与大数据挖掘

陈丽霞

上海立信会计金融学院

1. 引言

语言是思维的工具，是人类最高层次的抽象表达。如何引领学生利用大数据洞悉事物的本质，如何破除跨界学习“畏难”心理，高效地“走进”语言智能与大数据的世界？模型是对现实世界的数学描述，掌握模型思维是实现语言智能的利器。在数字化世界，模型思维是数据驱动的，是把数据转换为知识的框架设计。本文所描述的内容涉及语言智能教学中真实应用场景，重视理论与实践相结合，旨在阐释在新文科战略下跨专业、跨学科门类的深度融合和学科之间的内在联系与互补性。

2. 模型思维与大数据

模型是客观事物的简化表征。历史上，每一个伟大模型的提出都极大地推动了科学和社会的进步。时光进入智能和数字经济时代，在强大的计算能力和科学统计模型的双重辅助下，蕴藏在海量真实文本中语言运作规律和意义就有可能被挖掘出来，并产生巨大的经济价值。基于大数据提取出来的语言规律更符合实际需求，将语义分析中隐喻、指称、情感计算等研究作为突破口，语言智能的研究范式以应用驱动和深度学习为主，大数据挖掘集中在话题分析、观点摘要、立场检测、情感分类、意愿预测、声誉度 /影响力/可行度研究等具体任务和细分场景中。

在智能环境下，语言学与计算科学的交叉融合有了更便捷的技术条件和学科优势。挖掘、整合、利用海量的语言数据资源，并将这些宝贵的战略资源应用到现实学习和工作中，可以满足学生对大数据和数字知识的急迫需求、提升教师教研能力和大数据意识，为人才培养提供建议和解决方案。

3. 智能时代的课程设计与研究思路

以往的教学实践表明，不采用纯数学公式来描述和解释模型，才能避免文科背景的学生被复杂的数学公式吓倒，难度适中的教材和案例教学可以帮助学生学会使用现有的工具，模拟并满足各种场景的业务需求。

本研究旨在摸清语言智能领域的理论，并将人工智能相关理论运用于教研实践，让学生深切体验到大数据的强大力量和应用价值，引导学生积极行动起来，抓住人工智能国家战略的历史机遇，在未来直面挑战，有能力赢得高级别、高水平、高层次竞争。

4. 结语

在新文科背景下，我们尝试将本科生按照“准研究生”的要求和标准培养，整合认知语言学、数理金融学、数字科学等学科的力量，将模型思维前沿研究成果引入本课题研究。本课题建设符合学科融合和交叉的发展趋势，紧密结合当今科技发展和人才需求，为学生数字化信息素养，经济分析、决策和实践能力发展路径提供全新视角。

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基于知识图谱的“数据结构”课程学习平台

徐雅静 李思 胡佳妮

北京邮电大学

摘要：针对《数据结构》课程知识在学习中存在碎片化、不连贯的问题，深入分析该课程的相关概念分类和知识脉络的层次关系，构建基于实体关系图的直观描述知识以及知识之间关系的知识图谱。在此基础上设计了一套基于自然语言语义检索的课程学习平台，更好的帮助学生在复杂知识关系中避免“知识迷航”的困扰。

关键词：数据结构；知识图谱；词向量；语义检索；余弦相似度

随着计算机和人工智能技术的不断发展，“数据结构”课程的知识也在逐渐扩展和更新。大量交叉冗余的各种知识概念，使得学习中存在的碎片化、不连贯的问题日益突出，导致“知识迷航”。如何更好的帮助学生快速了解知识全貌、明确学习重点、掌握知识点之间复杂的关系，提高学习效率，是教学改革亟待解决的问题。

目前教学中常用的知识大纲、知识地图等方式，可以有效梳理课程的主要知识脉络，但却很难表达更加细粒度的知识点之间的多重关联以及跨课程跨领域的交叉知识。因此，本文借鉴 Google 提出的知识图谱(knowledge graph)技术[1]，重新建模知识结构，提出基于知识图谱的语义检索方法，以提升课程知识的可视化表达和利用效果，具体平台构架如图 1 所示。

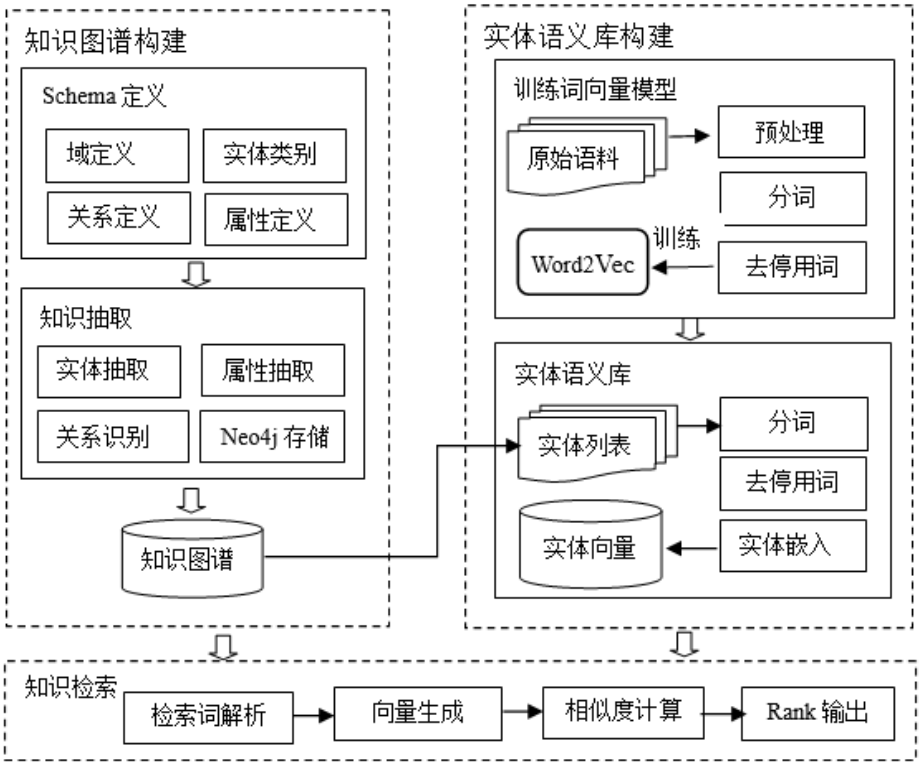

图 1 基于知识图谱的“数据结构”课程平台构架

如图 1 所示，课程平台由三个部分组成：1）梳理课程知识，构建知识图谱；2）构建实体语义库，用于语义检索；3）检索词解析。通过语义相似度计算在知识图谱中检索相应的知识，并可视化输出排序结果。

1. 知识图谱构

2012 年 5 月 Google 提出“知识图谱”概念，即通过知识图谱的“实体、属性和关系”阐述客观世界的概念、知识及其相互关联性，形成知识关系网络，提供了从“关系”的角度去解决问题的能力[2]。通过知识图谱技术将“数据结构”中复杂交叉、多源异构且与日俱增的知识体系整合起来，并给予可视化展示，是一种合理有效的复杂知识表达方式。

1.1 Schema 定义

知识图谱首先需要定义模式（Schema），Schema 相当于一个领域内的数据模型，包含了这个领域内有意义的概念类型以及这些类型的属性。一个域的 schema 主要由类型(type)和属性(property)来表达。本文以《数据结构与算法》[6]教材文本为原始语料，归纳整理了如图 2 所示的知识模式：共七个大类知识，每一类知识，比如树，则包含基本概念、逻辑结构、存储结构等 11 个子类，各个子类之间的相互交叉关联。

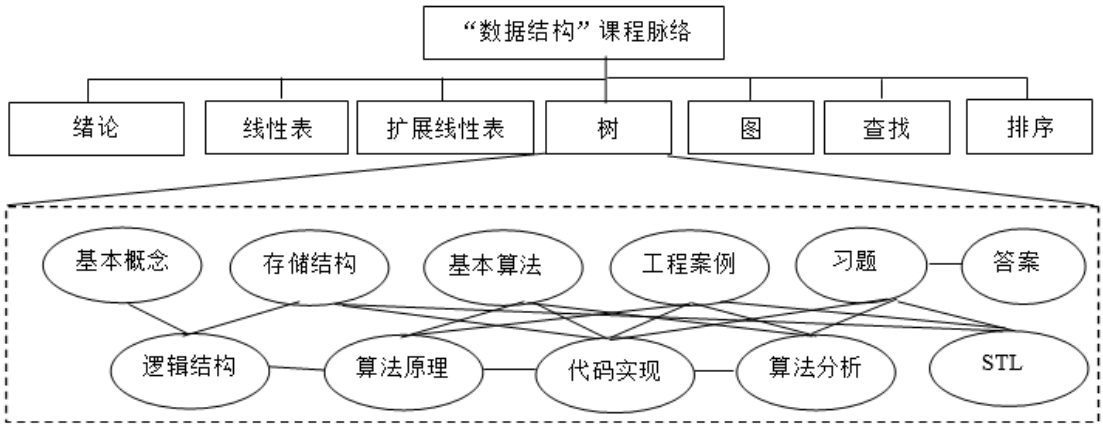

图 2 “数据结构”知识结构示意图

知识图谱通过实体节点表示具体知识内容，由于知识具有差异性和多样性，不同实体具有不同的语义类别，例如定义或描述、知识类型、计算方法等。因此，通过提取语义类别之间的共同特征并将其作为实体属性，进而对数据进行规范化，将有利于后续实现基于知识图谱的智能检索，其中，“数据结构”的实体属性如表 1 所示。

表 1：实体属性

	属性名称	类型	描述
1	ID	integer	实体唯一标识
2	Type	integer	实体类别，数值范围[0~7]*
3	Subtype	integer	实体子类别，数值范围[0~10]*
4	Caption	text	实体名称
5	Detail	text	定义或详细描述
6	Rank	integer	实体重要程度，数值范围[1~3] *

注：Type 值：0 外部知识 1-7 为大类知识；Subtype 值：0 其他 1-11 为 11 子类知识；Rank 值：1 重要 2 一般重要 3 一般，用来控制可视化显示。

1.2 知识抽取

Schema 定义完毕，则需要对原始文本语料进行知识抽取，包括实体抽取、属性抽取、关系识别，这也是构建知识图谱的核心技术步骤。课程知识图谱中，实体来自于课程的抽象

概念和术语，属性来自与实体相关的定义、算法描述、实现代码等，实体间的关系更多的来自于概念、算法之间抽象联系。

实体：与一般的知识图谱实体不同，课程知识图谱为了更好的保证学生学习知识的连贯性和完整性，最小的实体粒度需要覆盖一个完整定义或段落。一般可使用各个章节、小节、分段标题，重要但没有分段标题的段落由人工总结标题作为实体。

属性：由于实体属性的抽取范围一般在实体对应的标题范围内，可以采用自然语言处理领域内通用的文本标注工具来进行各个属性的抽取和赋值。

知识图谱最重要的特性之一就是具有丰富的关系，特别适合课程各个知识点之间交叉关联和多维度多角度的表示，本文定义了以下 7 种通用关系类别：

包含关系：表示概念实体和对应的并列子项，算法和相关原理、实现及性能之间的关系。如图 3 示例，形成完整三元组<E1,R,E2>(E1、E2 是实体，R 是关系)。

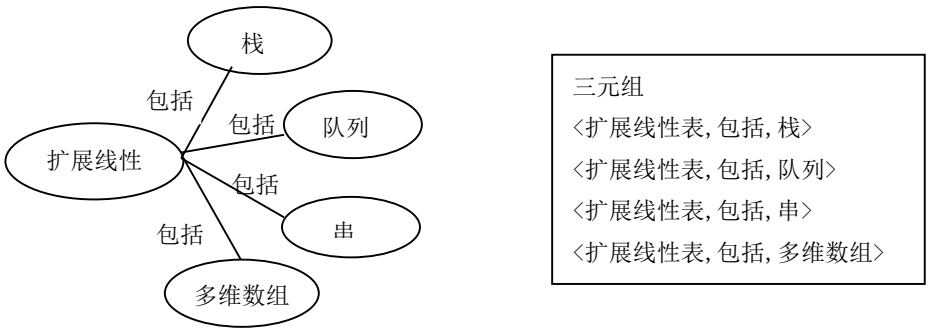

图 3 包含关系三元组举例

扩展关系：一般指算法的扩展应用等，例如：“归并算法”和“外部排序”，“Dijkstra 算法”和“地铁换乘线路”，“Huffman 编码”和“通信系统压缩编码”，如图 4 示例，每一对之间就是扩展关系。

优化关系：一般指基础算法和改进算法之间的关系，例如：“直接插入排序”和“希尔排序”，“简单选择排序”和“堆排序”，“二叉排序树”和“平衡二叉树”每一对实体之间就是优化关系。

对应关系：一般指概念、算法和习题、概念和 STL 之间一一对应的关系，例如：“双链表”和“list”，“类”和“数据结构”之间的关系。

顺承关系：主要指具有流程关系的实体，以算法实体“Huffman 编码”为例，其包含的多个子项之间，即“Huffman 树”“建编码表”“编码”、“解码”构成了 Huffman 编码的完整过程，因此各子项之间的关系是顺承关系，如图 4 所示。

实例关系：一般指经典概念或算法对应的实例，例如：“分治法”和“汉诺塔游戏”，“图论”和“着色问题”， “二叉树”和“Huffman 编码”之间的关系。

示意图关系：针对一些算法原理和概念，除了文字，也可以用图片来进行说明，这些图也作为知识图谱的一部分加入进来。

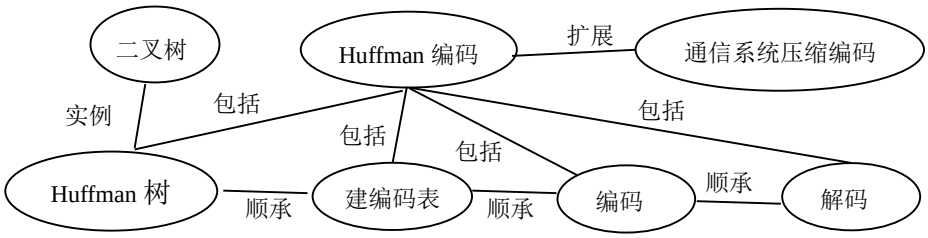

图 4 多种实体关系示例

根据上述实体、属性和关系定义，可以使用工具或人工从原始文本中构建得到知识图谱的基本单元——实体关系三元组,存储在 Neo4j 图形数据库中[3]，构成完整的“数据结构”课程知识图谱。

2. 语义库构建

从语义出发，词是构成语义的最小单位[4]41。人类可以使用形式上完全不同的词语表达相同或相似的语义，这对于信息检索领域是一个巨大的挑战。因此，将词语由符号转化为数值向量的技术从1960年随着信息检索的广泛应用发展起来，称为词嵌入（word embedding），即将词语映射为多维实数向量形式，利用向量之间的空间关系表达语义，提升信息检索的泛化性能。因此，语义库构建就是对词汇生成对应的向量集合的过程。

本文中语义库构建分成两个部分：一是训练词向量模型，使用更多“数据结构”领域的语料作为训练集训练 Word2Vec 模型；二是实体语义库，使用训练好 Word2Vec 模型生成知识图谱中的每一个实体名称对应的向量表示。

2.1 训练词向量模型

词向量模型的训练步骤如图 1 右上所示，需要对原始语料进行预处理、分词、去停用词和无监督训练 Word2Vec。

1）预处理：需要尽可能覆盖“数据结构”领域的全部词汇，因此除教材外，使用爬虫技术从互联网爬取了充足的相关文本，作为语料库，并以句字为单位进行去重、过滤特殊符号，存储得到以句子为单位的语料集合$S = \{s_1, s_2, s_3, \dots, s_n\}$,其中$s_i$为一个完整的句子。

2）分词：与英文不同，中文词语之间没有明显的分割，因此需要分词技术来进行词汇的划分，论文中使用 Python 提供的 jieba 分词工具进行分词。

3）去停用词：构建停用词表，比如”啊、吧、的、了、在…”等，在分词结果中通过字符精确匹配进行过滤，得到每一个原始句子对应的一行处理结果$s_i' = \{w_1, w_2, w_3, \dots, w_m\}$,其中$w_j$是一个词。构成分词语料库 $S' = \{s_1', s_2', s_3', \dots, s_n'\}$作为 Word2Vec 的输入。

4）训练 Word2Vec 模型

Word2Vec[5]是目前最常用的分布式词向量模型，其核心思想是利用神经网络对词的上下文进行建模、训练得到词的向量化表示。我们采用开源的第三方 Python 工具包 Gensim 提供的 Word2Vec 接口，使用分词语料库S'进行模型训练，训练代码如下：

model = Word2Vec(S', size=100, window=5, min_count=5, workers=4)

其中， size=100 表示生成的词向量维度是 100 维，通常设置为 100，200，300 较为常见。模型无监督地学习s_i'中每一个词w_j的隐层词向量表达v_j，训练完毕，保存 Word2Vec 模型，供后续使用。

2.2 实体语义库构建

实体语义库的构建算法如图 1 右上所示，由于实体名称可以是一个词或多个词组成的复杂短语，因此实体语义库的构建在对实体进行分词和去停用词处理后，需要使用训练好的 Word2Vec 模型，经过累加计算，得到复杂短语对应的向量，称为实体嵌入。

具体来说，已知知识图谱中所有实体名称集合$E = \{e_1, e_2, e_3, \dots, e_k\}$

1）对知识图谱中每一个实体名称e_i进行 jieba 分词，去停用词。该步骤与 2.1 小节操作相同，得到每一个实体e_i的分词结果$e_i' = \{w_1, w_2, w_3, \dots, w_k\}$;

2）实体嵌入：

首先，对实体e_i'中的每一个词w_j，逐词输入到已训练的 Word2Vec 模型中，得到对应的词向量v_j，组成e_i'的向量对集合$V_{e_i} = \{< w_1, v_1 >, < w_2, v_2 >, \dots, < w_k, v_k >\}$。

其次，对V_{e_i}中的每一个词对应的向量v_j进行累加，即$v_i' = \sum_{j=1}^{k} v_j$，得到每一个实体$e_i$对应的$< e_i, v_i' >$向量对,所有实体的向量对构成最终的实体语义库$V_e = \{< e_i, v_i' >\}$。

3. 基于语义的知识检索

知识图谱和实体语义库构建是整个课程检索平台的数据基础，借助已训练的 Word2Vec 模型来支撑线上的检索词解析和语义匹配，进而实现知识检索，步骤如图 1 下部所示。

3.1 检索词解析和相似度计算

这里采用和 Google、百度等常用搜索引擎类似的检索方式，即用户输入要检索的关键词q，该关键词可以是一个词或复杂的短语。检索词解析的目标就是生成检索词对应的语义向量v_q，通过 2.2 小节的生成步骤生成v_q即可。

之后，在知识图谱的实体语义库V_e中检索v_q，找到和v_q距离最近的实体节点。通常针对短文本的语义相似度计算采用余弦距离[4]127-135，即计算v_q和每一个实体e_i的词向量v_i'的余弦相似度，如公式 1。不妨设$v_q = \{x_1, x_2, \dots, x_k\}$，$v_i' = \{y_1, y_2, \dots, y_k\}$，k 是词向量的维度，则相似度计算公式如下：

$$Sim(q, e_i) = \cos\theta = \frac{v_q . v_i'}{\|v_q\| \|v_i'\|} = \frac{\sum_{j=1}^{k}(x_j * y_j)}{\sqrt{\sum_{j=1}^{k}(x_j)^2} * \sqrt{\sum_{j=1}^{k}(y_j)^2}} \quad (1)$$

$Sim(q, e_i)$即为输入检索词与实体的余弦相似度，范围在[-1,1]之间，值越趋近于 1，表示q和e_i的语义越相近；越趋近于-1，语义越相反；接近于 0，表示语义越不相似。

根据相似度结果，采用堆排序建立长度为 N 的小根堆进行 TopN 排序[6]249-253，即在内存中维护一个大小为 N 的小根堆，然后依次读取每一个相似度结果与堆顶进行比较，若比堆顶大，则删除堆顶，把当前数据压入堆顶，调整小顶堆；否则，丢弃。最终得到的小根堆即相似度最高的前 N 个候选实体，作为检索结果进行展示，这里$N \in [3\sim10]$。

3.2 平台可视化展示

基于知识图谱的“数据结构”课程学习平台，按照教学过程可视化展示了知识图谱中的知识关联、实体节点属性、节点重要性区分，该平台部分可视化效果如图 5 所示，方便学生全面了解课程知识，掌握知识重点，快速找到未知的知识，提升学习效果。

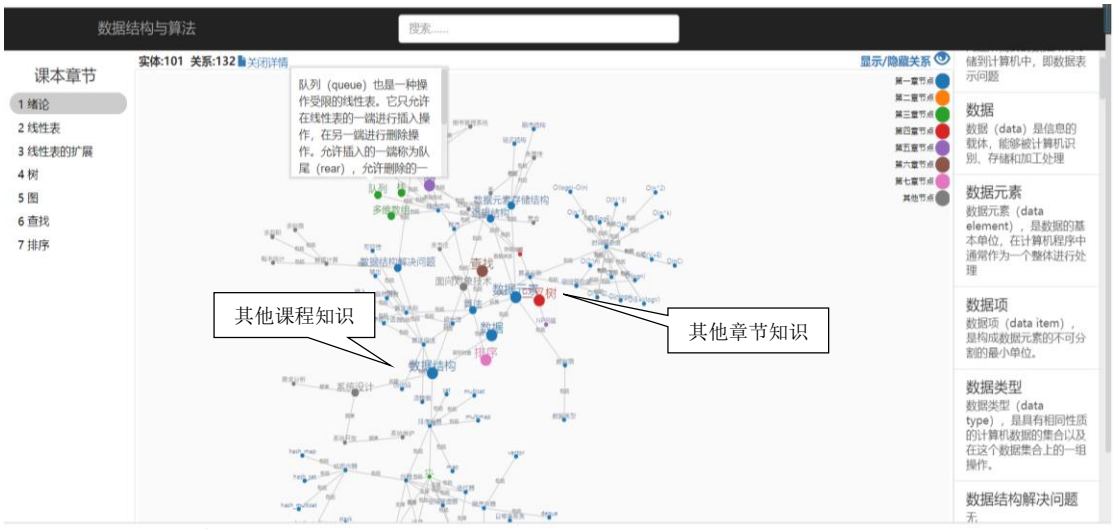

图 5 “数据结构”课程学习平台知识图谱展示

4. 结语

本文初步构建了“数据结构”课程知识图谱，并基于词向量和语义相似度计算，实现了基于知识的智能语义检索平台用于课程教学中。我们深知课程知识点多且离散、知识关联复杂，知识图谱应用才刚刚起步，未来我们将持续补充和完善 “数据结构”知识图谱，优化知识语义检索方法，力求在教育领域探索出更好的知识可视化学习模式。

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Abstract: The fragmentation and incoherence of knowledge will inevitably appear in the learning process of data structure. To solve this problem, in this paper we analyzed the classification of related concepts and the hierarchical relationships of knowledge context, and constructed a knowledge graph based on entity-relationship triples in order to intuitively describe the structure and relationship between knowledges. On this basis, a course platform based on natural language semantic retrieval was designed to help students avoid "knowledge lost" in the complex knowledge relationships. After testing for a while, students reflected that they can find learning target faster and more accurately to expand their learning.

Key Words: Data structure; Knowledge Graph; Word2vec; Semantic retrieval; Similarity

技术赋能教师：英语外刊阅读校本资源研发实践

张静[1] 王鹏[2]
1 科大讯飞智慧教育教研中心, 2 合肥市第六中学

【摘要】本文基于“三新”背景下高中英语开展外刊拓展阅读的必要性，从解决教师日常操作“想做而做不好”的两个实际困难（一是精准找合适素材难；二是加工改编处理时间受限）出发，通过人工智能系统进行“话题聚焦”、“素材溯源”、“词汇复现”、“难度把控”等操作，辅助教师进行外刊阅读校本资源的构建和应用监控。既帮教师减负，也顺应“双减”政策，用适配本校学情的资源来辅助学生用 OMO（Online Merge Offline）模式自主学习，有效进行主题阅读。

【关键词】人工智能技术；赋能教师；拓展阅读；校本资源；自主学习

一、问题的发现

在新课程改革和新高考改革的背景下，英语高考对阅读理解的考查体现出选篇广泛和考查深入的特点（李静,2021）。普通高中英语课程标准明确提出“要引导学生将课内与课外学习有机结合，每周开展课外阅读，为此，教师要积极与学生共同开发丰富和更有学习价值的学习资源，鼓励学生开展自主学习、合作学习和探究式学习（教育部，2020，p55）”。

在 2020 年山东省实行新高考之后，笔者所在英语教研组以及一线高中英语教师同行即做过相应探讨，老师们表达了较多困惑，如：“新高考的文本选材越来越地道，有心做地道刊物的拓展阅读，但不了解有哪些来源值得选”、“不确定如何匹配新高考需求来选择合适的阅读内容”、“日常从多种公众号或教辅收集新鲜话题素材并进行整理和改编耗时耗力，难以坚持，内容也不成体系”、“不清楚哪些材料内容难度合适、与新教材和新高考有良好的衔接性”、“未尝试过如何将课内教学与课外拓展阅读学习有机结合，不清楚效果”，等等。

笔者对以上问题亦感同身受。下一步将继续分析现状、探查问题解决的切入点。

二、调查分析与问题确认

根据初期交流和问题收集，笔者在暑期集中调研了市面上可见的 10 余类外刊阅读拓展资源（出版教辅书、主流报纸、外网原版刊、公众号、名师教案等），重点分析了其设计理念及内容优缺点。此外，进一步访谈了三所学校，共 5 位教研组长，了解其用外刊拓展阅读内容的使用场景和要求偏好。最后，结合现状，基于相关理论，笔者尝试着手设计了几个版本的学案，亦进一步确认了在新课程，新教材，新高考的“三新”背景下，教师提出的问题的有其充分的现实性、典型性。总体可归结为 3 大问题：

（1）外刊阅读资源类别分散，教师难以快速精准获取，且绝大部分需要二次加工，较为耗时，对单个老师来说负担重，难以持续进行。

（2）课外资源需要有以下特点：与课内具备话题内容互补性、文化知识增益性、基础知识相关性、教学目标一致性、考查目标关联性，要可确保“测评学”一致性，实现课内课外精准互补。

（3）2019 版新课标新教材开始广泛应用，教师发现单元词汇量显著增大。大单元整合教

学的趋势压缩了教师进行词汇教学的时长和精力。而词汇是构建能力的基础，势必需要有其他方式来助力词汇的习得效益。

基于上述问题，笔者牵头联合英语组老师、外校感兴趣的老师、教研专家及 AI 技术团队设计了一个“AI 技术+教师经验”,的校本外刊阅读研发实践项目。

三、方案设计的依据

Krashen(1982;1985)的输入假说认为，接触大量有意义、有趣或是相关的第二语言输入材料是决定第二语言能力的关键因素。诸多研究表明，如（Elley& M angubhai，1983 ; Krashen，1989) 大量阅读，包括消遣性阅读，有利于学生形成语感和语言习惯，提高第二语言能力，对学生的语言态度也会产生一定的影响。在我国，英语作为外语教学的高中阶段，有多项实证研究表明大量阅读对语言能力、学习兴趣有促进作用。真实地道的书籍、报刊，其丰富的话题和鲜活的语言，则对学生的跨语言文化意识构建有潜移默化的影响。因此，本研究在选材、话题方面使用兼容并包策略，匹配新课程标准的三大主题语境，覆盖全部话题，使话题具备多样性。

根据语言学习“附带词汇学习”的共识，大量的输入与接触可促进充分的词汇学习附带学习（Nation&Meara,2002）。大量的词汇是通过在各种话语环境中不断接触而逐渐习得的（Coady,1997）。对于高中英语学生来说，词汇的输入与接触主要来自阅读，尤其是教、辅材料的阅读（马广惠，2016）。本次实践在阅读材料处理方面，注重借助 AI 技术手段对词汇进行分层处理、增加复现频度，促进学生在阅读获得信息之余，通过一定活动附带习得词汇。以辅助课堂词汇学习产生更大效益。

大量阅读若要产生效益，关键在学生的态度：学生要“能且愿持续阅读”。辜向东（2017）研究发现在“大量阅读输入”教学模式下，引起学生阅读态度变化的主要因素包括学生对阅读材料的个体兴趣、学生的英语水平、阅读材料的 难度、教师因素、同伴影响、考试与其他课程作业等。因此在改编材料内容时，重视对于原版材料的适度处理、对时事热点的及时抓取与推送、语篇与同步单元的关联性、话题趣味性价值观的筛选、材料容量及便捷性设计。

四、行动方案与计划

根据需求调研及已有资源优缺点分析，形成自建校本外刊阅读资源库的设想。总体方案为：通过搜索系统抓取热点素材、外刊溯源及话题推送技术辅助本校教研组构建校本外刊阅读资源库，老师在此基础上筛选和适当加工后，打上多维度标签入库，对标签、内容、词汇、美句、读后检测试题等结构化存储，形成体系化的、适合本校需要的外刊扩展阅读资源。在校内教师服务平台 app 端，加上对应的功能入口，通过 AI 识别近期热点及单元进度融合的推荐技术来按照特定逻辑给教师每日推送，教师可实现一键下载使用。

技术辅助点包括以下几块：热点话题聚焦、素材溯源、词汇复现、易读度分层、词汇进度识别、个性化资源推送等。用 AI 技术辅助教师储备体系化的阅读资源。

内容设计标准涉及：内容理念、语篇选材、改编标准、词汇选取和处理标准等。客观的标准可以在研制 AI 系统时候用作依据，也使得多名老师参与的体系化资源编写有标尺可依。

笔者制定的行动计划从暑假起，贯穿高一到高二年级，覆盖必修一到选择性必修四的话题内容。计划分为以下步骤落地：

第一阶段（暑期）：需求调研、需求分析验证，文献调研及市面已有资源对比评估；
第二阶段（暑假）：设计外刊阅读资源整体方案、内容标准及技术协助部分论证。邀请专家评审论证；
第三阶段（暑假）：组织英语学科组及感兴趣的一线学校老师组稿，在 AI 系统及语料库工具辅助下完成稿件并熟练掌握工具；
第四阶段（开学）：在本班和其他部分班级启用。验证 OMO(Online Merge Offline)线上与线下结合的自主阅读模式并按需升级系统及推荐逻辑。也同步按需增补新鲜语篇。

五、行动方案的实施

1. 资源内容标准研发

资源内容的设计理念简称为“3+2”理念，内容做到 3 个对标，实现 2 个满足。内容制作标准要“对标新课程标准要求、对标高考评价体系、对标语言测评理念”，以满足教师备课筛选阅读素材需求，满足学生灵活进行拓展阅读需求。

图 1 内容设计的 3+2 理念示意图

根据新课标中关于课程内容和学业质量水平的描述，资源体系重点关注三个要素：覆盖三大主题语境，兼顾多样语篇类型，复现课标核心词汇，读后迁移句式表达。

话题体系：主线体系是新课标的三大主题语境下的题材内容全；用 AI 热点抓取技术，辅助筛选有教育意义的热点话题；利用主题关键词识别技术，计算特定教师群体的选题偏好，用以辅助主题的完善。做到“热点、经典、偏好点”全覆盖。

语篇选材：阅读资源承载着信息与文化。根据高考评价体系“立德树人”要求，所选素材内容必须能引导学生树立正确的世界观、人生观、价值观，辅助在教学过程中育人。本研究以优质在线题库为依托，利用 AI 题源回溯技术定位和辅助筛选适合命题的优质素材来源，沉淀备选素材库。

语篇模式：语篇模式是语篇内在的修辞结构。Hoey(1983)详细讨论了“问题—解决型”、“一般—特殊型”、“匹配比较型”以及“设定—真实型”的语篇模式。如“问题—解决型”可用于广告、科学论文、小说；“一般—特殊型”可用于诗歌、小说、科学论文等。关注语篇模式，可促使教师在选取外刊时，有意识关注该篇的写作模式，在后续进行内容节选、做段落取舍和排布会有科学的理论支持。

词汇处理：处理语篇中词汇，主要为了促进学生在阅读中附带进行词汇习得。并提醒学生关注核心词汇的复习。根据频率效应理论，输入中的目标词汇不但要有高频出现率，而且要恰当间隔地多次出现（马广惠，2016）。Paul Nation（2014）利用 COCA 语料库测算得出“通过大量阅读可学会最常用的 9000 词汇，可阅读后续遇到的 98%的材料”。同时，Paul 教授

认为“如果在阅读中遇到这个单词 12 次，你就很大机会可以把它记住。”该研究结论为本研究设计词汇词汇复现频率提供了参考。

2. AI 技术辅助文本词汇处理

本研究利用语篇内容防超纲工具、语料库进度查询工具等，辅助教师在文章语境中实现对课标核心词汇的筛选和注释。

卡片内容	适用范围	关联试题数	关联教材版本
release	考研词汇	5	
release	高考必备词汇	0	北师大版（新课标）
release	中学作业	0	译林版（新课标）
release	四六级词汇	788	
release	中学作业	0	上教版
release	中学作业	1	北师大版（新课标）
release	中学作业,智课资源	0	外研版（新课标）
release	中学作业	0	人教版（新课标）
release	中学作业	0	人教版

图 2 分级词汇关联教材进度语料库示意图

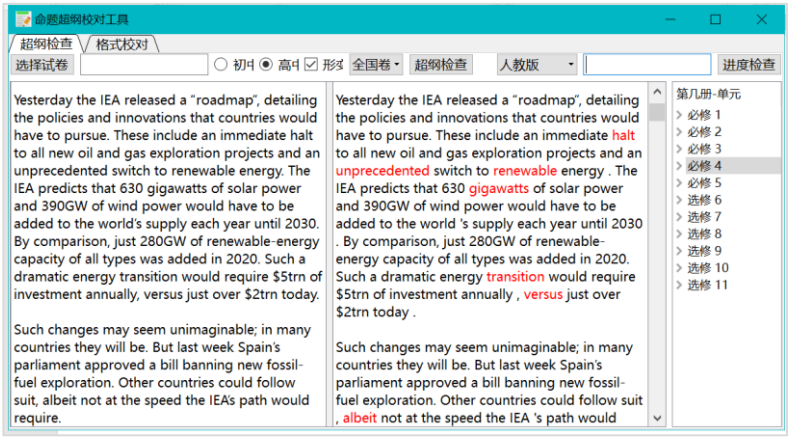

图 3 语篇内容防超纲检测工具界面示意

对于语篇难度分层，也会使用在线易读度查询网站（https://datayze.com/readability-analyzer）辅助判断材料适合度。综上，此类小工具为资源的制作本身带来了较大的便利，弥补了教师经验不足。

3. 资源呈现及推送模式设计

体系化资源搭建好之后，需要有合适的平台来自动化的推送和呈现，使教师可以便利的查找、下载、打印使用或者发送电子阅读任务给对应学生。本研究中，由合作的技术开发人员在本校内的学情系统教师端 APP 上实现了一个资源使用端口【今日推荐】。

图 4 今日推荐外刊阅读的 APP 平台示意图

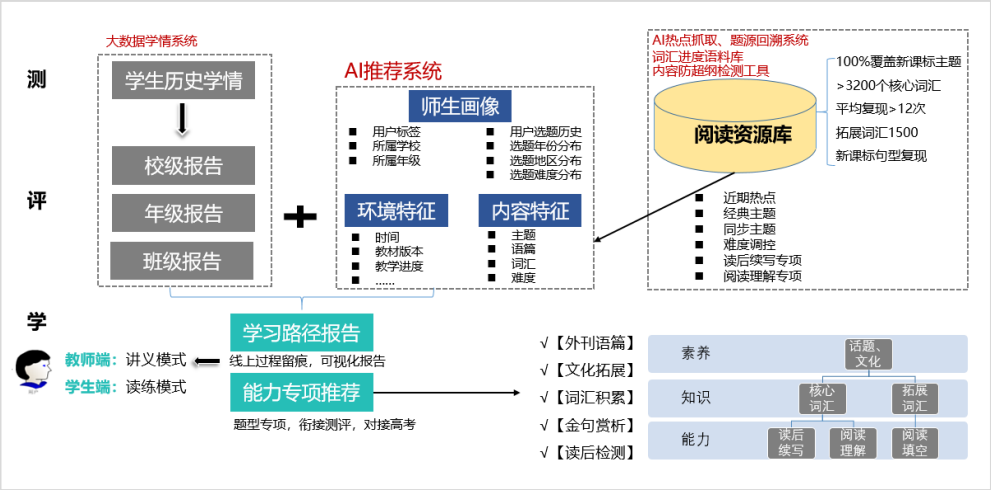

图 5 今日外刊阅读推荐系统方案示意图

依托学校考试的大数据精准学情系统，根据教学进度和历次考试、作业所沉淀的学生学情数据，由 AI 系统从阅读资源库定位到合适的选文进行自动推荐， 主要推荐逻辑有以下 5 种，老师可以根据自己偏好勾选设置：

推送逻辑 1：根据教材版本、单元话题推送；

推送逻辑 2：根据学生阅读报告的核心词汇复现频率推送；

推送逻辑 3：根据近期热点推送；

推送逻辑 4：根据近期本校考查高频重难点、话题进行推送；

推送逻辑 5：根据近期班级学情发现薄弱话题和词汇、语法，进行推题。

除了教师可自行根据需要选择内容推荐之外，在资源系统运行一段时间后，AI 推荐系统可根据学生或者班级的学习路径报告，来推荐专题阅读资源。

4. 资源应用模式设计

根据教学场景，结合资源特点，笔者初步设想了课前、课中、课后阅读的模式：（1）课前阅读单元相关话题，帮助学生完善背景知识。（2）课中主要用在自主阅读课上，当堂完成阅读、笔记及练习。（3）课后阅读、练习： 一种形式是教师下载，打印下发给学生自行安排时间阅读；每周 2~3 次；教师课间抽查学生的阅读笔记、词汇或金句掌握情况。对于有条件线上阅读的学生，教师可根据实际情况，布置线上阅读资料，学生线上阅读、作答读后检测试题、或者进行单词练习等活动，线上系统可记录已阅读篇目及作答过程。形成学生的阅读理解、知识掌握程度的反馈报告。应用模式需在实际过程中不断优化，按需调整。

六、结论与反思

本研究所产出的体系化资源和推荐平台，在 2021 年 9 月已经如期上线。目前资源系统主要推送至约 40 位老师，三周浏览量超过 680 次，人均查阅 13 篇以上，可见教师对此类资源持欢迎态度，已在课后和假期积极下载使用。笔者通过校内老师交谈，了解到对于资源的话题、新颖度、同步性表示认可。95%的教师反馈可减轻其外刊精细编撰工作至少 5h。由于新高一、高二教师使用较多，老师们对使用便捷性和内容的难度方面，提出一些优化建议。高三教师则偏向于要求更多的专题和高考题型。

本套系统初步给老师们提供一了个符合“三新”背景的外刊资源实用平台。截止目前，暂

无学生线上线下结合的使用案例。相关原因可能为：该套资源和系统并未做系统性宣讲，教师对笔者设计的使用模式不了解。本校高中生在校多不具备电子阅读条件，目前以打印下发为主。

下一步，如果需要持续跟踪该模式的收效，需要先行用个别班级试点，进行应用效果的实证研究，定期前测、调控、后测，分析学情等，来确定相对固定的、适合本班级或者本年级的模式。关于如何比对阶段性收益，尚未在教研组内引起重视。大部分老师以外刊资源便捷、务实落地使用为主，主要诉求是能跟当下同步教学结合，认为现状已可满足需求。

此外，通过英语阅读带动语言能力提升，是个相对持久的过程。 本研究虽然从资源体系构建方面，完全参照新课标、对接高考能力要求等，尽可能保障语篇覆盖、文化知识充分，也用技术手段协助保障词频复现达到合理书目、对教材的缺口形成补充。最终的效果，依然要教师引导学生，持续按照所规划的路径来大量阅读，通过检测、反馈、抽查来牵引学生自主阅读，形成持续自主阅读习惯，方能达到师生所期待的素养提升效果。

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An AI-technology-assisted Practice of School-based English Reading Curriculum Development

Abstract

The present paper is a response to the current problematic situation of build school-based further-reading resources in senior high school under the context of "new curriculum, new textbooks and new college entrance examination ". The start point was a needs investigation which reveals two difficult problems in daily operation of teachers' reading material preparation: one is the difficulty in teachers' finding **appropriate** materials accurately; another is the lack of time in their processing of materials. With the help of AI searching engine, glossary database and

recommend engine, this action research case aims to solve both problems mentioned above. The results of this study project are reflected in two aspects: As one response to the policy “Shuang Jian” , it surely ease teachers’ burden in preparing reading materials. Another thing to look forward to is that it can support an OMO (Online-Merge-Offline) mode of students’ reading activity.

Web-based Instructional Design and Assessment

基于网络的教学设计与评估

Emojis in online teacher-student communication: From the perspective of interpersonal pragmatics

ZHANG Qianyuan, LUO Rong
Hangzhou Normal University

Abstract: The outbreak of the COVID-19 has accelerated the process of online teaching. As a unique communication medium in online teaching space, emojis are widely used by teachers and students. Despite their growing popularity, little pragmatic research to date specifically addresses the use of emoji serving online teacher-student interaction. In this regard, the present study addresses this gap by examining emojis used in three online courses. Drawing on the interpersonal pragmatics and the framework of Spencer-Oatey's Rapport Management Model (RMM), we investigate the use of emojis from the corpus of teacher-student communication in Dingtalk. It is found that the use of emoji displays certain interpersonal pragmatic functions which promote teacher-student rapport and helps them to build a strong online community of inquiry.

Keywords: Online teacher-student interaction; emojis; Rapport Management Model (RMM); DingTalk

1. Introduction

Online education has been on the increase in the last two decades and the COVID-19 pandemic has accelerated this process, for it has made online teaching and learning the common delivery method across the world (Martin et al., 2020) and provided opportunities for schools to carry out more effective teaching. Emojis are an efficient tool for internet-mediated communication and are widely welcomed and employed in the interactions between students and teachers in online learning platforms. However, there are few studies analyze online teacher-student interactions from the perspective of emojis. As one of the most important media in online teacher-student interactions, emojis to some degree present a picturesque view of communication between teachers and students, which is of great significance. Therefore, the present study, seeks to investigate the use of emojis in online teacher-student interactions based on Dingtalk from the perspective of interpersonal pragmatics (Ran, 2018) and aims to reveal the potential pragmatic functions and teacher-student rapport.

2. Emojis and Rapport Management Model

2.1 What are emojis?

Emojis originated from emoticons, which is a kind of para-linguistic element, using sequence of punctuation marks that imitate facial expressions, such as ":-)" (Zhou, Hentschel & Kumar, 2017). In 1999, the first set of emojis was released, which have to be regarded as an advanced version of emoticons (Aull, 2019) and are viewed to be superior to emoticons in terms of content richness, input speed and expressiveness (Barbieri et al., 2016; Prada et al., 2018; Rodrigues et al.,

2017). Emojis are initially designed as an indicator of affective states and emotions (Dresner & Herring, 2010; Zappavigna & Zhao, 2017). Except accurate indication of emotion, some studies highlight the pragmatic functions of emojis. To be more specific, emojis can help clarify sender's intended meaning, tone, attention, and self-presentation, compensating for the absence of nonverbal cues in written communication (Ganster et al., 2012; Thompson et al., 2016). Despite research conducted on emojis (or emoticons) and their pragmatic functions is growing, it is still in its infancy. Thus, the present study will analyze the use of emojis in a corpus of teacher-student interaction based on DingTalk. By employing a broader conception of politeness in CMC settings, this study adopts Spencer-Oatey's (2008) Rapport Management Model.

2.2 Rapport Management Model

Rapport Management Model was out forward by Spencer-Oatey (2008). According to him, rapport refers to the (dis)harmony between interactants and has three bases, which moves beyond the face saving/ face threat focus and deals with relationship building, maintenance and negotiation in interaction. They are face sensitivity, sociality rights and obligations and interactional goals. Spencer-Oatey (2008) also believes that rapport is managed through multiple aspects of language use and is shaped by contextually-based conventions and norms across the following domains: the illocutionary domain, the discourse domain, the participation domain, the stylistic domain and the non-verbal domain. These five domains respectively concern verbal communication from the perspectives of the performance of speech acts, content and procedural aspects of an interchange, and stylistic choices, etc. In short, the three factors and five domains are interrelated, which together constitute the basis of harmonious interpersonal relations.

3. Methodology

3.1 Data and data collection

The present study is based on a 11230 words corpus of naturally occurring teacher-student interactions in Dingtalk, which is an intelligent mobile education platform used by 400 million users and 70 million organizations in China. The corpus was mainly from online teaching classes of three language courses, and they are *The Second Language Acquisition, An Integrated English Course II,* and *An Integrated English Course IV*. Participants were 3 teachers and 96 students.The interaction between teachers and students were firstly received as screenshots and then they were manually recorded into a Microsoft Word document. Interactions that took place in break time and those not related to the class were excluded.

3.2 Procedure

In order to fully understand how emojis are used in the corpus, a qualitative analysis of the selected conversations was performed, which adopts the methodology combined with the computer-mediated discourse analysis (Herring, 2004), and the Rapport Management Model (Spencer-Oatey, 2008). The analysis of the use of emojis presented in this study will focus on four out of the five relevant domains and the reason why the non-verbal domain is excluded is that it mainly deals with non-verbal cues in CMC settings, such as gestures, eye-contact, which does not

involve emojis. For the purpose of the study, we focus on the specific application of emojis in different online teaching sections. They are “greeting”, “initiation”, “response”, “feedback” and “closing”, which is named as the framework of "GIRFC". Accordingly, the selected conversations includes a total amount of 303 emojis, with 46 different ones. The most frequent emojis used are sending flowers (97times)  , smiling faces (43 times)  , and tears with joy (41 times)  .

4. Discussion

4.1 Illocutionary domain

The illocutionary domain concerns the rapport-threatening/ rapport-enhancing implications of performing speech acts, such as apologies, requests, compliments and so on(Spencer-Oatey, 2008). The speech acts mentioned above are also closely related to the core parts of online teacher-student interaction: “initiation”, “response” and “feedback” (IRF) (Sinclair & Coulthard, 1975). With the aim to achieve the successful teacher-student interaction, fully implementing the IRF is a certain sociality obligation and it is also the embodiment of accomplishing transactional goals in online teaching.

(1)

T Who would like to share the first question with us? Everybody can say something. 

S1 Let me answer the first question.

S1 Second language acquisition is helpful for us to understand the rules of students' language learning. Hence it is beneficial for us to improve teaching methods.

T I can’t agree anymore! 

T 

Teacher-student interactions normally begins with raising a question by teachers. To some extent, teachers' questions will exert psychological pressure on students, which would influence their face sensitivity (Spencer-Oatey, 2008). In example (1), the teacher applies downgraders (Brown & Levinson, 1987), such as "would like" and "can" to degrade the force of the questioning. Meanwhile, emoji *smiling faces* is used to make up for the rigidity of pure written texts (Provine et al., 2007), mitigating the negative impact of the speech act of questioning. What’s more, appropriate feedback can stimulate students' learning motivation and promote the relationship between teachers and students. In example (1), teachers' feedback is presented in the form of compliment and he also uses “can't... anymore” structure as a repetition combined with emojis smiling faces and *thumbing up*. These emojis work as upgraders, strengthening the already positive effect of the speech act of compliment.

4.2 Discourse domain

The discourse domain deals with the content and structure of an exchange (Spencer-Oatey, 2008). In this section, the use of emojis in “greetings” and “closings” is investigated because they have an important relational role in different CMC settings (Lorenzo-Dus & Bou-Franch, 2013),

especially as an indispensable part of online teaching with a “phatic function” (Sampietro, 2016). Emojis are considered as a creative way to ease the management of interpersonal relationships in those two key elements of a conversation, for they can help open and establish a conversation at the beginning and conclude it without producing any bad feelings.

(2)

T That's all for today's class! Next week we will review the content of the first six weeks and then read some papers.

S1 OK. Thank you very much~

Ss OK. Thank you~

Example (2) is a closing of an online class. As the most frequent emoji found in the corpus, the emoji *sending flowers* is often used in closings. According to Shegloff and Sacks (1973), as in telephone conversations, the closing section is composed by two adjacency pairs: the pre-closing with its acknowledgment and the proper final goodbye, both reciprocated. In this example, the negotiation of the closing starts with the teacher and it includes a reference to future contacts, which is common in offline classes and is also a way to show concern for the association rights of the communicators (Pavlidou, 2000). As for students, although there is no direct closing words, their utterances “thank you” combined with the emoji *sending flowers* expressing their gratitude and helping to transition from the pre-closing to the proper closing without a verbal farewell, thus signaling the end of the conversation.

4.3 Participation domain

The participation domain concerns the procedural aspects of an interchange, such as turn-taking, the inclusion/exclusion of people present, and the use/ non-use of listener responses (verbal and non-verbal)(Spencer-Oatey, 2008). As a pictograph in online teaching space (Monti, 2016), emojis also have the function of imitating words to convey complete information (Danesi, 2016). The use of emois helps teachers and students to implement the association rights and maintain netiquette (Joanne, 2004), because the empty of turn in conversations often threatens the face of both parties in communication.

(3)

T Hi, everyone! I am available now. You can ask me questions if you have.

S1

S2 OK. Thank you, teacher. If I have questions I will ask you.

S2

Due to the convenience of using emojis and their complementarity to the expression of emotions (Jaeger et al., 2018), emojis usually appear individually or in combinations in CMC settings (Ge & Herring, 2018). Example (3) is a complete turn-taking, which starts with the teacher’s instruction and ends with the the emoji *sending flowers* in combination. After the

teacher's utterance, student 1 immediately used standalone emoji *smiling faces* as a response, which could be interpreted that he got the message and student 2's *sending flowers is* followed by his utterance, which can be interpreted as his gratitude. With the unique functions of emojis, the teacher and students successfully accomplish the goals of communication. In such a benign interaction, the risk of face threats is minimized and netiquette is fully built.

4.4 Stylistic domain

The stylistic domain deals with phenomena as the choice of the tone, syntax, and genre-appropriate lexis, the use of terms of address and honorifics, etc (Spencer-Oatey, 2008). Adopting emojis can be considered as a stylistic choice per se, for interlocutors would choose different emojis according to different communicative contexts, with the aim to build ideal interpersonal relationships when communicating (Sampietro, 2019).

(4)

T What about lexical composition? Do Chinese characters have English prefixes and suffixes? @S1 Are you available now?

S1 Yes. 🙂

T Would you please talk something about it? Ex-boyfriend, for example. Haha 🤭

Ss Haha 😄

In online teaching, emojis are used by teachers and student to create a positive virtual communication atmosphere, which reflects the interlocutors' consideration of communicative tone. In Example (4), the teacher introduces the topic of "ex-boyfriend", which makes the discussing atmosphere relaxed and humorous. The use of the emoji *tittering faces* reflects the teachers' humorous teaching style and the use of emoji *grinning faces* by students below also confirms that the teacher's topic has aroused students' interest. Students successfully identify teachers' conversational intention, and jointly shape a relaxed and interesting discourse atmosphere with teachers (Kelly & Watt, 2015), which provides support for the construction of harmonious teacher-student rapport.

5. Summary and conclusion

Drawing on the framework of Rapport Management Model and discourse analysis, this study investigates online teacher-student interactions by analyzing the use of emojis in different teaching sections. To summarize and discuss the findings, the pragmatic functions identified throughout the analysis of the corpus are conversation management, tone modification and netiquette maintenance. All in all, the three pragmatic functions mentioned above make online teaching engaging and humane, which is conducive to the management of teacher-student rapport.

The major limitation of the present study is that the corpus size is smaller than a standard corpus, for this study mainly focuses on the use of emojis based on Dingtalk. Future research can

expand the coverage of corpus sources and investigate the use of emojis in different online teaching platforms and the differences of grades, majors and genders can also be taken into considerations in a more detailed way to see how they have an impact on the online teacher-student interactions and the management of the online teacher-student rapport.

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