

國中科技領域

雙語教學資源手冊

生活科技 英語授課用語

A Reference Handbook for **Junior High School Bilingual Teachers**
in the Domain of **Technology (Living Technology)** : Instructional
Language in English

〔國中七年級〕





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單元一 生活科技導論

Introduction of Basic Living Technology

國立高雄師範大學工業科技教育學系 許廷郡、李婷涵、周家豪、歐承臻

■ 前言 Introduction

本單元主要是讓學生學習進入生活科技教室時，所應具備的基本知能，包括生活科技使用規範，創意與思考和解決科技議題。我們確保學生在危險的環境下可安全地學習。再者，透過實作活動，學生被期待能培養各種重要能力，如創意思考與問題解決等。

In this unit, before we enter the classroom we will let students learn the basic expertise related to living technology, including: rules of living technology, creativity and thinking, as well as solving technology issues. We will make sure students can study safely in this hazardous environment. Moreover, students are expected to cultivate various significant capabilities such as: creative thinking and problem solving, etc., by way of practical activities.

■ 活動目標 Activity Goals

活動一，學生認識生活科技教室的環境，了解並遵守生活科技教室的安全規範。

In activity 1, students meet the environment, learn safety regulations in the living technology classroom and are expected to obey these regulations.

活動二，學生學習各式創意思考的方法，並針對日常生活問題提出構想與應用。

In activity 2, students learn several creative thinking methods and propose concepts and applications for day-to-day problems.

活動三，學生建立科技問題解決的歷程概念，並透過實作活動了解其正確步驟與意涵。

In activity 3, students establish their own processes concepts of solving technological problems. Through practical activities, they learn and understand the right steps as well as the significance of problem-solving.

■ 詞彙 Vocabulary

單字	中譯	單字	中譯
first aid kit	(n.) 急救箱	technology	(n.) 科技
tool box	(n.) 工具箱	creativity	(n.) 創意
scroll saw (machine)	(n.) 線鋸機	problem-solving	(n.) 解決問題
drill press	(n.) 鑽床	teamwork	(n.) 團隊合作
grinder sander disc sander belt sander air sander	(n.) 砂輪機 (n.) 砂磨機 圓盤砂磨機 砂帶砂磨機 氣動砂磨機	theme	(n.) 主題
vise	(n.) 老虎鉗	analyze	(v.) 分析
hammer	(n.) 鐵鎚	evaluate	(v.) 評估
emergency switch	(n.) 緊急開關	execute	(v.) 執行
safety regulation	(n.) 安全規範	design	(v.) 設計
goggles	(n.) 護目鏡	information	(n.) 資料

■ 教學句型與實用句子 Sentence Frames and Useful Sentences

① Could you please _____?

例句：Could you please elaborate about some precautions or related matters which require attention in our living technology classroom?

請你能幫我列出幾項生活科技教室的預防或注意事項嗎？

② Yes, I can. We need to pay attention to _____ while we are __in _____.

例句：Yes, I can. We need to pay attention to whether our hands are in the path of the cutting line while we are using the scroll saw in the living technology classroom.

是的，我可以。當我們在科技教室使用線鋸機時，我們需要注意是否自己的手放置於切割路徑上。

③ There are _____ in the process of solving technology issues which _____.

例句：There are seven steps in the process of solving technology issues which could help us face problems more easily plus more methodically.

在解決科技問題的流程中，有七個步驟可以幫助我們較簡單且有條不紊地面對問題。

■ 對話 Dialogues

對話一 Dialogue 1

Teacher: Good morning, everyone! Did you see how foggy the sky was when you arrived at school?

Student: Yes, I did. It felt like there was going to be a sandstorm.

Teacher: I was also hoping it was simply a sandstorm. However, sadly it was smog which is harmful to our health.

Student: Seriously? It's so scary to hear that!!! Teacher, how could we protect ourselves?

Teacher: Please open your living technology book to page 28. Let us find out together!

Student: Student: OK. I am surprised there are so many steps to solving a problem.

Teacher: You are right. We can apply these seven main steps to solve a problem more methodically in the midst of facing day-to-day issues.

Student: Oh, I see.

Teacher: Can anyone tell me what's the problem we are going to solve during today's lesson?

Student: I know. We need to understand how to avoid bad things such as smog from entering our nose. Also, monitor the severity of the smog to know when to refrain from having outdoor activities.

Teacher: Christopher, that's a great answer.

Student: Thank you, Teacher.

Teacher: Now, students are divided into seven groups and seated in 30 seconds.

Student: Hurry up!

Teacher: Each group has to come up with a way to solve the problem and finish filling out the learning sheet.

Student: OK, teacher. We will try our best.

老師： 早安，各位！你們來上課時，有沒有看到天空霧濛濛的？

學生： 有的。我感覺好像將有沙塵暴。

老師： 我希望那只是簡單的沙塵暴。然而，那是對我們健康有害的霧霾。

學生： 真的嗎？聽得太恐怖了吧！老師，請問我們該如何保護自己？

老師： 請翻開你們生活科技課本第 28 頁。讓我們一起來想方法！

學生： 好的。我很訝異竟然有這麼多步驟來解決問題。

老師： 沒錯。當我們遇到日常生活中的問題時，我們可以運用這七大步驟較有條理地解決問題。

學生： 喔！了解。

老師： 有人可以告訴我今天的課程中，我們要解決的問題是什麼呢？

學生： 我知道。我們需要知道如何避免霧霾的壞東西吸入鼻腔，並且避免戶外活動，來監控霧霾的嚴重性。

老師： 克里斯多福，你回答的很棒。

學生： 謝謝老師。

老師： 現在，同學分成七組，並且於 30 秒內迅速就坐。

學生： 動作快！

老師：各組必須想出一個解決問題的方案，並填寫學習單。

學生：好的，老師。我們會盡全力。

對話二 Dialogue 2

Teacher: Did you have any problems during designing and making balloon cars?

Student: Yes, I did. The balloon car I made always inclines while it is going forward.

Teacher: Can you share with everyone how you solved the problem?

Student: I glued a coin under the balloon car to increase the weight of the car and the balloon car stopped slanting.

Teacher: Good idea! In this way, the car can move forward more steadily. Apart from this, were there any other aspects you needed to adjust?

Student: My balloon car wasn't moving far enough.

Teacher: You can try to change the thickness of the straw, the stability of the body and the size of the wheels, etc.

Student: OK! I will try again.

Teacher: After production, you can use your creativity to decorate the balloon car. Everyone can share their balloon cars with each other.

老師：你們在設計和製作氣球車的過程中，有沒有任何問題呢？

學生：是的，我有。我做的氣球車在行進時，容易歪斜。

老師：你可以和大家分享你是如何解決問題的嗎？

學生：我在車底黏了一枚硬幣，加重車的重量，車子就不歪斜了。

老師：好棒的點子！如此一來，車子就較能穩定前進。除此之外，還有沒有你需要調整的地方呢？

學生：我的氣球車沒辦法跑得遠。

老師：你可以試著改變吸管的粗細、車身的穩固性及車輪的大小等。

學生：好的！我再試看看。

老師：製作完成後，你們可以發揮創意巧思，裝飾氣球車，每個人都可以相互分享自己的氣球車。

單元二 看見科技

Meet Technology

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■ 前言 Introduction

本單元，主要引導學生，思考身邊的物件從何而來？科技又是什麼？學生了解身邊的物件，很多是屬於人為製造之科技產物，而科技產物，又會因人們的需求與規畫，形成科技系統，建構出現今社會的科技系統。在了解人與科技間的關係後，我們讓學生思考自身對科技的使用，知道科技產品的類型與發展規範，並認識哪些科技是生活中需要的？進而選擇正確的科技產品選擇。

In this unit, students are mainly led to think about where things around them come from, and what “technology” means. Then they will realize that most objects in their life are human-made technology products. These products are constructed into technology systems because of human needs and plans and nowadays these systems appear in technology systems. After understanding the relationship between humans and technology we will let students think of the use of technology by themselves. They will understand there are different types and developments of technology products. They can realize what kinds of technology are necessary for their lives. And furthermore, they can make correct technology product choices.

■ 活動目標 Activity Goals

活動一，學生藉由重新檢視生活周遭熟悉的科技產品，了解科技的意義與功能。

In activity 1, students learn the meanings and functions of technology by reviewing familiar technology products in their surroundings.

活動二，學生能夠舉例說明科技系統的目標、輸入、處理、輸出和回饋的功能。

In activity 2, students are able to give examples of a technology system, including target, input, processing, output and feedback.

活動三，學生能夠察覺科技發展對人類生活及產業的影響。

In activity 3, students become aware of how the development of technology has deeply influenced our lives and industries.

活動四，學生具備選用科技產品的能力。

In activity 4, students have the ability to identify and choose technology products.

■ 詞彙 Vocabulary

單字	中譯	單字	中譯
technology	(n.) 科技	communication	(n.) 通訊
manufacture	(n.) 製造	construction	(n.) 營建
transportation	(n.) 運輸	energy	(n.) 能源
biological	(adj.) 生物的	system	(n.) 系統
input	(n.) 輸入	process	(n.) 過程
output	(n.) 輸出	feedback	(n.) 回饋
culture	(n.) 文化	environment	(n.) 環境
eco-friendly	(adj.) 環保	cycle	(n.) 循環
evaluate	(v.) 評估	decide	(v.) 決定
maintenance	(n.) 保養	repair	(n.) 維修
specification	(n.) 規格	instruction	(n.) 說明書

■ 教學句型與實用句子 Sentence Frames and Useful Sentences

① Follow/Hope _____.

例句：Before going home, **follow** the instructions to assemble the furniture.

回家之前，你們按照說明書的指示製作傢俱。

② This / These / That / Those / Such /Neither + is/are + _____.

例句(1)： **This is** the computer with my dream specifications.

這是一台擁有我夢想規格的電腦。

例句(2)： **Neither** of these (tools) **is** able to repair the broken fans.

兩者(工具)皆無法維修這些壞掉的電風扇。

③ First, _____. Second, _____. Third, _____. Last, _____.

例句：Generally speaking, a complete technology system usually includes the following steps:

First, an input. **Second**, the process. **Third**, an output. **Last**, feedback.

一般來說，一個完整的科技系統通常包括以下步驟。第一，輸入。第二，過程。第三，輸出。最後，反饋。

■ 對話 Dialogues

對話一 Dialogue 1

Teacher: Hello, everyone! Welcome to this course where we will be discussing technology in our daily lives.

Teacher: Who is particularly interested in technology?

Student: I'm very interested in technology. Especially smartphones and social media.

Teacher: Great! Smartphones and social media indeed play a significant role in our lives. In what way(s) do you think smartphones are important in our daily lives?

Student: Smartphones are extremely important because they not only make calls and send messages, but also can browse the internet and use various applications, such as: maps and social media.

Teacher: Exactly! Moreover, smartphones help us manage our time better, such as: setting reminders and calendar events which increase efficiency.

Student: Absolutely! Email and video conferencing tools are also vital for work and education. We can communicate quickly with others through emails, and participate in virtual meetings using video conferencing tools, just like what we did last year during the COVID-19 pandemic.

Teacher: These are all excellent points! Apart from smartphones, are there any other technologies that play a crucial role in our daily lives?

Student: Wearable devices, such as smartwatches and fitness trackers, have become popular and help us monitor our health and fitness levels.

Teacher: Very true! Wearable devices have certainly made an impact on our daily lives. They provide us with valuable health-related data and encourage an active lifestyle.

Student: Another technology that plays a crucial role in our daily lives is artificial intelligence (AI). It has been used in various applications, such as voice assistants and recommendation systems.

Teacher: That's right! AI has indeed revolutionized many aspects of our lives and continues to advance in various fields.

Student: I can think of the Internet of Things (IoT). It allows devices to connect and communicate with each other, enabling automation and making our lives more convenient.

Teacher: Absolutely! The IoT has transformed the way we interact with our surroundings, from smart homes to smart cities.

Student: Moreover, virtual reality (VR) and augmented reality (AR) technologies have also become increasingly popular, providing immersive experiences and applications in various fields, such as gaming, education and training.

Teacher: Well said! VR and AR have opened new possibilities and have the potential to revolutionize many industries.

Student: Overall, technology has become an integral part of our daily lives, shaping the way we communicate, work and live.

Teacher: Thank you for sharing your insights! Technology indeed continues to advance and impact our lives in numerous ways.

老師：大家好！歡迎來上今天的課程，我們將一起討論日常生活中的科技。

老師：誰對科技特別感興趣？

學生：我對科技非常感興趣。特別是智慧型手機和社交媒體。

老師：很好！智慧型手機和社交媒體確實在我們的生活中，扮演重要的角色。請問你認為智慧型手機在我們的日常生活中，有何重要性呢？

學生：智慧型手機極為重要，因為它們不僅可以打電話和傳訊息，還可以上網、使用各種應用程式，如地圖和社交媒體。

老師：你說得對！此外，智慧型手機幫助我們較好地管理時間，例如：設置提醒和日曆事項，增進我們的效率。

學生：的確如此！電子郵件和視訊會議工具對於工作和教育也非常重要。我們可以透過電子郵件與他人進行快速的溝通，並使用視訊會議工具參與虛擬會議，就像去年武漢肺炎流行時，我們所能做的一樣。

老師：很好的觀點！除了智慧型手機，還有其他的科技在我們的日常生活中扮演重要的角色嗎？

學生：可穿戴裝置，例如智能手錶和健康追蹤器，現在很流行，而且它們可以幫助我們監測身體健康和健身水平。

老師：非常真實！可穿戴裝置確實對我們的日常生活產生重要的影響。它們提供我們有價值的健康相關數據，並鼓勵我們過活躍的生活型態。

學生：在我們的日常生活中，還有一項扮演關鍵角色的技術就是人工智慧。它已被應用在各種應用程式中，例如語音助手和推薦系列。

老師：沒錯！人工智慧確實在我們生活中革新了許多層面，並且在各個領域持續深入。

學生：我還想到物聯網。它能夠讓設備相互連接和通信，實現自動化，讓我們的生活較便利。

老師：當然！物聯網已經改變了我們與周圍環境互動的方式，從智能家居到智慧城市。

學生：再者，虛擬實境和擴增實境技術也越來越受歡迎，在遊戲、教育和培訓等領域，提供沉浸式的體驗和應用。

老師：說得好！虛擬實境和擴增實境打開了許多新可能性，並有潛力革新很多工業。

學生：總而言之，科技已經成為我們日常生活的組成部分，形塑我們的溝通方式、工作和生活。

老師：感謝大家分享你們的洞見！科技確實以各種方式持續進步和影響著我們的生活。

對話二 Dialogue 2

Teacher: Hello, everyone! Today, we're going to dive into the world of electronic products. Specifically, smartphones and laptops. Our focus will be understanding their specifications and providing recommendations to others after the class. Let's get started!

Teacher: Imagine you're helping a friend choose a new smartphone. What are the important factors you would consider?

Student: The first thing I would consider is the operating system. Whether it's iOS or Android, the choice depends on the user's preferences and ecosystem compatibility.

Teacher: Absolutely! The operating system plays a significant role in the user's experiences. What other specifications should we investigate?

Student: I think the camera quality is also crucial. Most users want a smartphone that captures sharp and vibrant photos so a high-resolution camera with advanced features would be a good choice.

Teacher: Excellent point! A good camera can enhance our photography experiences. What about the screen and storage capacity?

Student: For the screen, a high-resolution and vibrant screen is desirable, especially for multimedia usage and gaming. As for storage, it's crucial to have sufficient space for apps, photos and videos. This means a larger storage capacity would also be preferable.

Teacher: Great considerations! What other factors might be important when choosing a smartphone?

Student: Battery life is also important, especially for users who are constantly going out. A long-lasting battery ensures uninterrupted usage throughout the day.

Teacher: I agree with you! Battery life is an important consideration. Any other specifications or features we should keep in mind?

Student: It's also worth considering the processor performance and memory capacity. A fast processor ensures smooth multitasking, while ample memory allows for efficient app usage and storage.

Teacher: Excellent! A powerful processor and sufficient memory are indeed important for overall performance. Well done, everyone!

老師：大家好！今天，我們來深入探討電子產品的世界，尤其是智慧型手機和筆記型電腦。我們的焦點會是了解它們的規格，並在課後給大家提供建議。讓我們開始吧！

老師：想像一下，你正在幫朋友選購新的智慧型手機。你會考慮哪些重要因素呢？

學生：我會先考慮的第一件事是操作系統。不論是 iOS 還是 Android，選擇性都取決於使用者的偏好和生態系統的相容性。

老師：當然！操作系統在使用者的體驗中，扮演一個重要角色。我們還須研究哪些其他規格呢？

學生：我認為相機品質也是重要。大部分使用者都希望手機能夠拍攝出鮮明、生動的照片，因此，一個具有高解析度和先進特色的相機是好的選擇。

老師：優秀的觀點！好的相機可以提昇我們攝影的體驗。螢幕和儲存容量如何呢？

學生：就螢幕而言，一個高解析度和色彩鮮豔的螢幕是令人滿意的，特別是在播放影片和遊戲方面。至於儲存空間，有足夠的空間來存放應用程式、照片和影片是重要的，因此，較大的儲存容量會更好。

老師：很好的考慮！選擇智慧型手機時，還有其他因素嗎？

學生：電池續航時間也很重要，特別是對於經常外出的使用者來說。長續航電池確保一整天的使用不中斷。

老師：我同意你！電池續航時間是一個重要的考慮因素。我們還有其他規格或特色需要記住的嗎？

學生：還值得考慮處理器性能和記憶體容量。快速的處理器能確保流暢的多重資料處理，而充足的記憶體則能允許有效率的應用程式使用和儲存。

老師：太棒了！強大的處理器和充足的記憶體確實對整體的性能重要。大家做得很好喔！

單元三 設計與製作的基礎

Basics of Design and Production

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■ 前言 Introduction

本單元以視圖於生活中之使用為主軸，內容包括基本工程繪圖工具的種類，和手繪製圖及 3D 繪圖的正確方法。學生能以更多元的方式，了解視圖的意義與重要性。教師亦介紹 Onshape 電腦繪圖軟體，讓學生學習操作與使用，然後，學會製圖與視圖的能力，自己可試著完成基礎的作品設計。此外，學生認識在生活科技教室裡實作時，常見的手工器具，了解如何正確安全的使用它們。

This unit focuses on the practical usage of the drawings in everyday life, including the types of basic engineering drawing tools and the correct methods for hand-drawing and 3D drawings. Students can understand the significance and importance of drawings in various ways. Teachers also introduce Onshape computer-aided design software, and let students learn its operation and usage. Students then develop important skills in drawing and viewing and try to complete basic design projects by themselves. Additionally, students recognize the common hand tools during practical work in the life technology classroom to understand correct and safe usage of these.

■ 活動目標 Activity Goals

活動一，學生了解視圖與製圖在設計時的重要性，及認識測量工具的使用方法。

In activity 1, students understand the importance of drawings and viewings during the design process. They also learn how to use measurement tools.

活動二，學生認識電腦繪圖軟體的使用方式，並實際練習操作。

In activity 2, students learn how to use computer-aided design software, and practice operating this software.

活動三，學生學習在日常生活使用手工具的正确方法，並認識材料處理方式的技巧。

In activity 3, students learn the correct methods of using hand tools in daily life and are familiar with techniques of material processing.

■ 詞彙 Vocabulary

單字	中譯	單字	中譯
design	(n.) 設計	vertical	(adj.) 垂直的
graph paper	(n.) 方格紙	parallel	(adj.) 平行的
steel ruler	(n.) 鋼尺	hand tools	(n.) 手工具
caliper	(n.) 游標卡尺	material	(n.) 材料
line	(n.) 直線	electric drill	(n.) 電鑽
curve	(n.) 曲線	hammer	(n.) 槌子
size	(n.) 尺寸	wrench	(n.) 板手
unit	(n.) 單位	screwdriver	(n.) 螺絲起子
scale	(n.) 比例	sandpaper	(n.) 砂紙
right angle	(n.) 直角	vise	(n.) 虎鉗

■ 教學句型與實用句子 Sentence Frames and Useful Sentences

① S+ be V + PP

例句(1)：Screws **are loosened or tightened** by people.

螺絲可以被人們鬆開或鎖緊。

例句(2)：Paper can **be cut** with a utility knife.

紙張可以用美工刀來裁切紙張。

② In order to _____, _____.

例句(1)： **In order to** allow people to have a more precise understanding of product specifications, standards for technical drawings have been established.

為了讓人們對於產品規格有較精確的理解，製圖的標準因而被制定。

例句(2)： **In order to** assemble the storage rack more quickly and accurately, we can refer to the views provided in the instruction manual.

為了較快速且正確地組裝置物架，我們可以參考說明書上所附的視圖來組裝。

■ 對話 Dialogues

對話一 Dialogue 1

Teacher: Hello, everyone. Today I will introduce the concept of “view” to you. Does anyone know what a view is?

Student: Yes, I do. We can know the size and appearance of a product through a view. It helps us verify its specifications.

Teacher: That’s correct. In the process of designing, manufacturing, selling, and using a product, many individuals are involved. To ensure precise communication and understanding among all parties, views or drawings serve as important communication tools.

Student: I see! Views sound incredibly important.

Teacher: Yes! Have you ever seen views in your daily life?

Student: I've seen some before. I previously assembled a storage rack by myself based on the assembly diagram in the instruction manual. I followed the illustrations to assemble the rack. I think assembly diagrams can be considered as a type of view.

Student: I've seen some too. Recently, my father bought me an electric toy car and its instruction manual had a densely packed circuit diagram. This could also belong to the category of views.

Teacher: Great! You all have provided very relatable examples. In addition, floor plans, architectural drawings, plumbing diagrams and so on are also types of views we often encounter.

Teacher: Now, everyone has a certain understanding of views. You can also learn how to correctly interpret views. Please pay attention to some details, such as paper size, lines, and scale annotations. There are many small details to be noted.

Student: After learning this skill, it will be easier to understand various types of visual representations, making it super practical.

Teacher: Absolutely! Let's explore how to correctly interpret views now.

老師：各位好。今天，我來介紹視圖的概念給你們。有人知道什麼是視圖嗎？

學生：是的，我知道。我們可以從視圖知道產品的尺寸和外觀。它幫助我們確認產品的規格。

老師：沒錯。產品從設計、製作、銷售到使用的過程中，會有很多人參與。為了確保所有人都能精確的溝通與理解，視圖或製圖就成為重要的溝通工具。

學生：原來如此！視圖聽起來超級重要。

老師：是啊！你有在日常生活中看過視圖呢？

學生：我有看過。我之前依據說明書上的組裝圖，有自己動手拼裝置物架。我依照說明書的圖示，組裝置物架，且認為組裝圖，可算是視圖的一種。

學生：我也有看過。最近，我父親買給我一台電動玩具車，它的說明書上有一張密密麻麻的電路圖，它應該也是屬於視圖的一種。

老師：非常棒！你們都提供很相關的例子。除此之外，室內配置圖、建築結構圖、管路圖……等，也都是我們常見的視圖。

老師：現在，每人對於視圖都有一些認識，你們也可學習如何正確判讀視圖。請留意從圖紙大小、線條和尺度標註的細節，有很多小細節都需要注意。

學生：學會此技能後，了解各種視圖就較容易了，超級實用。

老師：當然囉！現在，讓我們探索該如何正確判讀吧。

對話二 Dialogue 2

Teacher: Pay attention here, everyone! Have you noticed that there are many different types of hand tools placed on the table?

Student: Yes! I see a hammer, screwdriver, electric drill, and wrench, plus some tools that I have never seen.

Teacher: Why do we use these hand tools? Let's take a guess!

Student: These tools might allow us to accomplish tasks more easily, conveniently, and efficiently.

Teacher: Well said! We can choose tools based on our specific needs to assist us in completing tasks.

Student: Teacher, may I ask you a question?

Teacher: Go ahead.

Student: What is this thick, rough, and grainy paper on the table? I haven't seen it before.

Teacher: This is called sandpaper, which can be used to smoothen the surface of objects or remove materials on the surface of objects.

Student: That's pretty cool! It has such an amazing function. Are there any other impressive hand tools?

Teacher: Take your time! Today, I will indeed introduce the various types of hand tools and their correct usage to everyone. I will instruct the usage of each tool in detail one by one.

Student: Ok! There are so many tools that I want to try.

Teacher: No problem! I will demonstrate and let you practice using the tools later, so you have to pay close attention.

老師：各位，注意這邊！你們有察覺到桌面上擺好多不同樣式的手工具嗎？

學生：有！我看到槌子、螺絲起子、電鑽和鉋手，還有一些沒看過的工具。

老師：為什麼我們要使用這些手工具呢？猜猜看！

學生：這些工具可能讓我們較輕鬆、便利、省時的完成工作。

老師：說得很好！我們可以依照特殊需求來選擇工具，協助我們完成工作。

學生：老師，我可以問您一個問題嗎？

老師：請說。

學生：桌上這張摸起來厚實、粗糙，且有顆粒感的紙是什麼？我以前沒看過它。

老師：這叫砂紙，可以用來平整物品的表面，或去除物品表面的物質。



學生：太酷了！竟然有如此神奇的功能。還有其他令人印象深刻的手工具嗎？

老師：別急！今天，我的確要介紹各種不同的手工具，及正確的使用方式給每一個人，我會一一詳細說明每個工具。

學生：好的！我有好多工具想要嘗試看看。

老師：沒問題！我會示範，並讓你們練習操作，所以，你們一定要專心聽。

單元四 結構與機構

Structure and Mechanism

國立高雄師範大學工業科技教育學系 許廷郡、李婷涵、周家豪、歐承臻

■ 前言 Introduction

本單元的目標，是讓學生能學習結構與機構的知識，包含結構的組成元素，必要條件，簡單機械，和可產生特定功能的可動構造，並認識科技產品中常見的結構與機構種類及其應用。最終，學生能應用所學知識，設計出自己的實作作品。

In this unit, students learn about structure and mechanism, including the components and requirements of structures, simple machines and movable structures that can generate specific functions. Students understand common types of structures and mechanisms found in technology products as well as their applications. Ultimately, students apply the knowledge they have gained to design their own practical projects.

■ 活動目標 Activity Goals

活動一，學生認識力的種類與應用，並分析結構的原理與功能。

In activity 1, students learn different types of forces and their applications. They also learn to analyze the principles and functions of a structure.

活動二，學生了解日常生活中椅子、建築、橋梁的結構，並說明各個結構類型和使用材料。

In activity 2, students learn the structures of chairs, buildings, and bridges. They try to explain different types of structures and materials that are used.

活動三，學生認識機械的特性與組成要素，並了解機械對於工業發展和日常生活的重要性。

In activity 3, students learn the properties and components of machinery and understand the importance of machinery in industrial development and daily life.

活動四，學生了解簡單機械的原理、機械的運動類型及應用方式。

In activity 4, students learn the principles of a simple machine, general mechanical movements and types as well as their applications.

活動五，學生認識常見的機構種類與其設計目的，並利用連桿機構設計一張可動卡片。

In activity 5, students learn common types of mechanisms plus the purposes of their designs. They try to design a movable card with linkages.

■ 詞彙 Vocabulary

單字	中譯	單字	中譯
structure	(n.) 結構	purpose	(n.) 用途
truss	(n.) 桁架	machine part	(a.)(n.) 機件
force	(n.) 力	mechanism	(a.)(n.) 機構
stable	(adj.) 穩固的	machinery	(n.) 機械
stress	(n.) 應力	linkage	(n.) 連桿
specific	(adj.) 特定的	frame	(n.) 機架

■ 教學句型與實用句子 Sentence Frames and Useful Sentences

① What is the difference between _____ and _____?

例句：What is the difference between structures and mechanisms?

結構和機構有什麼不同呢？

② I think _____ can move, while _____ cannot.

例句：I think mechanisms can move, while structures cannot.

我覺得機構可以動，但結構不能動。

③ How many _____?

例句：How many components does the mechanism require to operate efficiently?

這個機構需要多少部件才能有效的運行呢？

■ 對話 Dialogues

對話一 Dialogue 1

Teacher: Hello, everyone! Today, we are going to learn about structures and mechanisms.
Can anyone tell me some of the differences between structures and mechanisms?

Student: Mechanisms can move, while structures cannot.

Teacher: Sure, you could say so. Structures and mechanisms have different definitions and purposes. Structures provide strength to carry the loads. Mechanisms, on the other hand, are used to convert power into different mechanical movements to achieve specific functional purposes. Can anyone come up with some structures that have an impact on your daily life?

Student: Structures are things like chairs, buildings and bridges.

Teacher: Yes! A truss bridge is a kind of bridge. You can observe truss bridges. What shapes are contained in the structure of truss bridges?

Student: There are lots of triangles ! A triangle is the simplest structure in trusses.

Teacher: That's right! A triangle is also one of the strongest shapes which humans know of. We can take thin strips of card and make up some polygon frames. Do you know what happens when force is applied to a corner of the frame?

Student: I found that a square distorts but a triangle doesn't. .

Teacher: Great! A triangle is a more stable and rigid structure. Moreover, all structures have forces to act upon them which we call “stress.” There are different kinds of stress. Now, let’s get into the hands-on section to get a feel of this.

Student: Yeah!

老師：各位好！今天，我們來學習結構與機構。有人可以告訴我結構和機構有什麼不同嗎？

學生：機構可以動，但結構不能動。

老師：是的，你可以這麼說。結構和機構有不同的定義和用途。結構提供強度，以便承載負重。機構則是用來將能量轉換成不同的機械運動，以實現特定的功能目的。有人想到什麼影響你日常生活的結構嗎？

學生：結構像是椅子、建築物，和橋梁。

老師：是的！桁架橋就是橋梁的一種。你們可以觀察桁架橋，他們在結構中是什麼形狀呢？

學生：有很多三角形！三角形是桁架中最簡單的結構。

老師：沒錯！三角形也是我們人類所知最堅固的形狀之一。我們可以拿薄卡片製作一些多邊形框架。你知道當力施加到框架的一個角時，會發生什麼情形嗎？

學生：我發現正方形會變形，但是三角形不會。

老師：是的！三角形是較穩定和堅固的結構。再者，所有結構都有著作用在其上的力，稱之為「應力」。我們有很多不同種類的應力，讓我們動手實際操作，感受一下吧！

學生：好的！

對話二 Dialogue 2

Teacher: In our last class, we learned about machinery. Does anyone remember the three main components that comprise machinery?

Student: Yes, I do. Machinery is composed of: machine parts, mechanisms and frames.

Teacher: Yes, that’s right. Machinery that is often seen in our daily lives can help us achieve specific purposes. For example, we can utilize mechanism design to generate an expected movement.

Student: Teacher, do you mean something like a linkage mechanism that can swing from side to side?

Teacher: Yes. Today, we are going to use linkages to create a movable card.

Student: I can't wait to start!

老師：在上一節課，我們學到機械，有人記得組成機械的三大要素嗎？

學生：是的，我知道。機械是由機件、機構和機架所組成的。

老師：是的，很對。在我們的日常生活中，常見的機械可以幫助我們達成特定的目的。例如，我們可以運用機構設計，產生預期的動作。

學生：老師，是不是就像連桿機構那樣可以左右擺動呢？

老師：是的。今天，我們要運用連桿，來做一張可動的卡片。

學生：我迫不及待要開始製作了！

單元五 製作一個創意機構玩具

Making a Creative Mechanical Toy

國立高雄師範大學工業科技教育學系 許廷郡、李婷涵、周家豪、歐承臻

■ 前言 Introduction

本單元的目標，是讓學生設計與製作一個創意機構玩具。他們運用先前介紹過的問題解決步驟，來完成整個活動。在活動進行的同時，教師逐步引導學生善用科技產品來解決問題。在完成作品後，學生持續能發想機構的改良與進步。

The goal of this unit is to let students design and make a creative mechanical toy. They will use the problem-solving steps which were introduced earlier to complete the entire activity. At the same time teachers gradually guide students to use technology products in order to solve the problems. After completing their work, students can continue to come up with ideas to improve and progress these mechanisms.

■ 活動目標 Activity Goals

活動一，學生回顧並運用問題解決歷程，檢視所學習到的重點知識與技能。

In activity 1, students review and apply problem-solving steps and examine key knowledge and skills.

活動二，學生運用凸輪、連桿與曲柄的知識，設計創意的機構玩具。

In activity 2, students utilize knowledge of cams, linkages, and cranks to design the creative mechanical toys.

活動三，學生運用手繪製圖技巧，繪製工作圖，並進行尺度標註。

In activity 3, students utilize hand-drafting skills to draw the working diagram, and perform scale annotation.

活動四，學生製作凸輪玩具，遵守問題解決步驟，如加工、組裝、測試及問題修正。

In activity 4, students manufacture a mechanical cam toy by following the problem-solving steps such as: machining, assembly, testing, and problem correction.

活動五，學生能用口頭或書面溝通，表達他們的設計理念與成品。

In activity 5, students demonstrate they can express their design concepts and products via verbal or written communication.

■ 詞彙 Vocabulary

單字	中譯	單字	中譯
cam	(n.) 凸輪	draft	(n.) 草圖
crank	(n.) 曲柄	machining	(n.) 機械加工
linkage	(n.) 連桿	electric drill	(n.) 電鋸
gear	(n.) 齒輪	whirl	(n.) 旋轉
catapult	(n.) 投石器	elicit	(v.) 引出
artifact	(n.) 人工製品	epitomize	(n.) 成為...的典範

■ 教學句型與實用句子 Sentence Frames and Useful Sentences

① There are _____, _____ and _____ in this _____.

例句：There are cranks, linkages, and cams in this mechanical toy.

這個機構玩具中有曲柄、連桿和凸輪。

② Do you know where the _____ are stored?

例句：Do you know where the screws are stored?

你知道螺絲存放在哪裡嗎？

③ _____ are often used to _____.

例句：Wood planers are often used to level the surface of wooden materials.

平刨機通常用於修整木材表面的水平。

■ 對話 Dialogues**對話一 Dialogue 1**

Teacher: Hello, students! Today, we are going to learn different types of moving motion. Can anyone give me an example?

Student: Circular motion.

Teacher: Awesome! In addition, how do we achieve this kind of motion?

Student: We can do it by attaching some linkages to an electric motor, or we can use gears to achieve the same purpose.

Teacher: Yes! There are different approaches to create the same moving motion.

Student: Can we just directly turn it by hand?

Teacher: Yes, you can. But the purpose of using mechanical structures is to save effort. Thus, we can make our lives easier. Besides, we assure that the circle made by a machine is always the same as the previous one. If you turn it by hand, not only will you get a sore arm, the movement would also change over time and result in a less accurate motion.

Student: I get it!

Teacher: We are going to make a mechanical toy after class. You can think of some methods to implement this project in advance.

Student: I want to make a parrot that nods its head.

Teacher: Great! You can write down and draw the draft and then discuss how to make it.

Student: OK!

老師：各位好！今天，我們將學習不同種類的運動。有人能舉例嗎？

學生：圓周運動。

老師：真是太棒了！除此之外，我們該如何達到這種運動方式呢？

學生：我們可以將一些連桿連接在電動馬達上，或者，我們可以利用齒輪來達到相同的目的。

老師：很好！我們有不同的方法，來創造同樣的運動方式。

學生：我們能直接用手轉動它嗎？

老師：是的，可以。但是，我們使用機械結構的目的是為了節省力氣，如此，我們可以使生活較便利，而且，我們確信機器製出的圓圈，總會與前一個相同。如果你用手來轉動它，不僅你的手臂會酸痛，而且運動會隨著時間改變，導致不夠準確。

學生：原來如此！

老師：下課後，我們要做一个機構玩具。你們可以先想一些運動模式，來完成此計劃。

學生：我想要做一个會點頭的鸚鵡。

老師：很好！你們可以寫下並畫出草稿，然後，你們討論如何製作。

學生：好！

對話二 Dialogue 2

Teacher: Did you remember from last time which form of mechanism can produce a reciprocating motion?

Student: Yes, I do. Through good design and utilizing a crank, linkages and a slide block, we can make a reciprocating motion mechanism.

Teacher: Fantastic! This is only one of the ways to form a reciprocating motion. Each team can think of which motion they want to firstly use on the mechanical toy and then figure out which mechanism can be utilized to perform the action.

Student: Teacher, are we going to draw the design on paper?

Teacher: No, there is no need. We are going to use a computer simulation program to design the toy.

Student: I can't wait to do it!

老師：你們記得上次學到的機構種類中，什麼可以做往復運動的呢？

學生：是的，我記得。在良好的設計下，運用曲柄、連桿與滑塊，我們可以做出一個往復運動機構。

老師：太棒了！這只是其中一個能形成往復運動的方法。各組可以先想機構玩具的運動模式，然後，再想用哪種機構可以呈現動作。

學生：老師，我們要把設計畫在紙上嗎？

老師：不，你們不用。我們會使用電腦模擬軟體來設計玩具。

學生：我迫不及待要開始製作了！

單元六 機械與社會的關係

The Relationship Between Machinery and Society

國立高雄師範大學工業科技教育學系 許廷郡、李婷涵、周家豪、歐承臻

■ 前言 Introduction

本單元的目標，是介紹機械、建築與人類的關係給學生。聚焦各種機械設計與建築結構的設計，與現今人類生活的關係。學生了解在日常生活中，機械與建築產品對社會的正及負面影響，再者，學生知道相關領域的科技達人，瞭解不同職業的辛酸，對於未來職業的選擇，能有較深層及全面的思考。

The goal of this unit is to introduce the relationship between machinery, architecture and humans to students. It focuses on various designs of machinery and architectural structures and their relevance to modern human life. Students understand the positive and negative impacts of machinery and architectural products in society within their daily lives. Furthermore, students learn about experts in tech-related fields, learn the challenges that different professionals face and have a deeper and more comprehensive way of thinking when considering their future career choices.

■ 活動目標 Activity Goals

活動一，學生思考隨著機械的演進，生活型態有何改變。以腳踏車及鎖為例，學生理解到科技逐漸演進的過程。

In activity 1, students reflect on the changes in their lifestyles through the evolution of machinery. Take bicycles and locks as examples, students comprehend the gradual progression of technology.

活動二，學生知悉現代世界中不同機械相關行業的工作人員，有不同的工作責任。他們分析工作的優缺點，據此來討論未來工作的選擇。

In activity 2, students gain an understanding of the job responsibilities of professionals in various machinery-related industries in the modern world. They analyze the advantages and disadvantages of these jobs and use this information as a basis for discussing their future career choices.

活動三，學生學習台灣有名的建築物，及世界上知名建築特色與文化。

In activity 3, students learn about famous buildings in Taiwan and the distinctive architectural features and cultures of renowned buildings around the world.

活動四，學生知悉建築業所需的專業能力、工作責任和薪資待遇。他們獲得建築行業相關資訊全面與整體的瞭解。

In activity 4, students learn about required professional skills, job responsibilities and salary considerations in the field of architecture. They gain a comprehensive and thorough understanding of all the relevant information about the architecture industry.

■ 詞彙 Vocabulary

單字	中譯	單字	中譯
facial	(adj.) 面部的	asphalt	(n.) 瀝青
recognition	(n.) 辨識	architecture	(n.) 建築物
blacksmith	(n.) 鐵匠	professional	(adj.) 專業的
carpenter	(n.) 木匠	The dome of light	(n.) 光之穹頂(高捷地標)
transportation	(n.) 運輸	solder	(v.) 焊接
concrete	(n.) 混凝土	pyramid	(n.) 金字塔

■ 教學句型與實用句子 Sentence Frames and Useful Sentences

① **What type of transportation do you take when you go to _____ every _____?**

例句：What type of transportation do you take when you go to school every morning?

當你每天早上上學時，選擇怎樣的交通方式呢？

② **I go to _____ by _____ every _____.**

例句：I go to the library by MRT every afternoon.

我每天下午搭乘捷運去圖書館。

③ **_____ puts their all into _____ to _____.**

例句：Engineers put their all into designing machines to make our lives easier.

工程師們全力以赴地設計機器，使我們的生活較便利。

■ 對話 Dialogues

對話一 Dialogue 1

Teacher: Hello, students! Today, we are going to look at different types of architecture. Can anyone give me an example of a famous building in Taiwan?

Student: I have been to Taipei 101 before. The view on the top is fascinating.

Teacher: I bet you had a wonderful experience. Taipei 101 is the tallest building in Taiwan. This iconic building embodies the essence of many professional engineers and architects.

Student: What does an engineer actually do?

Teacher: Engineers usually design machines, systems and structures. Such a job requires problem-solving abilities and expert math and physics calculations for practical solutions.

Student: It sounds so cool to be an engineer.

Teacher: Yes. Engineers are very important in many projects and their contributions are irreplaceable. However, engineers often work very hard in high pressure environments and the job can be very tiring.

Student: I'm up to the challenge!

Teacher: If you really want to take this as your future career, you should focus on studying. You can also ask engineers for advice about how to achieve this goal.

Student: My father is an engineer. I'll take notes from him.

Teacher: Great! Taking notes from people in the actual professional field is the most accurate way to understand the job.

老師：各位好。今天，我們來看看不同種類的建築物。有人可以給我一個台灣知名建築物的例子嗎？

學生：我有去過台北 101 大樓。上面的景色非常迷人。

老師：我敢說你有個美好的體驗。台北 101 是台灣最高的建築物。這個標誌性的建築物，是眾多專業工程師和建築師的智慧精華。

學生：工程師在工作時會做些什麼呢？

老師：工程師通常設計機械、系統和建築。這項工作需要問題解決的能力，及專業的數學、物理計算，來求得實際問題解決的方案。

學生：當工程師聽起來好酷。

老師：是的。工程師在很多計畫中是非常重要的。他們的貢獻無可替代。不過，工程師經常要在非常高壓的環境下，辛苦工作，工作是非常累的。

學生：我可接受挑戰！

老師：如果你真的想要拿工程師作為你未來的職業，你應該專注在研讀。你也可以問工程師如何達到你的目標，作為建議。

學生：我父親是工程師。我會從他那兒記筆記。

老師：很好！從專業領域的從業人員中作筆記，是最準確知道工作的方法。

對話二 Dialogue 2

Teacher: Hello, everyone. Today, we're going to discuss a really interesting topic: the technological evolution of bicycles. What do you know about bicycles?

Student: Bicycles are a type of transportation that we pedal with our feet.

Teacher: Fantastic! That's correct. However, bicycles have undergone many technological advancements and changes in the past few decades. Do you know any examples of the technological evolution of bicycles?

Student: There are electric bicycles now that use electric power to assist with pedaling. Is that one of the advancements?

Teacher: Yes. The emergence of electric bicycles is indeed a significant advancement in bicycle technology. Can you take other examples of advancements?

Student: I've heard of bicycles with carbon fiber frames. They are lighter and more durable than traditional steel frames. Is that another advancement?

Teacher: Yes. The usage of carbon fiber material has indeed made bicycles lighter and more durable.

Student: Teacher, how do these advancements in bicycle technology impact our lives?

Teacher: That's a great question. Advancements in bicycle technology have made bicycles more convenient, comfortable, and safe. Electric bicycles can alleviate the burden of riding, especially for long distances or hilly routes. The lightweight design of carbon fiber frames improves riding efficiency. These technological advancements enhance our bicycle experiences, encourage more people to use bicycles as a daily mode of transportation and benefit the environment and our health.

Student: Thank you, teacher. I now have a deeper understanding of bicycles.

老師：大家好。今天，我們來談論一個非常有趣的主題：腳踏車的科技演進。你對腳踏車知道多少呢？

學生：腳踏車是一種用腳踩踏的交通工具。

老師：太棒了！非常正確。然而，腳踏車在過去幾十年間，經歷許多科技的進步和改變。你知道有哪些腳踏車科技演進的例子嗎？

學生：現在有電動腳踏車，是用電力來輔助踩踏。這是其中一項演進嗎？

老師：是的。電動腳踏車的出現，確實是腳踏車科技的一大進步。你能舉出其他演進的例子嗎？

學生：我聽說碳纖維車架的腳踏車，它比傳統的鋼製車架較輕盈持久，這是另一個演進嗎？

老師：是的。碳纖維材料的應用，確實使腳踏車較輕量與耐用。

學生：老師，這些腳踏車科技的演進對我們的生活有何影響呢？

老師：那是很好的問題。腳踏車科技的演進使腳踏車較方便、舒適和安全。電動腳踏車能減輕騎行的負擔，尤其是在長途或山區間騎乘。碳纖維車架的輕量化設計改進騎乘效率。這些科技的進步提昇我們的腳踏車體驗，鼓勵較多人使用腳踏車作為日常交通方式，且有益於環境和健康。

學生：謝謝老師，我現在對腳踏車有較深入的了解。

國內外參考資源 More to Explore

<p>自造教育及科技輔導中心</p> <p>這個網站以創新教育為主題，提供高級中等以下學校的教育資源，並透過系列課程、競賽專區及線上微課程等功能，推動教育界探索未來教學的新視野與可能性。</p> <p>https://tech.k12ea.gov.tw/</p>	
<p>能源教育資源總中心</p> <p>國中機構結構與能源相關教學活動的分享內容，包含木工製作、機械結構與動力實驗等範例。</p> <p>https://learnenergy.tw/index.php?inter=digital&caid=1&id=295</p>	
<p>高雄市教育局國民教育輔導團-高雄國民教育各學科領域專頁</p> <p>匯集高雄國民教育各學科領域的專頁資訊，提供多元學科資源及社群連結，方便教師和學習者快速找到相關支持與交流平台。</p> <p>https://reurl.cc/M6yNan</p>	



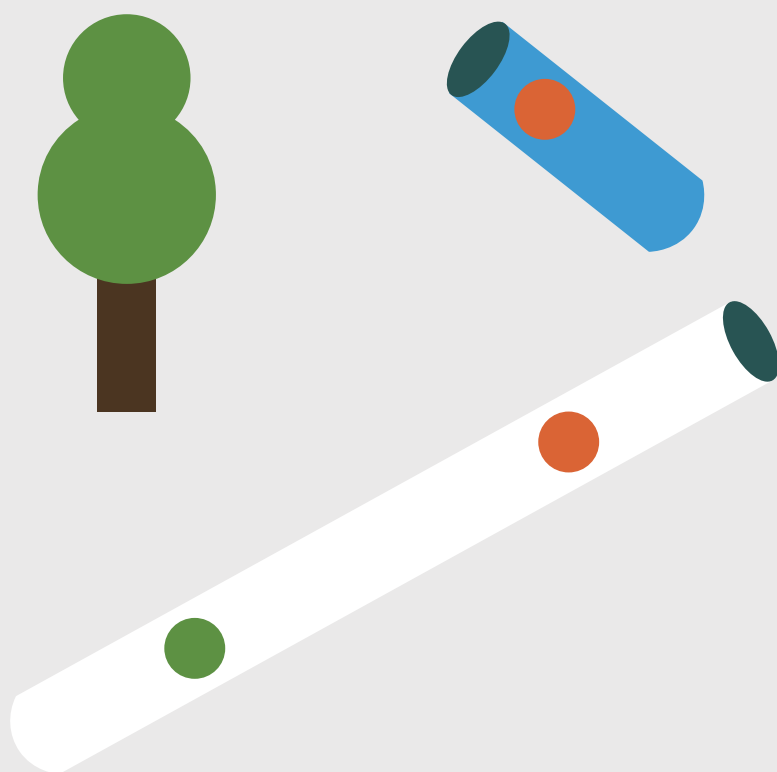
國中科技領域雙語教學資源手冊: 生活科技科英語授課用語

[七年級]

A Reference Handbook for Junior High School Bilingual Teachers in the Domain of Technology (Living Technology): Instructional Language in English

[7th grade]

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NKNU EMI AND BILINGUAL EDUCATION CENTER

指導單位 教育部師資培育及藝術教育司

MOE DEPARTMENT OF TEACHER AND ART EDUCATION