essense

Education Supporting Smart Environments for Seniors

Validation of Joint Curriculum - Analysis.

1st Version

Erasmus+

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Erasmus+

1. Introduction

The ESSENSE Erasmus+ project is developing a High Educational course on "Building Information Modelling (BIM) towards the development of Smart environments for Seniors" (ESSENSE). This course is about to integrate smart solutions, ambient assisted living (AAL) elements, and building information modelling (BIM) methods into the built environment to facilitate support of active and healthy ageing.

At this stage the first version of the course Joint Curriculum is developed. The curriculum is divided into five modules (and each module is further divided into units):

Module 1: Basic concepts on Building Information Modelling
Module 2: The needs of their senior citizens and their caretakers
Module 3: Smart Housing and Ambient Assisted Living principles
Module 4: Interactions between BIM, Smart Housing and AAL
Module 5: Project Management, Innovation Management and collective competences for an optimum implementation of BIM principles and AAL concepts.

In order to identify potential weaknesses and opportunities for improvement, each partner should identify at least 2 entities to review the Joint Curriculum and provide feedback in terms of its relevance in achieving project objectives and their expected impact.

2. Evaluation of the Joint Curriculum

External market stakeholders, ranging from universities, enterprises and workers, public bodies, caretakers and relatives, etc. were asked to evaluate the Joint Curriculum. Disseminated by the project partners, the stakeholders received the Summary of the Joint Curriculum (see Annex 1) together with the developed questionnaire (see Annex 2).

With the purpose to reach a large number of potential experts in each partner country, it was decided by the consortium to translate the survey and the Joint Curriculum into the partner country languages.

In the beginning, the participants were asked for general feedback of the curriculum as a whole. Gradually the questions became more specific and asked about the relevance and quality of specific course modules as well as the units belonging to each module.

3. Results of the Evaluation

The survey has reached around 600 people all over the world – with the majority coming from EU, USA and Canada. In total, 27 respondents completed the survey, of those 6 partially and 20 in full. Most of them were from Germany, followed by North Macedonia, Spain and Slovenia.

In general, the feedback results are very homogeneous and confirms that the Joint Curriculum is covering the expectations of the AEC-Industry (Architecture-Engineering-Construction Industry).

In the following, the feedback will be summarized related to each single question:

Question 1: 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?

Almost all participants believe that the Joint curriculum considerably or somewhat **addresses** the requirements of the construction and maintenance industry. One expressed concern was that the course content is very complex and is appropriate mainly for those experienced in BIM (comment f.). Another idea was to offer two BIM-related courses, one with theoretical and the other with practical focus (comment g.). Additionally, one responded did miss the requirements of the execution of the construction work (comment a.). And finally, it was suggested to make the course more interdisciplinary (comment e).

Below the overview of all suggestions given to improve the curriculum:

a. “where is the project partner \"execution\" or its requirements? does the bim-software point out that there are different ones depending on which work is better or worse suited for the respective process/work step?”
b. “dealing with different construction and collision programs (which ones exist, what can they do); what are new file formats and what can they do (keyword ifc-file); what are new possibilities to display existing buildings (keyword drones); important: visit of construction sites which were built or planned with BIM”
c. “BIM standards for an exchange of information”
d. “to wider the BIM in construction management (especially in structural and MEP design) and in facility operation”
e. “to implement a higher level of interdisciplinary approach.”

f. “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.”

g. “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.”

h. “greater emphasis on interior design for the older adults. the faculty of design has extensive experience in this field.”

Question 2: 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?

In the opinion of 96% of the participants the curriculum considerably/somewhat addresses the requirements.

A participant of the survey asks to include the ethical discussion of technology. (comment c.) Another suggestion is to offer more lessons of practical work and lessons to work on new skills for older adults (comment b.)

Below the overview of all suggestions given to improve the curriculum:

a. “Digital skills”

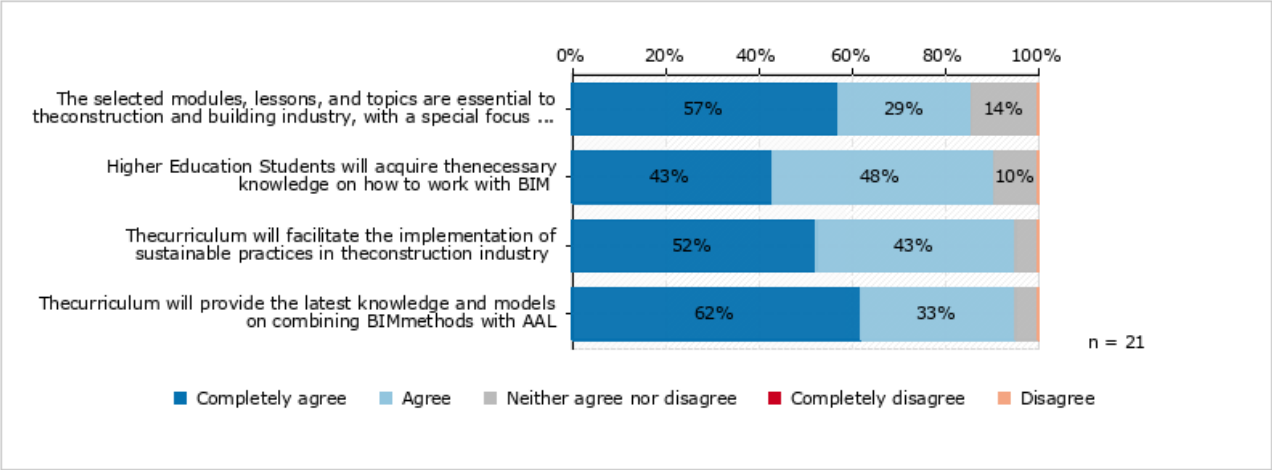
b. “To have more hours (lessons) of practical work, to have lessons to work on new skills of older adults”

c. “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?

Question 3: Please express your agreement with the following statements related to the curriculum

About 90% of the respondents rated the curriculum content as very positive. (Figure 1) They expressed, that the Higher Education Students will acquire the necessary knowledge on how to work with BIM and Smart Housing; that the curriculum will facilitate the implementation of sustainable practices in the construction industry and that it will provide the latest knowledge and models on combining BIM methods with AAL. 74% of the respondents agree that the selected modules, units and topics fit into the curriculum. On the other hand, 21% think that the elected topics are neither relevant nor irrelevant and 5% think that the selected topics are not of interest for the built industry at all. (Figure 1)

Figure 1: Level of agreement on statements related to the curriculum



Question 4: Please rate the relevance of each module for the construction industry.

The relevance of the single **modules** was generally evaluated as very high. On average, 95% of all participants rated all 5 Modules as very or quite relevant. Only in the Module 2 (The needs of the senior citizens and their caretakers) the score was lower, where 71% of the respondents believed that the topic is quite or very relevant.

Question 5: Please rate the relevance of each unit for the construction industry

On average more than 90% of all participants think that the content of the single **Units** within the different Modules is quite or very relevant for the construction industry. In contrast to this, 10% believe that some Units are less relevant.

<u>The following suggestions were given regarding to further content to be considered in the units:</u>
(see Analysis Overview Annex 3)

- “standards and procedures in digital exchange of information in bim environment.”

- “smart and energy efficient buildings of the future smart finance for smart buildings: investing in smart and energy efficient buildings”
- “smart housing and sustainable energy development”
- “to wider the bim in construction management (especially in structural and mep design) and in facility operation”
- “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.”

Question 6: Please indicate the level of agreement with the following statements

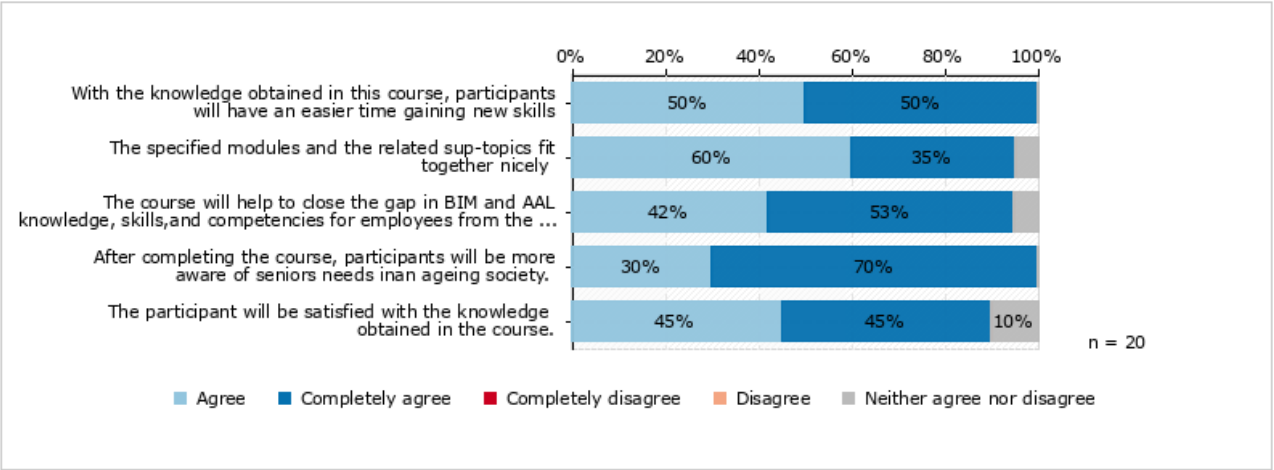
All participants (completely) agree that it is essential that the course implements a user-centred pedagogical approach (e.g., videos, infographics, slide presentations, etc.)

The majority (more than 90%) confirmed that the learning outcomes should be easily accessed through quizzes and test. All respondents agreed that the course should conclude with a certificate and that the course could be interesting to people from different areas of the AEC-Industry (Architecture, Engineering and Construction).

Question 7: Please rate your level of agreement with the following statements related to the key driver to implement the curriculum

Almost all of the respondents agreed or completely agreed to the determined key drivers to implement the curriculum (Figure 2).

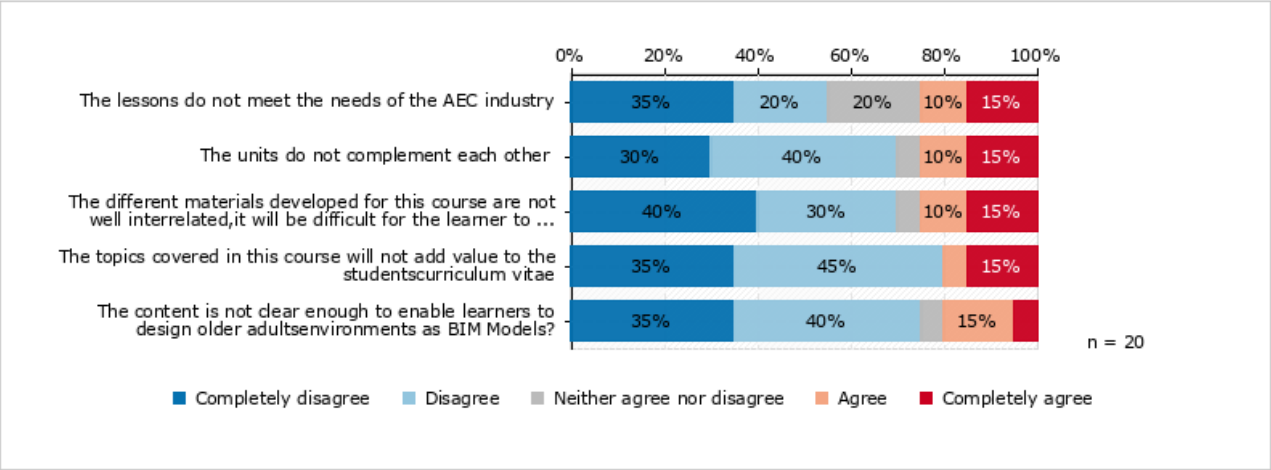
Figure 2: Level of agreement with the statements related to the key driver to improve the curriculum



Question 8: Please rate your level of agreement with the following statements related to possible barriers of the curriculum

The feedback about the **barriers** related to the framework of the course is mixed, compared with the other answers in this survey. Whereas the summary of the evaluation over all questions is very positive and confirms that the course content is well developed and structured, about 20-25% of the respondents of this question stated that the course content is **not** well defined and offers **no** value for the course participants. (Figure 3)

Figure 3: Level of agreement with statements related to possible barriers of the curriculum



Considering the answers to the previous questions, it is unlikely that results on this question accurately reflect the opinion of respondents. It is possible that some participants did not properly understand the questions, as they were negatively framed (e.g. “the lessons do **not** meet the needs of the AEC industry”). Still, at least 75-80% completely disagree and disagree regarding the defined barriers.

Question 9: If you have any other comments or suggestions, please include them here:

To include more practical examples, interactive training methods (c.) and to consider the role of the execution within the construction process (a.) is highly recommended by the participants. Additionally, it is advised to clarify the technology opportunities and the needs of older people in their housing (b.). That the senior citizens might require themselves digital educational to be able to use the new technologies can be interpreted from the comments d) and e).

In the following suggestions were given regarding to further suggestions to improve the curriculum (reference see Annex 3)

a) “the execution is left out too much, as usual”
b) “the link between technology and the housing needs of older people and the requirements of care should be clarified”

c) “include more practical examples and interactive methods of training, that empower learners’ engagement and progress.”
d) “bim solutions and smart architectural solutions for education of senior citizents”
e) “smart architectural solutions for education and function for senior citizents”

4. Conclusion of the Evaluation of the Joint Curriculum

The defined Joint Curriculum – with its five Modules and related Units is considered by the participating experts as very positive. The outlined topics are defined well and fit together to reach the main target.

The suggestions of the participants are very beneficial to understand the priorities of the market representatives and it is useful to pay special attention on this feedback while reviewing the Joint Curriculum. Based on the feedback, the consortium does not see any significant weaknesses, but it will use the feedback to further improve the Joint Curriculum and to develop the didactic content.

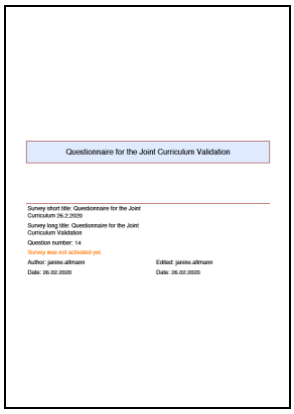
Annex 1: Summary of the Joint Curriculum

Annex 1_Curriculum Summary.pdf

Annex 2: Questionnaire for the Joint Curriculum Validation

Questionnaire withdrawn from the survey tool: https://www.1ka.si/

Please double click the document to open.



Annex 3: Analysis Summary

Survey tool: 1ka.si

ANALYSIS - Summary

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

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 displaying existing buildings (keyword drones); important: visiting construction sites which are or were planned with bim	1	0%	13%	100%
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

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**
		Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely 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	Somewhat irrelevant	Neither irrelevant nor relevant	Somewhat 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	Somewhat irrelevant	Neither irrelevant nor relevant	Somewhat 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	Somewhat irrelevant	Neither irrelevant nor relevant	Somewhat 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 planning.	1 (6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (33%)	11 (61%)	18 (100%)	18	659	6.3	1.4
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	1	0%	17%	83%

	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.				
	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.**										
	Subquestion	**Answers**						**Valid**	**Units**	**Average**	**Std. deviation**
		Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree	Valid				
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 sup-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	0 (0%)	0 (0%)	2 (10%)	9 (45%)	9 (45%)	20 (100%)	20	659	4.4	0.7

	the course.										

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 citizents	1	0%	20%	40%
	smart architectural solutions for education and fuction for senior citizents	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%	