

essense

Izobraževanje za
podporo pametnih
okolij za starejše

Validacija učnega načrta - Analiza.

1. različica



Erasmus+

Naslov projekta	Višješolski program o informacijskem modeliranju v gradbenštvu za razvoj pametnih okolij za starejše
Kratika	ESSENSE - Education Supporting Smart Environments for Seniors.
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Začetni datum	01-09-2018
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Partnerji	<ul style="list-style-type: none"> - Karlsruher Institut fuer Technologie (DE), Coordinator. - buildingSMART e. V. (DE) - Fundación Ageing Social Lab (ES) - Ss. Cyril And Methodius University in Skopje (MK) - Asociación Empresarial de Investigación Centro Tecnológico del Mueble y la Madera de la Región de Murcia (ES) - ALFATRaining Bildungszentrum GMBH (DE) - Univerza na Primorskem Universita del Litorale (SI)
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Različica	1.
Avtor	buildingSMART in AgeingLab

Spremembe v dokumentu

Različica	Datum	Spremembe
1.	Feb. 2019	Začetna različica dokumenta.
2.		

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1. Uvod

Projekt Essense Erasmus+ razvija visokošolski izobraževalni tečaj o informacijskem modeliranju gradenj (ang. Building Information Modeling; BIM) za razvoj pametnih okolij za starejše (ESSENSE). Tečaj bo povezal pametne rešitve, pomoč iz okolice pri samostojnem življenju (ang. Ambient Assisted Living; AAL), in BIM metode v povezavi z grajenim okoljem v podporo aktivnemu in zdravemu staranju.

Na tej točki je razvita prva različica učnega načrta tečaja. Učni načrt je razdeljen na pet modulov (vsak modul je razdeljen v enote):

Modul 1: Osnovni koncepti BIM

Modul 2: Potrebe starejših občanov in njihovih negovalcev

Modul 3: Pametna stanovanja in podpora iz okolja pri samostojnem življenju (AAL)

Modul 4: Interakcija med BIM, pametnimi bivališči in AAL

Modul 5: Upravljanje projektov, upravljanje inovacij in skupne kompetence za optimalno implementacijo načel BIM in konceptov AAL

Da bi ugotovili morebitne pomanjkljivosti in možnosti za izboljšanje učnega načrta, je vsak partner našel vsaj dve osebi za pregled učnega načrta in pridobitev povratnih informacij glede doseganja ciljev projekta in njihovega pričakovanega učinka.

2. Ocena učnega načrta

Zunanje zainteresirane deležnike, od univerz, podjetij in delavcev, javnih organov, skrbnikov in sorodnikov starejših itd., smo prosili, naj ocenijo učni načrt. Deležniki so prejeli povzetek skupnega učnega načrta (glej prilogo 1) skupaj z razvitim vprašalnikom (glej prilogo 2).

Z namenom, da bi dosegli veliko število potencialnih strokovnjakov v vsaki partnerski državi, je bila sprejeta odločitev, da konzorcij prevede učni načrt in vprašalnik v vse jezike partnerjev.



V začetku smo respondente prosili za splošno povratno informacija učnega načrta kot celote. Postopoma so vprašanja postala bolj specifična in preverjala ustreznost in kakovost posameznih modulov, tako kot tudi enot, ki pripadajo posameznim modulom.

3. Rezultati evalvacije

Raziskava je dosegla okoli 600 ljudi po vsem svetu – večina jih prihaja iz EU, ZDA in Kanade. Skupno je anketo izpolnilo 27 anketirancev, od teh 6 delno in 20 v celoti. Največ jih je bilo iz Nemčije, sledijo udeleženci iz Severna Makedonije, Španije in Slovenije.

Na splošno so rezultati povratne informacije zelo homogeni in potrjujejo, da učni načrt uspešno naslavlja pričakovanja gradbene industrije.

V nadaljevanju so povratne informacije povzete posamično za vsako zastavljeno vprašanje:

Vprašanje 1: V kolikšni meri menite, da učni načrt tečaja naslavlja zahteve gradbeništva in vzdrževanja stavb v smislu znanj, veščin in kompetenc na področju BIM?

Skoraj vsi udeleženci menijo, da učni načrt bistveno ali nekoliko naslavlja zahteve gradbene industrije. Ena oseba je izrazila skrb, da je vsebina zelo kompleksna in primerna predvsem za tiste, ki imajo izkušnje z BIM (komentar f). Nekdo je predlagal nudenje dveh BIM tečajev, enega s teoretičnim in drugega s praktičnim poudarkom (komentar g.). Poleg tega je ena oseba pogrešala informacije povezane s tehnično izvedbo gradbenih del (komentar a.). Bilo je tudi predlagano, da naj bo učni načrt bolj interdisciplinaren (komentar e).

Pregled vseh predlogov podanih za izboljšanje učnega načrta:

- a. "Kje je govora o sami izvedbi ali njenih zahtevah? Ali program za BIM glede na vrst dela označi bolj ali manj primerni pristop za posamezni proces / delovni korak? "



- b. "Ukvarjanje z različnimi gradbenimi programi (kateri obstajajo, kaj lahko storijo); kaj so nove oblike datotek in kaj lahko storijo (ključna je IFC-datoteka); kakšne so nove možnosti za prikaz obstoječih stavb (ključna beseda brezpilotna letala); Pomembno: obisk gradbišč, ki so bila zgrajena ali načrtovana z BIM "
- c. "BIM standardi za izmenjavo informacij"
- d. "Več o BIM pri vodenju gradnje (predvsem v strukturnem in MEP oblikovanju) in pri obratovanju objekta"
- e. "Izvajati višjo stopnjo interdisciplinarnega pristopa."
- f. "modula 3 in 4 sta zelo ambiciozna; z namenom, da se znanje poglobi, mora njihova vsebina pristopiti bolj z tehničnega vidika, v vseh sistemih avtomatizacije bivališča, ki se izvajajo z BIM. ob upoštevanju, da učenci ne bodo nujno poznali vseh vsebin. Te teme bi lahko zaradi svoje kompleksnosti že same sestavile celoten predmet. "
- g. "Ni mi jasno, kako dolgo bo tečaj trajal, vendar mora po mojem mnenju biti na voljo študentom, ki že imajo znanje o BIM. Ali pa naj bo malo več prostora namenjenega BIM. Mislim, da bi bili potrebni dve enoti o BIM, ena teoretična in ena praktična. "
- h. "Večji poudarek na notranji opreми za starejše odrasle. Fakulteta za oblikovanje ima bogate izkušnje na tem področju."

Vprašanje 2: V kolikšni meri menite, da učni načrt naslavlja potrebe starejših odraslih in njihovih negovalcev v domačem okolju ter posledične izzive za širitev pametnih življenjskih okolij?

Po mnenju 96% udeležencev učni načrt bistveno / nekoliko naslavlja zahteve.

Udeleženec ankete predlaga vključitev etične razprave o tehnologiji (Komentar c.) Drug predlog je, da se ponudi več vsebin o praktičnem delu in izkušnjah ter lekcij za pridobivanje novih znanj na področju dela s starejšimi odraslimi (komentar b.)

Pregled vseh predlogov, podanih za izboljšanje učnega načrta:

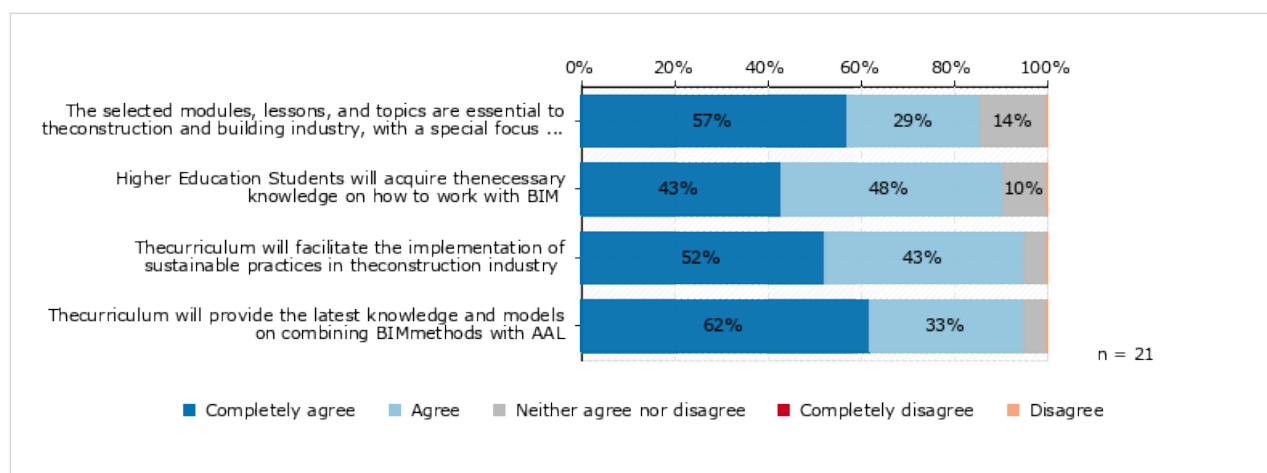
- a. "Digitalne veščine"
- b. "Da bi imeli več ur praktičnega dela, da imajo učne ure za pridobivanje spretnosti na področju dela s starejšimi odraslimi"
- c. "Rad bi, da se tukaj obravnava absolutno potrebno etično razpravo tehnologije. To razpravo je treba vsekakor vključiti v učni načrt. Bilo bi dobro vzpostaviti

povezavo med tehnologijo in ljudmi. Kako deluje tehnologija v podporo ljudem v določenih primerih?

Vprašanje 3: Prosimo, da izrazite svojo stopnjo strinjanja z naslednjimi izjavami povezanimi z učnim načrtom.

Približno 90% vprašanih ocenjuje vsebine učnega načrta kot zelo pozitivno. (Slika 1) Izrazili so, da bodo visokošolski študenti pridobili potrebno znanje o tem, kako delati z BIM in pametnimi bivališči; da bo učni načrt vodil do lažjega izvajanja trajnostnih praks v gradbeništvu in zagotavljal najnovejše znanje glede združevanja metod BIM z AAL. 74% vprašanih se strinja, da izbrani moduli, enote in teme spadajo v učni načrt. Po drugi strani jih 21% meni, da so izbrane teme niti pomembne niti nepomembne; 5% pa jih meni, da izbrane teme niso relevantne za gradbeno industrijo. (Slika 1)

Slika 1: Stopnja strinjanja z izjavami v zvezi z učnim načrtom



Vprašanje 4: Prosimo, ocenite relevantnost vsakega modula učnega načrta za gradbeno industrijo.

Pomembnost posameznih modulov je bila na splošno ocenjena kot zelo visoka. V povprečju je 95% vseh udeležencev ocenilo vseh pet modulov kot zelo ali precej pomembnih. Samo v modulu 2 (potrebe starejših in njihovih negovalcev) je bil rezultat nižji in sicer 71% vprašanih je menilo, da je tema precej ali zelo pomembna.



Vprašanje 5: Prosimo, ocenite ustreznost posameznih enot učnega načrta za gradbeno industrijo.

V povprečju več kot 90% vseh udeležencev meni, da je vsebina posameznih enot v okviru različnih modulov precej ali zelo pomembna za gradbeno industrijo. V nasprotju s tem jih 10% meni, da so nekatere enote manj pomembne.

Pregled vseh predlogov, podanih za izboljšanje enot:

(Glej Analiza Pregled Prilogo 3)

- "standardi in postopki v digitalni izmenjavi informacij v BIM okolju."
- "Pametne in energetske učinkovite stavbe prihodnosti; pametno financiranje za pametne zgradbe: vlaganje v pametne in energetske učinkovite stavbe"
- "Pametna bivališča in trajnostni energetski razvoj"
- "Širše o BIM pri vodenju gradnje (predvsem v strukturnem in MEP oblikovanju) in pri obratovanju objekta"
- "Učni načrt bo bolj koristen, če se vključi podroben opis o nekateri BIM programski opremi, ki se pogosto uporablja v gradbeni industriji. Na ta način boste pomagali prihodnjim inženirjem uspešno sodelovati z inženirji iz drugih področij. Prav tako bo to zelo koristno, če se vključi vsebina o vplivu tega sistema na vse druge gradbene faze in blažitev njihovih možnih ovir. "

Vprašanje 6: Prosimo, da izrazite svojo stopnjo strinjanja z naslednjimi izjavami.

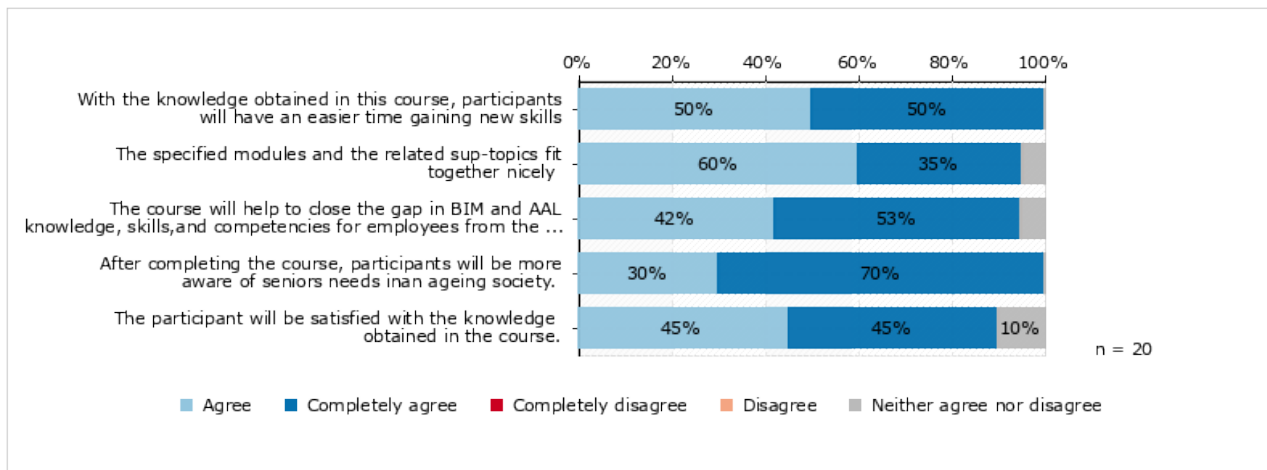
Vsi udeleženci se v celoti strinjajo, da je bistveno, da se izvaja na uporabnika osredotočen pedagoški pristop (npr. video posnetki, infografike, diapozitivi, itd.) Večina (več kot 90%) je potrdila, da je treba učne rezultate enostavno preveriti prek kvizov in testov. Vsi vprašani so se strinjali, da je treba izobraževanje skleniti s certifikatom in da je tečaj lahko zanimiv za ljudi iz različnih področij gradbeništva (arhitektura, inženirstvo).

Vprašanje 7: Prosimo, da izrazite svojo stopnjo strinjanja z naslednjimi izjavami.



Skoraj vsi anketiranci se v celoti ali delno strinjajo s izjavami povezanimi s ključnimi dejavniki za izvajanje učnega načrta (Slika 2).

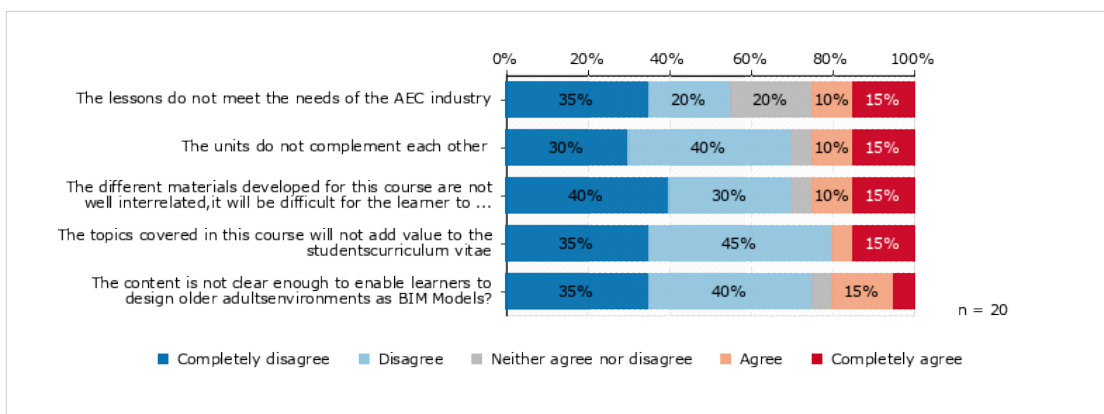
Slika 2: Stopnja strinjanja z izjavami povezanimi s ključnimi dejavniki za izboljšanje učnega načrta



Vprašanje 8: Prosimo, ocenite naslednje izjave o možnih ovirah povezanih z učnim načrtom.

Povratne informacije o ovirah povezanih z učnim predmetov so mešane v primerjavi z drugimi odgovori v tej anketi. Evalvacija je skozi vsa vprašanja zelo pozitivna in potrjuje, da je vsebina tečaja dobro razvita in strukturirana, pri tem vprašanju pa približno 20-25% anketirancev meni, da vsebina tečaja ni dobro definirana in ne ponuja vrednosti za učence. (Slika 3)

Slika 3: Stopnja strinjanja z izjavami v zvezi z morebitnimi ovirami povezanimi z učnim načrtom



Glede na odgovore na prejšnja vprašanja, je malo verjetno, da rezultati pri tem vprašanju natančno odražajo mnenje anketirancev. Možno je, da nekateri udeleženci niso pravilno razumeli vprašanja, ker so bila ta zastavljena v negativni obliki (npr. "vsebine **ne** ustrezajo potrebam gradbene industrije"). Kljub temu se je vsaj 75-80% udeležencev popolnoma ne strinjalo ali ne strinjalo glede opredeljenih ovir.

Vprašanje 9: Če imate kakršne koli druge pripombe ali predloge, vas prosimo, da jih vključite tukaj:

Vključiti več praktičnih primerov, interaktivne metode usposabljanja (c.) in naj se pretehta vključitev vsebin o izvedbi v procesu gradnje (a.). Poleg tega je bilo priporočeno, da se pojasni možnosti tehnologije v povezavi s potrebami starejših v njihovih bivališčih (b.). Omenjeno je bilo, da naj bi se tudi starejši izobrazili o temah povezanih z tehnologijo, da bi te lahko uporabili (d.) (e.).

Dodatni predlogi za izboljšanje učnega načrta (glej Prilogo 3)

- a) "Premalo poudarka na izvedbi, kot običajno"
- b) "Povezavo med tehnologijo in stanovanjskimi in varnostnimi potrebami starejših je treba pojasniti"
- c) "Vključiti več praktičnih primerov in interaktivnih metod usposabljanja, da se spodbudi vključenost in napredek učencev."
- d) "BIM rešitve in pametne arhitekturne rešitve za izobraževanje starejših"
- e) "Pametne arhitekturne rešitve za izobraževanje starejših"

4. Zaključek evalvacije učnega načrta

Učni načrt, s svojimi petimi moduli in pripadajočimi enotami, je s strani sodelujočih strokovnjakov ocenjen kot zelo pozitiven. Navedene teme so dobro opredeljene in se ujemajo pri doseganju glavnega cilja.



Predlogi anektiranih so zelo koristni za razumevanje prioritet predstavnikov trga in tej povratni informaciji je potrebno nameniti pozornost pri pregledu učnega načrta. Na podlagi povratnih informacij konzorcij pri učnem načrtu ne vidi nobenih bistvenih slabosti, vendar se bodo povratne informacije uporabile za nadaljnje izboljšanje in razvoj didaktične vsebine.



Priloga 1: Povzetek učnega načrta



O1A3_Analysis-deliv
ery_SLO.pdf

Priloga 2: Vprašalnik za evalvacijo učnega načrta

Vprašalnik je iz spletne platforme <https://www.1ka.si/>

Za odpiranje dokumenta dvokliknite nanj.



Microsoft Word
Document

Priloga 3: Povzetek analize

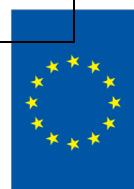
Orodje za anketiranje: lka.si

ANALIZA - Povzetek

Q1	In your opinion, to what extent does the Joint curriculum address the requirements of the construction and maintenance industry regarding knowledge, skills, and competencies in the field of BIM?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (Considerably addresses the requirements)	14	2%	64%	64%
	2 (Somewhat addresses the requirements)	7	1%	32%	95%
	3 (Partially addresses the requirements)	1	0%	5%	100%
	4 (Poorly addresses the requirements)	0	0%	0%	100%
Valid	Valid	22	3%	100%	

Average	1.4	Std. deviation	0.6
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Q2_3	Do you have any ideas or suggestions that might help us improve the curriculum?				
	Answers	Frequency	Percent	Valid	Cumulative
	where is the project partner execution or its requirements? does the bim-software point out that there are different works depending on which works are better or worse suitable for the respective process/work step?	1	0%	13%	13%
	to wider the bim in construction management(especially in structural and mep design) and in facility operation	1	0%	13%	25%
	modules 3 and 4 are very ambitious, and with a view to a more in-depth knowledge of the subject, their contents must be approached from a more technical point of view, on all home automation systems to be implemented in bim. taking into account that the professionals who are going to take this course do not know both subjects, these, by themselves, could already constitute a complete course due to their complexity.	1	0%	13%	38%
	greater emphasis on interior design for the older adults. the faculty of design has extensive experience in this field.	1	0%	13%	50%
	bim standards for exchange of information	1	0%	13%	63%
	· to implement higher level of interdisciplinary approach.	1	0%	13%	75%
	i am not clear how long it would last as a course, but in my opinion this should be a course offered to students who already have knowledge of bim. or give a little more space to the topic of bim within the course. i think two units on bim would be needed, one theoretical and one practical.	1	0%	13%	88%
	dealing with different construction and collision programs (what are they and what can they do); what are new file formats and what can they do (keyword ifc-file); what are new possibilities for	1	0%	13%	100%



	displaying existing buildings (keyword drones); important: visiting construction sites which are or were planned with bim				
Valid	Valid	8	1%	100%	

Q3	In your opinion, to what extent does the curriculum address the needs of older adults and their caretakers in their domestic environment and the resulting challenges for the construction of smart environments?				
	Answers	Frequency	Percent	Valid	Cumulative
	1 (Considerably addresses the requirements)	17	3%	71%	71%
	2 (Somewhat addresses the requirements)	6	1%	25%	96%
	3 (Partially addresses the requirements)	1	0%	4%	100%
	4 (Poorly addresses the requirements)	0	0%	0%	100%
Valid	Valid	24	4%	100%	

Average	1.3	Std. deviation	0.6
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Q4	Do you have any ideas or suggestions that might help us improve the curriculum?				
	Answers	Frequency	Percent	Valid	Cumulative
	digital skills	1	0%	33%	33%
	to have more hours (lessons) of practical work____ - to have lessons to work on new skills of older adults	1	0%	33%	67%
	i would like to address here the absolutely necessary ethical discussion of technology. this discussion should definitely be included in the curriculum. it would be good to establish the connection between technology and people. how does technology support people in the respective case/restriction. where are the advantages.	1	0%	33%	100%
Valid	Valid	3	0%	100%	

Q5	Please express your agreement with the following statements related to the curriculum.										
	Subquestion	Answers						Valid	Units	Average	Std. deviation
		Comple tely disagree	Disagree	Neither agree nor disagree	Agree	Comple tely agree	Valid				
Q5a	The selected modules, lessons, and topics are essential to the construction and building industry, with a special focus on BIM and Smart Housing	0 (0%)	0 (0%)	3 (14%)	6 (29%)	12 (57%)	21 (100%)	21	659	4.4	0.7
Q5b	Higher Education Students will acquire the necessary knowledge on how to work with BIM	0 (0%)	0 (0%)	2 (10%)	10 (48%)	9 (43%)	21 (100%)	21	659	4.3	0.7



Q5c	The curriculum will facilitate the implementation of sustainable practices in the construction industry	0 (0%)	0 (0%)	1 (5%)	9 (43%)	11 (52%)	21 (100%)	21	659	4.5	0.6
Q5d	The curriculum will provide the latest knowledge and models on combining BIM methods with AAL	0 (0%)	0 (0%)	1 (5%)	7 (33%)	13 (62%)	21 (100%)	21	659	4.6	0.6

Q6 Please rate the relevance of each module for the construction industry.													
	Subquestion	Answers								Valid	Units	Average	Std. deviation
		Very irrelevant	Quite irrelevant	Some what irrelevant	Neither irrelevant nor relevant	Some what relevant	Quite relevant	Very relevant	Valid				
Q6a	Module 1. Basic concepts on Building Information Modelling	1 (5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	8 (38%)	12 (57%)	21 (100%)	21	659	6.3	1.3
Q6b	Module 2. The needs of the senior citizens and their caretakers	1 (5%)	0 (0%)	0 (0%)	2 (10%)	3 (14%)	4 (19%)	11 (52%)	21 (100%)	21	659	6.0	1.5
Q6c	Module 3. Smart Housing and Ambient Assisted Living Principles	1 (5%)	0 (0%)	0 (0%)	0 (0%)	2 (10%)	6 (29%)	12 (57%)	21 (100%)	21	659	6.2	1.4
Q6d	Module 4. Interactions between BIM, Smart Housing and AAL	1 (5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (29%)	14 (67%)	21 (100%)	21	659	6.4	1.3
Q6e	Module 5. Project Management, Innovation Management and collective competences for an optimum implementation of BIM principles and AAL concepts	1 (5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	7 (37%)	11 (58%)	19 (100%)	19	659	6.3	1.4

Q7 Please rate the relevance of each unit for the construction industry.													
	Subquestion	Answers								Valid	Units	Average	Std. deviation
		Very irrelevant	Quite irrelevant	Some what irrelevant	Neither irrelevant nor relevant	Some what relevant	Quite relevant	Very relevant	Valid				
Q7a	1.1 Introduction to Building Information Modelling	1 (5%)	0 (0%)	0 (0%)	1 (5%)	1 (5%)	3 (16%)	13 (68%)	19 (100%)	19	659	6.3	1.5
Q7b	1.2 Paradigm shift in the AEC Sector – from 2D to 3D modelling	1 (5%)	0 (0%)	0 (0%)	0 (0%)	2 (11%)	4 (21%)	12 (63%)	19 (100%)	19	659	6.3	1.4

Q7c	1.3 What are the main goals of BIM?	1 (6%)	0 (0%)	0 (0%)	0 (0%)	2 (13%)	3 (19%)	10 (63%)	16 (100%)	16	659	6.2	1.6
Q7d	1.4 What are the main possible benefits by using BIM methods in the Building and Construction sector?	1 (6%)	0 (0%)	0 (0%)	1 (6%)	1 (6%)	1 (6%)	12 (75%)	16 (100%)	16	659	6.3	1.7
Q7e	1.5 Obstacles to the introduction of BIM methods into the AEC Sector	1 (6%)	0 (0%)	0 (0%)	1 (6%)	1 (6%)	5 (31%)	8 (50%)	16 (100%)	16	659	6.0	1.6
Q7f	1.6 Brief description of main software used by BIM	1 (7%)	0 (0%)	0 (0%)	0 (0%)	1 (7%)	4 (27%)	9 (60%)	15 (100%)	15	659	6.2	1.6
Q7g	1.7 Application of BIM methods in the Architecture, Engineering and Construction (AEC) Industry.	1 (7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (33%)	9 (60%)	15 (100%)	15	659	6.3	1.5
Q7h	2.1 Characteristics and needs of older adults	1 (5%)	0 (0%)	0 (0%)	0 (0%)	2 (11%)	4 (21%)	12 (63%)	19 (100%)	19	659	6.3	1.4
Q7i	2.2 Supporting the needs of older adults in the building environment	1 (5%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)	4 (21%)	13 (68%)	19 (100%)	19	659	6.4	1.4
Q7j	2.3 Working with older adults and their caregivers	1 (5%)	0 (0%)	0 (0%)	1 (5%)	1 (5%)	5 (26%)	11 (58%)	19 (100%)	19	659	6.2	1.5
Q7k	2.4 Human centric design strategies	1 (5%)	0 (0%)	0 (0%)	0 (0%)	2 (11%)	3 (16%)	13 (68%)	19 (100%)	19	659	6.3	1.5
Q7l	3.1 AAL principles	1 (5%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)	4 (21%)	13 (68%)	19 (100%)	19	659	6.4	1.4
Q7m	3.2 Sensors	1 (5%)	0 (0%)	0 (0%)	1 (5%)	1 (5%)	6 (32%)	10 (53%)	19 (100%)	19	659	6.1	1.5
Q7n	3.3 Signal processing basics	1 (5%)	0 (0%)	0 (0%)	1 (5%)	1 (5%)	6 (32%)	10 (53%)	19 (100%)	19	659	6.1	1.5
Q7o	3.4 How do components communicate?	1 (5%)	0 (0%)	0 (0%)	0 (0%)	2 (11%)	6 (32%)	10 (53%)	19 (100%)	19	659	6.2	1.4
Q7p	3.5 Industry examples and state of the art	1 (5%)	0 (0%)	0 (0%)	1 (5%)	1 (5%)	5 (26%)	11 (58%)	19 (100%)	19	659	6.2	1.5

Q2	Please rate the relevance of each unit for the construction industry.												
	Subquestion	Answers								Valid	Units	Average	Std. deviation
		Very irrelevant	Quite irrelevant	Some what irrelevant	Neither irrelevant nor relevant	Some what relevant	Quite relevant	Very relevant	Valid				
Q2a	4.1 Integration of other disciplines into BIM planning methods.	1 (6%)	0 (0%)	0 (0%)	0 (0%)	1 (6%)	5 (28%)	11 (61%)	18 (100%)	18	659	6.3	1.4
Q2b	4.2 Consistent documentation of buildings as a base for Facility Management.	1 (6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (28%)	12 (67%)	18 (100%)	18	659	6.4	1.4
Q2c	4.3 Smart Housing and AAL aspects in	1 (6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (33%)	11 (61%)	18 (100%)	18	659	6.3	1.4

	planning.													
Q2d	4.4 Smart House and AAL aspects during the operation phase.	1 (6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (28%)	12 (67%)	18 (100%)	18	659	6.4	1.4	
Q2e	4.5 Technical issues.	1 (5%)	0 (0%)	0 (0%)	1 (5%)	0 (0%)	5 (26%)	12 (63%)	19 (100%)	19	659	6.3	1.5	
Q2f	5.1 Project management	1 (5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (32%)	12 (63%)	19 (100%)	19	659	6.4	1.4	
Q2g	5.2 Innovation and Digital World	1 (5%)	0 (0%)	0 (0%)	2 (11%)	1 (5%)	5 (26%)	10 (53%)	19 (100%)	19	659	6.0	1.6	
Q2h	5.3 BIM Implementation Plan	1 (5%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)	7 (37%)	10 (53%)	19 (100%)	19	659	6.2	1.4	
Q2i	5.4 Return on Investment (ROI) with BIM	1 (5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	7 (37%)	11 (58%)	19 (100%)	19	659	6.3	1.4	
Q2j	5.5 BIM Framework components to enable accurate and consistent BIM performance measurement	1 (5%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)	5 (26%)	12 (63%)	19 (100%)	19	659	6.3	1.4	
Q2k	5.6 Ambient Assisted Living Concepts	1 (5%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)	5 (26%)	12 (63%)	19 (100%)	19	659	6.3	1.4	

Q8	In your opinion, are there any other topics that we should consider including?				
	Answers	Frequency	Percent	Valid	Cumulative
	standards and procedures in digital exchange of information in bim environment.	1	0%	17%	17%
	smart and energy efficient buildings of the future smart finance for smart buildings: investing in smart and energy efficient buildings	1	0%	17%	33%
	smart housing and sustainable energy development	1	0%	17%	50%
	to wider the bim in construction management(especially in structural and mep design) and in facility operation	1	0%	17%	67%
	this curriculum will have greater benefits if you provide detailed description on some of the bim software which is widely used in the construction industry. in that way you will help future engineers to have much successful cooperation with engineers from other fields. also, it will be quite beneficial if you provide in some extent what is the impact of this system on all other building phases and mitigation of the possible obstacles.	1	0%	17%	83%
	i consider module 1 very basic. as didactic material, 100 pages are proposed. if a professional does not know anything about bim, this teaching material will not be enough. however, if other modules are accompanied by video tutorials for learning, then it seems right to me. as i mentioned in a previous answer, there is room for a more technical development of units 3 and 4.	1	0%	17%	100%
Valid	Valid	6	1%	100%	

Q9	Please indicate your level of agreement with the following statements.							Valid	Units	Average	Std. deviation
	Subquestion	Answers					Valid	Units	Average	Std. deviation	
		Completely disagree	Disagree	Neither agree nor	Agree	Completely agree	Valid				



				disagree							
Q9a	It is essential that the course implements a user-centred pedagogical approach (e.g., videos, infographics, slide presentations, etc.)	0 (0%)	0 (0%)	0 (0%)	4 (20%)	16 (80%)	20 (100%)	20	659	4.8	0.4
Q9b	The learning outcomes should be easily accessed through quizzes and tests	0 (0%)	0 (0%)	1 (5%)	6 (30%)	13 (65%)	20 (100%)	20	659	4.6	0.6
Q9c	This course should give some form of recognition (e.g., certificate)	0 (0%)	0 (0%)	1 (5%)	4 (20%)	15 (75%)	20 (100%)	20	659	4.7	0.6
Q9d	The course could interest learners from different sectors of the AEC industry	0 (0%)	0 (0%)	0 (0%)	5 (25%)	15 (75%)	20 (100%)	20	659	4.8	0.4

Q10	Please rate your level of agreement with the following statements related to the key driver to implement the curriculum.										
	Subquestion	Answers						Valid	Units	Average	Std. deviation
		Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree	Valid				
Q10a	With the knowledge obtained in this course, participants will have an easier time gaining new skills	0 (0%)	0 (0%)	0 (0%)	10 (50%)	10 (50%)	20 (100%)	20	659	4.5	0.5
Q10b	The specified modules and the related sub-topics fit together nicely	0 (0%)	0 (0%)	1 (5%)	12 (60%)	7 (35%)	20 (100%)	20	659	4.3	0.6
Q10c	The course will help to close the gap in BIM and AAL knowledge, skills, and competencies for employees from the construction and facility management fields	0 (0%)	0 (0%)	1 (5%)	8 (42%)	10 (53%)	19 (100%)	19	659	4.5	0.6
Q10d	After completing the course, participants will be more aware of seniors needs in an ageing society.	0 (0%)	0 (0%)	0 (0%)	6 (30%)	14 (70%)	20 (100%)	20	659	4.7	0.5
Q10e	The participant will be satisfied with the knowledge obtained in the course.	0 (0%)	0 (0%)	2 (10%)	9 (45%)	9 (45%)	20 (100%)	20	659	4.4	0.7

Q11	Please rate your level of agreement with the following statements related to possible barriers of the curriculum.										
	Subquestion	Answers						Valid	Units	Average	Std. deviation

		Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree	Valid				
Q11a	The lessons do not meet the needs of the AEC industry	7 (35%)	4 (20%)	4 (20%)	2 (10%)	3 (15%)	20 (100%)	20	659	2.5	1.5
Q11b	The units do not complement each other	6 (30%)	8 (40%)	1 (5%)	2 (10%)	3 (15%)	20 (100%)	20	659	2.4	1.4
Q11c	The topics covered in this course will not add value to the students curriculum vitae	7 (35%)	9 (45%)	0 (0%)	1 (5%)	3 (15%)	20 (100%)	20	659	2.2	1.4
Q11d	The different materials developed for this course are not well interrelated, it will be difficult for the learner to manage such content	8 (40%)	6 (30%)	1 (5%)	2 (10%)	3 (15%)	20 (100%)	20	659	2.3	1.5
Q11e	The content is not clear enough to enable learners to design older adults environments as BIM Models?	7 (35%)	8 (40%)	1 (5%)	3 (15%)	1 (5%)	20 (100%)	20	659	2.2	1.2

Q12	If you have any other comments or suggestions, please include them here:				
	Answers	Frequency	Percent	Valid	Cumulative
	include more practical examples and interactive methods of training, that empower learners' engagement and progress.	1	0%	20%	20%
	bim solutions and smart architectural solutions for education of senior citizens	1	0%	20%	40%
	smart architectural solutions for education and fuction for senior citizens	1	0%	20%	60%
	die verzahnung von technik und wohnbedürfnissen älterer menschen und die anforderungen der pflege sollte genauer hergestellt werden.	1	0%	20%	80%
	die ausführung wird wie so üblich zu stark aussen vor gelassen.	1	0%	20%	100%
Valid	Valid	5	1%	100%	

