sustainability

Supplementary Materials

Proposed matrices of competency to supplement curricula with content related to healthy buildings.

Table S1. Competencies related to healthy construction for levels 3 and 4 of education.

Symbol		Knowledge
K1	thermal comfort	Has knowledge of building materials and their proper use in the project in terms of thermal insulation
K2	thermal comfort	Knows legal regulations and technical solutions related to thermal insulation in buildings.
K3	thermal comfort	Has knowledge about new thermal insulation materials and their correct use in the project
K4	thermal comfort	Has knowledge of how to compare techniques and technologies used depending on the case
K5	thermal comfort	Know systems air conditioning
K6	thermal comfort	Knows the principles of building energy-efficient buildings
K7	humidity comfort	Has knowledge about the dangers of mould in buildings
K8	humidity comfort	Has knowledge of building materials and their proper use in the project in terms of moisture insulation
K9	humidity comfort	Has basic knowledge about building tightness
K10	humidity comfort	Has basic knowledge about thermal bridges in buildings
K11	humidity comfort	Has basic knowledge of building physics in the field of protection against moisture in buildings
K12	humidity comfort	Knows waterproofing materials
K13	humidity comfort	Has basic knowledge about the impact of humidity on thermal comfort
K14	clean air	Has knowledge about the disposal of construction materials
K15	clean air	Has knowledge about the release of harmful substances from building materials
K16	clean air	Knows the basics of human chemistry and physiology
K17	acoustics	Has general knowledge about the impact of sounds and infrasound on health

K18	environmental protection	Has knowledge about the impact of building materials on the environment
K19	environmental protection	He knows what material can be reused
K20	environmental protection	Has basic knowledge of the life cycle of materials
K21	environmental protection	Has general knowledge about carbon footprint
K22	environmental protection	Has general knowledge about material passports (DPP)
K23	environmental protection	Has general knowledge of what green construction is
K24	environmental protection	Has general knowledge of what sustainable construction is
K25	universal design	Has general knowledge of the principles of universal design
K26	radiation protection	Knows the types of soil with higher radon content
K27	radiation protection	Knows the principles of ventilation in the building
K28	radiation protection	Knows which building materials have the highest content of radioactive elements
	Skills	
S1	thermal comfort	Can instal materials thermal insulation
S2	thermal comfort	Is able to calculate heat transfer coefficients
S3	thermal comfort	Is able to select materials and technologies that ensure adequate thermal insulation
S4	thermal comfort	Is able to apply IT in construction works
S5	thermal comfort	He can pre-size heating installations and verify them
S6	humidity comfort	Is able to properly connect walls, ceilings, and roofs in order to avoid thermal bridges
S7	humidity comfort	Is able to properly instal waterproofing, vapour barrier, and vapour permeable foils
S8	humidity comfort	He can perform professional sealing of a building partition
S9	humidity comfort	Is able to select materials and technologies for moisture insulation
S10	humidity comfort	He can dry buildings

S11	clean air	Knows how to clean and maintain air conditioning systems
S12	clean air	Knows how to properly use tools and handle highly volatile substances during construction
S13	acoustics	He can instal sound-absorbing mats and soundproofing elements in buildings
S14	acoustics	Is able to properly instal window joinery for acoustic protection
S15	acoustics	Is able to instal anti-vibration protection
S16	environmental protection	Can recognises conditions installation
S17	environmental protection	Describes, explain, recognises and handles building materials
S18	universal design	Is able to instal elements of textured pavement markings
S19	universal design	Can instal loop induction
S20	universal design	Can instal stair platforms for the disabled
S21	radiation protection	Can perform tight insulation of foundations and floors on the ground using roofing felt or foil - also to protect against radioactive radiation
Symbol		Responsibility and autonomy
C1	environmental protection	Feels responsible for environmental protection
C2	environmental protection	Understands the importance of ecology
C3	environmental protection	Understands the need to choose human/environment-friendly building materials
C4	clean air	Understands the importance of maintaining proper ventilation and air quality in the building to maintain a healthy indoor environment
C5	universal design	Understands the diversity of needs of different people in the light of universal design
C6	radiation protection	Understands the need for protection against radiation
C7		Understands the need to work in accordance with documentation

Table S2. Competencies related to healthy construction for levels 5 and 6 of education.

Symbol		Knowledge
K1	thermal comfort	Knows the physical properties of various thermal insulation materials

K2	thermal comfort	Knows construction techniques in the field of thermal insulation
K3	thermal comfort	He knows technical physics
K4	thermal comfort	Has knowledge about green construction
K5	thermal comfort	Has knowledge of building materials technology
K6	thermal comfort	Has knowledge about the possibilities of using solar energy to heat building interiors
K7	thermal comfort	Has extensive and specialised knowledge of the detailed requirements for energy-neutral buildings
K8	thermal comfort	Has extensive and specialised knowledge of energy-neutral materials
K9	thermal comfort	Has extensive and specialised knowledge of energy-neutral activities based on legislation, regulations, and requirements for a passive house and an active house
K10	thermal comfort	Has extensive knowledge of aspects of human well-being in life, work, and living environment
K11	thermal comfort	Has extensive knowledge of control tools enabling practical verification of undertaken activities
K12	thermal comfort	Has knowledge of more complex energy performance calculations
K13	thermal comfort	Has knowledge about energy storage
K14	humidity comfort	Has detailed knowledge of the building's tightness
K15	humidity comfort	Has detailed knowledge about thermal bridges in the building
K16	humidity comfort	Has detailed knowledge of building physics in the field of protection against moisture in buildings
K17	humidity comfort	Knows waterproofing materials
K18	humidity comfort	Has detailed knowledge of the impact of humidity on thermal comfort
K19	humidity comfort	Has knowledge of methods for drying buildings
K20	clean air	Has knowledge about environmental toxins in the human body
K21	clean air	Knows the regulations regarding air cleanliness standards in buildings
K22	clean air	Has knowledge about the extraction of these raw materials and any negative consequences for the environment and/or people
K23	clean air	Has knowledge of more sustainable, alternative raw materials/products to burdensome raw materials/products

K24	natural light	Has general knowledge of the impact of sunlight on the human body
K25	natural light	Knows the regulations regarding the required time of natural lighting in rooms
K26	natural light	Knows the types of light sources and their impact on people's eyesight
K27	acoustics	Has general knowledge about the impact of sounds and infrasound on health
K28	acoustics	Knows the principles of acoustic insulation and vibration isolation
K29	acoustics	Knows the principles of designing buildings with regard to protection against noise and vibrations
K30	acoustics	Knows the acoustic insulation requirements of building partitions
K31	environmental protection	Has knowledge about the impact of building materials on the environment
K32	environmental protection	He knows what material can be reused
K33	environmental protection	Has basic knowledge of the life cycle of materials
K34	environmental protection	Has general knowledge about carbon footprint
K35	environmental protection	Has general knowledge of material passports (DPP)
K36	environmental protection	Has general knowledge of what green construction is
K37	environmental protection	He has detailed knowledge of what sustainable construction is
K38	environmental protection	Knows the basic criteria for the multi-criteria certification BREEAM, LEED, FITWEL, WELL, DGNB
K39	universal design	Has detailed knowledge of the principles of universal design
K40	radiation protection	Knows the types of soil with higher radon content
K41	radiation protection	Knows the principles of ventilation in the building
K42	radiation protection	Knows which building materials have the highest content of radioactive elements
K43	radiation protection	Knows the permissible values of the annual equivalent radon concentration in rooms of a building intended for permanent human stay
K44	e-smog	Knows the regulations governing the location of buildings with rooms for people to stay in order to protect against the effects of electromagnetic fields
K45	universal design	Knows the principles of universal design

Symbol		Skills
S1	thermal comfort	Is able to apply nanotechnology in construction, research, development, service, maintenance and assembly
S2	thermal comfort	Is able to use specialized software in thermal analyses of a building
S3	thermal comfort	Is able to prepare an energy balance of a building
S4	thermal comfort	Can operate a thermal imaging camera
S5	thermal comfort	Is able to calculate heat transfer coefficients
S6	thermal comfort	Is able to select materials and technologies that ensure adequate thermal insulation
S7	thermal comfort	Can design an energy-efficient building
S8	thermal comfort	Is able to integrate energy-neutral solutions with digital building models
S9	humidity comfort	Is able to properly design connexions of walls, ceilings, and roofs in order to avoid thermal bridges
S10	humidity comfort	Is able to select waterproofing materials, vapour barrier, and vapour permeable foils
S11	humidity comfort	Is able to determine the cause of moisture in building elements
S12	humidity comfort	Is able to calculate water vapour condensation in building partitions
S13	humidity comfort	Can perform simple measurements, e.g. tightness measurement
S14	natural light	Knows how to select sun protection systems
S15	natural light	He knows how to choose window joinery
S16	natural light	Is able to calculate the sunlight exposure in rooms
S17	acoustics	He can measure and calculate interior acoustics
S18	acoustics	Is able to select appropriate materials and technologies for acoustic insulation and anti-vibration protection
S19	universal design	Is able to design buildings with eliminated architectural obstacles
S20	radiation protection	Is able to select building materials with low radioactivity
S21	e-smog	He can design the partitions of a Faraday Cage

Symbol		Responsibility and autonomy
C1	environmental protection	Feels responsible for environmental protection
C2	environmental protection	Understands the importance of ecology
C3	environmental protection	Understands the need to choose human/environment friendly building material
C4	universal design	Understands the diversity of needs of different people in the light of universal design
C5	radiation protection	Understands the need for protection against radiation
C6		Is interested in participating in multidisciplinary design and construction teams