

**Table S1.** Overview of the operational elements of the proposed AR-supported LA system.

Section	Category	Classification	Values	Objectives	Input			Analysis		Visualisation	Stakeholders
					Machine	Human	LA Machine	LMS	D = Developers E = Educators S = Students		
Technology	Apparatus	General Purpose Equipment	Desktop PC	System Usability	System-log	-	Statistics	Graph	D		
			Laptop					Statistical			
	Tablet	Timeline									
	Smartphone	Word cloud									
AR Equipment	Wearables	-	AR Lenses / Glasses	User Experience	Sensed	-	ML / EDM	Circular	E, D		
			Smartwatch					Graph			
	Headset / EarPods	Bubble plot									
	Physical Objects	Concept map									
Pedagogy	Discipline	Field	Computer Science	-	System	-	Statistics	Statistical	E		
			Info. Technology								
	Engineering										
	Mathematics										
Intervention	Tasks	-	Observation	Knowledge & Skills Comprehension	Camera	Educational Resources	ML / EDM	Statistical	E, S		
			Problem Solving					Understanding Enhancement			
	Experimentation	Knowledge / Skills Retention									
	Content Creation										
Psychology	Psychometrics	Assessment	Formative	Progress Monitoring	LMS-log	Educational Resources	ML / EDM	Word cloud	E, S		
			Summative								
	Motivation	Satisfaction	LMS-log	Administrative	Statistics	Statistical	E				
	Multimodal	Engagement	-	Eye Tracking	Intention to use AR	Sensed	-	ML / EDM	Heatmap	E	
Facial Expressions											
Gesture Tracking											
Noise Levels											
Heart Rate											
Skin Conductivity											