# PILOT STUDY RESULTS

## Introduction

Below, the results from the pilot study regarding the first phase of GBL/EDG syllabi implementation at higher education institutions in Poland and Slovakia are presented. The pilot phase was designed as a quasi-experimental study to examine the immediate effects of the intervention on participants' perceptions, motivation, and readiness regarding GBL and EDG. For future game developers, the focus is on their readiness to create educational games, whereas for future teachers, it is on their readiness to implement games in their educational practice. In addition, the study seeks to explore students' reflective learning experiences related to the implemented syllabi.

## 1.1 Methodology

The analysis integrates both quantitative and qualitative data. The quantitative data are intended to assess changes in participants' perceptions, motivation, and readiness before and after the intervention, as well as their evaluation of the syllabi after the course. The qualitative data, in turn, provide deeper insight into participants' lived experiences, challenges, engagement, and perceptions of the value of the courses. This combined approach ensures a more comprehensive understanding of the outcomes of the pilot phase.

Data for course participants was collected using a combination of quantitative and qualitative methods:

### a) Pre-/Post-Questionnaires

Questionnaires administered at the beginning and end of the course that measured:

- perceptions of GBL/EGD (both pre and post)
- motivation to use or design educational games (both pre and post)
- readiness for future implementation (both pre and post)
- assessment of the course (post)

These questionnaires provide measurable evidence of change across the intervention period.

Research Questions

**RQ1. How do students perceive the value and pedagogical usefulness of Game-Based Learning (GBL) and Educational Game Design (EGD) for their future practice?**

This question captures students' general perceptions of GBL and EGD, especially its usefulness, relevance, and educational effectiveness.

**RQ2. To what extent are students motivated to use or design educational games in their future teaching?**

This question measures students' intentions, willingness, and future-oriented motivation to apply or promote GBL.

**RQ3. How ready do students feel to implement GBL in practice, in terms of confidence, skills, and self-efficacy?**

This question measures readiness for future implementation, especially self-confidence and perceived competence.

**RQ4. How does participation in the game-based syllabus influence students' engagement, learning experience, and post-course perceptions of GBL?**

This question captures the impact of the course/syllabus itself on students' experience and perception after the intervention. It also captures the intervention effect more directly than the first three. It focuses on engagement; attention; enjoyment; mastery; usability; relevance and perceived professional value. So it reflects the experienced impact of the syllabus, not just abstract beliefs about GBL/EDG

**Final grouping of questions for the GBL syllabus**

**Items measuring RQ1: Perceptions of GBL**

- I think educational games will be useful in my future practice. (Q13)
- Using games for learning could improve student engagement. (Q15)
- Applying GBL will enhance learning outcomes for my students. (Q17)

**Items measuring RQ2: Motivation to use or design educational games**

- I intend to integrate GBL into my lessons next semester. (Q24)
- I plan to recommend educational games to my colleagues. (Q25)
- I will look for opportunities to use game-based activities in my teaching. (Q26)
- I expect to continue developing games for educational purposes. (Q27)
- I doubt that I will ever use educational games in my teaching. (*reverse-coded*) (Q23)

**Items measuring RQ3: Readiness for future implementation**

- I feel confident that I can use game-based learning in my teaching. (Q8)
- I believe I have the skills needed to develop educational games. (Q9)
- I can teach others how to apply game-based learning techniques. (Q11)

**Items measuring RQ4: Post-course syllabus impact on perception**

- The activities in the syllabus were fun and engaging. (Q1)
- I found myself looking forward to each game-based session. (Q2)
- The course did not hold my attention during its duration. *(reverse-coded)* (Q3)
- Working with educational games made the material more interesting. (Q4)
- I felt absorbed in the tasks when using the game-based approach. (Q5)
- I think the course was mostly boring. *(reverse-coded)* (Q6)
- I was able to master the concepts presented in the GBL syllabus. (Q10)
- In comparison to others, I did pretty well in the course. (Q12)
- The game-based syllabus content is relevant to real classroom needs. (Q14)
- The skills I gained are worthwhile for my professional development. (Q16)
- It is easy for me to learn how to develop an educational game. (Q18)
- I found it straightforward to navigate the tools and resources. (Q19)
- Learning to develop games felt more frustrating than helpful. *(reverse-coded)* (Q20)
- Interacting with the game-based modules required little effort. (Q21)
- I can quickly become skillful at using the syllabus materials. (Q22)

Questionnaires administered at the beginning of the course aimed to measure:

- perceptions of GBL
- motivation to use or design educational games
- readiness for future implementation

Questionnaires administered after the end of the course aimed to measure:

- perceptions of GBL
- motivation to use or design educational games
- readiness for future implementation
- post course sylabus impact

**Final grouping of questions for the EDG syllabus**

**Items measuring RQ1: Perceptions of the value and relevance of educational game development**

- The Educational Game Development syllabus content is relevant to authentic classroom needs (Q14)
- Designing games for learning could meaningfully improve student engagement (Q15)
- The game design skills I gained are worthwhile for my future career as an educational game developer (Q16)
- Applying the principles from this course will enhance learning outcomes for end users of my games (Q17)

**Items measuring RQ2: Motivation to design educational games**

- I enjoy creating educational games (Q1)
- Designing game mechanics for learning feels rewarding (Q2)
- Working on educational games keeps me engaged (Q4)
- I lose track of time when I'm building game based activities (Q5)
- I look forward to each session of developing educational content (Q6)
- I feel I was unable to perform well in the course (R-C) (Item 7)
- I doubt that I will ever create educational games in my work (R-C) (Item 23)
- I intend to publish at least one educational game in the next six months (Item 24)
- I plan to share my game-based projects with the teaching community (Item 25)

**Items measuring RQ3: readiness to create ED**

- my games can meaningfully improve learner engagement (Item 8)
- I can implement instructional design principles in my games (Item 9)
- I am confident in my ability to code or configure game elements (Item 10)
- the effort I put into game development will pay off in real-world use (Item 11)
- creating educational games will enhance my professional portfolio (Item 12)
- educational game design is not important for me (R-C) (Item 13)

**Items measuring RQ4: Post-course syllabus impact on perception**

- it is easy for me to learn how to develop an educational game using the provided materials (Item 18)
- I found it straightforward to navigate the game-development tools and resources (Item 19)
- learning to develop educational games felt more frustrating than helpful (R-C) (Item 20)
- working with the Educational Game Development modules required little effort (Item 21)
- I could quickly become skillful at using the course's game-development materials (Item 22)

Questionnaires administered at the beginning of the course aimed to measure:

- perceptions of EDG
- motivation to design educational games
- readiness for future implementation

Questionnaires administered after the end of the course aimed to measure:

- perceptions of EDG
- motivation to design educational games
- readiness for future implementation
- post course sylabus impact

### b) Student Reflective Diaries

Reflective diaries were used to capture participants' ongoing learning experiences. They provided insight into engagement; challenges; perceived value of the course and personal reflections on learning and future application. Reflective diaries contributed primarily to the qualitative analysis. The following research question guided the analysis:

**RQ5:** How do students reflect on their learning experiences in GBL and EGD courses through their reflective diaries, and what themes emerge from these reflections regarding engagement, challenges, and perceived value?

### c) Focus Groups

As part of the final course evaluation, students participated in focus group discussions designed to gather collective reflections on their experience of the Game-Based Learning syllabus. The focus groups were conducted in international, mixed teams and followed a structured discussion format. Each group included a moderator, responsible for guiding the conversation and ensuring that all participants contributed, and a note-taker, responsible for recording the main points and anonymised quotations. A mentor was also available to provide procedural support when needed, for example by clarifying a question or helping the group stay focused, but the discussion itself remained student-led. The groups were asked to work collaboratively toward a shared set of outputs. By the end of the session, each group was expected to identify three strengths of the course, three pain points, three quick wins (small changes that could be introduced immediately), three structural changes (broader improvements for future iterations), and two anonymised quotations reflecting the main issues discussed. To support consistency across groups, the discussion was guided by a set of core prompts focusing on what worked well in the course, what was difficult, and what should be changed. Additional optional prompts explored issues such as pedagogy–tool balance, support, barriers, teamwork, inclusivity, feedback, assessment, and future transfer to professional practice.

The applied structure ensured that the focus groups generated both evaluative feedback on the course and qualitative evidence relevant to the study's research questions, especially in relation to students' perceptions, motivation, and readiness to apply GBL and educational game design in future contexts.

**RQFG1.** Which course elements did students perceive as most effective in supporting their learning and the development of a playable educational game prototype?

**RQFG2.** What challenges, barriers, and sources of confusion did students experience during the course and the game design process?

**RQFG3.** How did students perceive the balance between pedagogical application and game design, and how feasible did they consider these approaches for future professional use?

**RQFG4.** What changes did students recommend to improve future iterations of the course in terms of pedagogy, support, collaboration, assessment, and inclusivity?

## Participant Groups

The analysis focuses on pre-service teachers (Group T) following the Game-Based Learning syllabus. We wanted to examine the following:

- perceptions of game-based learning/educational game development
- motivation to apply these approaches in future professional practice
- readiness to use or create educational games
- reflective accounts of learning experiences (both qualitative and quantitative)2

### a) CUBA participants:

A total of 22 participants took part in the pre-questionnaire evaluation. Of these, 19 were female and 3 were male. In terms of age, 5 participants were between 20 and 24 years old, while 17 were between 25 and 29 years old. Regarding level of study, 15 participants were undergraduate students and 7 were master's students. The majority of participants (n = 16) reported that they had not previously attended any related courses; 4 participants had attended one course, and 1 participant each had attended three and four courses, respectively. A similar pattern was observed for workshop attendance. 13 participants reported no previous workshop attendance, 5 had attended one workshop, and 2 had attended two workshops.

### b) UBB participants

Only seven students participated in the course, all of whom filled in the questionnaire before and after the course. 4 participants were at 20-24 years old, 1 from 25-29 and two after 30 years of age. Four of them studied at the undergraduate level, two masters, and one post graduate. Only two participants had participated in a game-based or gamification course. Two has taken part in a game-based workshops (on average 2,5 workshop).

### c) UCM participants:

A total of 33 participants took part in the study. Of these, 8 were female, 24 were male, and 1 preferred not to disclose their gender. In terms of age, 24 participants were between 25 and 29 years old, while 9 were aged 30 or above. Regarding previous course attendance, the data appear to be inconsistent and require verification. One part of the data indicates that 15 students had attended no courses, 6 had attended one course, and 7 had attended two courses. However, the remaining figures are unclear, as the values "3 one," "4 three," and "20 one" do not align logically with the total sample size.

A similar issue applies to workshop attendance. The data suggest that 17 students had attended no workshops, 3 had attended one workshop, 7 had attended two workshops, and 1 had attended four workshops. However, the additional figures provided ("5 one," "6 one," "7 two," and "10 one student") are inconsistent and need clarification before they can be reported accurately. In relation to perceptions of GBL, the students were asked the following questions and the scored gathered are present alongside for individual items and for a global category score.

## Data Analysis

The quantitative results are going to be presented first – divided by institution and then integrated for pedagogy students and Game design students. Afterwards, the qualitative analysis regarding students reflective journals is to be presented in a similar manner, followed by the integrated results from the focus group.

**UBB RESULTS**

**PRE-MEASUREMENT QUESTIONNAIRE RESULTS**

| **PERCEPTIONS OF GBL** | | | |
|---|---|---|---|
| | **MEAN** | **STD DEV** | **MEDIAN** |
| usefulness in future practice | 4,29 | 0,76 | 4 |
| improved student engagement | 4,71 | 0,49 | 5 |
| enhanced learning outcomes | 4,29 | 0,76 | 4 |
| **GLOBAL SCORE** | **4,33** | **0,67** | **4,33** |

| MOTIVATION TO USE OR DESIGN EDUCATIONAL GAMES | | | |
|---|---|---|---|
| intend to integrate GBL next semester | 3,86 | 1,07 | 4 |
| recommend educational games to colleagues | 4,14 | 0,90 | 4 |
| look for opportunities to use game-based activities | 4,43 | 0,53 | 4 |
| continue developing games | 4,14 | 0,90 | 4 |
| doubt that I will ever use educational games *(reverse-coded)* | 4,71 | 0,76 | 5 |
| **GLOBAL SCORE** | **4,20** | **0,83** | **4** |
| **READINESS FOR FUTURE IMPLEMENTATION** | | | |
| I feel confident I can use GBL | 4,43 | 0,53 | 4 |
| I have skills to develop educational games | 3,86 | 0,90 | 4 |
| I can teach others how to apply GBL techniques | 3 | 1,15 | 3 |
| **GLOBAL SCORE** | **3,76** | **0,86** | **4** |

**POST-MEASUREMENT QUESTIONNIARE RESULTS**

| PERCEPTIONS OF GBL | | | |
|---|---|---|---|
| | **MEAN** | **STD DEV** | **MEDIAN** |
| usefulness in future practice | 4,17 | 0,98 | 4 |
| improved student engagement | 4,5 | 0,55 | 4 |
| enhanced learning outcomes | 3,67 | 0,52 | 4 |
| **GLOBAL SCORE** | **4,11** | **0,76** | **4** |
| **MOTIVATION TO USE OR DESIGN EDUCATIONAL GAMES** | | | |
| intend to integrate GBL next semester | 1,83 | 0,98 | 4 |
| recommend educational games to colleagues | 3,83 | 1,17 | 4 |
| look for opportunities to use game-based activities | 4,0 | 0,89 | 4 |
| continue developing games | 4,17 | 0,75 | 4 |
| doubt that I will ever use educational games *(reverse-coded)* | 3,67 | 1,37 | 4 |
| **GLOBAL SCORE** | **4,35** | **1,31** | **4** |
| **READINESS FOR FUTURE IMPLEMENTATION** | | | |
| I am confident I can use GBL | 4,17 | 0,98 | 4 |
| I have skills to develop educational games | 3,67 | 1,37 | 4 |
| I can teach others how to apply GBL techniques | 3,17 | 0,98 | 3 |
| **GLOBAL SCORE** | **3,67** | **1,14** | **4** |
| **POST-COURSE SYLLABUS IMPACT** | | | |
| The activities in the syllabus were fun and engaging. | 3,50 | 1,05 | 3 |
| I found myself looking forward to each game-based session. | 3,33 | 0,12 | 3 |

| | | | |
|---|---|---|---|
| The course did not hold my attention during its duration. **(R-C)** | 4,0 | 0,89 | 4 |
| Working with educational games made the material more interesting. | 4,17 | 0,75 | 4 |
| I felt absorbed in the tasks when using the game-based approach. | 3,0 | 1,41 | 3 |
| I think the course was mostly boring. **(R-C)** | 3,83 | 1,17 | 4 |
| I feel I was unable to perform well in the game-based learning course. **(R-C)** | 3,17 | 0,89 | 3 |
| I was able to master the concepts presented in the GBL syllabus. | 3,5 | 0,84 | 4 |
| In comparison to others, I did pretty well in the course. | 3,17 | 0,98 | 3 |
| The game-based syllabus content is relevant to real classroom needs. | 3,83 | 0,75 | 4 |
| The skills I gained are worthwhile for my professional development. | 3,5 | 1,05 | 3 |
| It is easy for me to learn how to develop an educational game. | 3,17 | 0,98 | 3 |
| I found it straightforward to navigate the tools and resources. | 3,67 | 0,82 | 4 |
| Learning to develop games felt more frustrating than helpful. **(R-C)** | 3,33 | 0,82 | 3 |
| Interacting with the game-based modules required little effort. | 3,17 | 0,75 | 3 |
| I can quickly become skillful at using the syllabus materials. | 3,33 | 0,82 | 3 |
| **GLOBAL SCORE** | **3,5** | **0,93** | **4** |

The quantitative analysis examined changes in students' perceptions of GBL, motivation to use or design educational games, and readiness for future implementation before and after participation in the syllabus-based intervention. In line with the framework, post-course questionnaire data were also used to evaluate the perceived impact of the syllabus itself on students' learning experience. The sample was very small (**n = 7**), so the analysis is interpreted as descriptive and exploratory, not inferential. This means that the emphasis is placed on mean-score differences, dispersion, and item-level discrepancies, rather than on significance testing.

### Perceptions of GBL – RQ 1

Students' perceptions of GBL were already highly positive at the beginning of the course and remained positive after the intervention, although with a slight decline. The global score decreased by 0.22 points, from 4.33 to 4.11. At item level, the strongest

pre-course belief was that games could improve student engagement (M = 4.71), and this remained high after the course (M = 4.50). Belief in the usefulness of educational games in future practice also stayed high, dropping only slightly from 4.29 to 4.17. The largest decline in this category concerned the belief that GBL would enhance learning outcomes, which fell from 4.29 to 3.67. This pattern suggests that the intervention did not weaken students' general support for GBL, nut rather encouraged a somewhat more critical and differentiated view, especially regarding claims about direct learning-outcome improvement. After practical exposure to GBL and educational game design, students may have remained convinced of its motivational and engagement value, while becoming less certain that it automatically leads to stronger learning outcomes.

### Motivation to use or design educational games

Motivation showed the only category-level increase, rising from M = 4.20, SD = 0.83 before the course to M = 4.35, SD = 1.31 after it, a gain of 0.15 points. This suggests that participation in the course generally strengthened students' willingness to use, recommend, or continue designing educational games in the future. The item "I expect to continue developing games for educational purposes" stayed very high, moving slightly upward from 4.14 to 4.17, while "I will look for opportunities to use game-based activities in my teaching" remained strong at 4.00 post-course. At the same time, motivation became much more variable, as shown by the increase in standard deviation from 0.83 to 1.31. This means the intervention did not affect all students equally.

### Readiness for future implementation

Readiness was the lowest-scoring of the three categories both before and after the intervention. The global score declined slightly from M = 3.76, SD = 0.86 to M = 3.67, SD = 1.14, a difference of -0.09. This is a very small decrease, suggesting that readiness remained broadly stable overall. At item level, confidence in using GBL decreased from 4.43 to 4.17, and confidence in having the skills to develop educational games decreased from 3.86 to 3.67. The only item showing improvement was "I can teach others how to apply GBL techniques," which increased slightly from 3.00 to 3.17. The post-course rise in standard deviation from 0.86 to 1.14 again indicates greater variation among students. Some likely finished the course feeling more capable, while others may have become more conscious of the complexity of implementation and therefore rated themselves more cautiously.

### Summary of the post-course evaluation

The post-course questionnaire provides a generally positive picture of how students evaluated the syllabus after completing the intervention. Overall, the post-course syllabus impact category reached a mean of 3.50 with a standard deviation of 0.93, indicating a

moderately positive evaluation of the course as a whole. The strongest aspect of the post-course evaluation was students' perception that the course made the learning material more interesting. The highest-rated item in this section was "Working with educational games made the material more interesting" (M = 4.17, SD = 0.75), suggesting that the game-based format increased interest in the content. Students also rated quite positively the item stating that the syllabus content was relevant to real classroom needs (M = 3.83, SD = 0.75), which indicates that the course was seen as professionally meaningful and applicable to future teaching practice. In addition, students gave relatively positive ratings to the item concerning the worthwhile nature of the skills gained for professional development (M = 3.50, SD = 1.05). Together, these results suggest that students perceived the course as both engaging and professionally useful.

The evaluation also suggests that students responded positively to the overall structure and atmosphere of the course. Scores for looking forward to each game-based session (M = 3.33) and for the view that the activities in the syllabus were fun and engaging (M = 3.50) show that the course generated a moderate level of anticipation and enjoyment. Similarly, students reported a moderate sense of having mastered the concepts presented in the GBL syllabus (M = 3.50, SD = 0.84), which suggests that the intervention supported learning, although not at a uniformly high level for all participants.

At the same time, the results show that students did not experience the course as especially easy. Ratings for ease of learning how to develop an educational game (M = 3.17, SD = 0.98), interacting with the game-based modules required little effort (M = 3.17, SD = 0.75), and being able to quickly become skillful at using the syllabus materials (M = 3.33, SD = 0.82) were only moderate. Likewise, students' ratings of their own performance in the course were not especially high, as seen in the item "In comparison to others, I did pretty well in the course" (M = 3.17, SD = 0.98). This suggests that the course was valued, but also experienced as demanding and, for some students, somewhat challenging.

A particularly important point is that the course appears to have been seen as worthwhile rather than effortless. Students found the content interesting, relevant, and useful, but they were more reserved when evaluating the ease of the learning process or their own level of performance.

## QUALITATIVE DATA FROM UBB STUDENTS

Research aim:

**To measure the impact of syllabi-based interventions on students' perceptions, motivation, and readiness related to GBL and EDG implementation, using students' reflective journals as qualitative evidence.**

The uploaded journals show a clear developmental trajectory: students move from initial curiosity, uncertainty, and theoretical understanding of games toward practical confidence, prototype development, playtesting awareness, and readiness to apply educational game design principles. The journals contain uneven participant entries, so the analysis was treated as reflective qualitative evidence of change over time, not as a balanced

participant-by-participant longitudinal dataset. The results are presented in relation to the identified themes.

**Theme 1: Students moved from seeing games as engaging activities to understanding them as designed educational systems**

At the start, students described the course in broad affective terms: inspiring, engaging, interesting. However, even early reflections show emerging awareness that game design is complex. One student noted that they had learned: "how complexed it is to make a game, especially the one which is engaging for students." Later entries show a more sophisticated understanding. Students discussed function, mechanics, player experience, emotion, target group, educational goals, prototypes, and playtesting. One student explicitly wrote that educational game design should start from "what change we want to create in the player," and that mechanics are "tools - not the starting point." This indicates a strong positive impact on students' perceptions of GBL and EDG. They increasingly perceived educational games not as simple add-ons, but as structured pedagogical tools requiring intentional design.

**Theme 2: Motivation increased when students engaged in practical, hands-on creation**

Motivation appears strongest when students moved from theory to making. Students described feeling "focused and productive," "engaged and motivated," and rewarded by seeing the physical version of the game come together. The later reflections show that physical prototyping had a powerful motivational effect. Cutting cards, assembling components, matching pawns and dice, redesigning boards, and preparing final versions helped students experience visible progress. One student reported spending around 12 hours outside class finalising physical materials, describing the workload as intensive but motivating. This suggests that the syllabi-based intervention supported motivation most effectively when it offered active production, not only theoretical input.

**Theme 3: Students developed readiness through iterative prototyping and reflection**

Readiness is visible in students' ability to describe the current stage of their projects: "concept stage," "preparation phase," "stable state," "advanced stage," "almost ready," and "finalizing the project." This language shows increasing project-management awareness. Students were not only making games; they were learning to assess progress, identify priorities, and plan next steps. By the final entries, students could discuss usability, rule clarity, physical interaction, pacing, educational value, and presentation. This indicates growing readiness to implement EDG in a real educational context.

**Theme 4: Playtesting became a key marker of design maturity**

Early entries show that playtesting was not yet possible or not yet understood as central. Students often wrote "not applicable," "none," or "there was no playtesting yet."

Later, students began to describe playtesting as a source of insight. They identified unclear rules, pacing issues, usability problems, and the value of feedback from people outside the design process. One student wrote that playtesting helped them understand "how real players experience the game." This is an important indicator of EDG readiness. Students came to understand that educational games cannot be evaluated only by the designer's intention; they must be tested through player experience.

**Theme 5: Students still needed support in balancing fun, clarity, and educational value**

A recurring uncertainty concerned the relationship between learning and gameplay. Students asked how to choose appropriate mechanics for learning objectives, how to make rules clear, and how to balance educational content with fun gameplay. This is not a weakness of the intervention; rather, it shows that students reached a more advanced stage of design thinking. They were no longer asking only "How do I make a game?" but "How do I make this game educational, playable, motivating, and appropriate for a target group?" This is precisely the kind of reflective tension expected in EDG training.

## Impact on perceptions

The intervention appears to have shifted students' perceptions from a surface-level view of games as enjoyable activities to a more professional understanding of games as educational design systems. Students increasingly used concepts such as function, mechanics, learning goals, target group, player emotion, prototypes, usability, and playtesting.

**Conclusion:** The intervention had a positive impact on students' conceptual understanding of GBL and EDG.

## Impact on motivation

Motivation was repeatedly expressed through words such as "inspired," "engaged," "motivated," "productive," "interesting," and "rewarding." Motivation was especially strong when students worked practically on their own prototypes and saw visible progress.

**Conclusion:** The intervention supported motivation, particularly through practical, creative, hands-on work.

## Impact on readiness

Readiness developed gradually. Early reflections show curiosity and uncertainty. Middle entries show concept development and prototype planning. Later entries show physical production, playtesting, feedback interpretation, and preparation for final presentation. Students became more capable of identifying learning goals; designing for a

target group; selecting or questioning mechanics; creating prototypes; testing games; responding to feedback; and evaluating usability and clarity.

## Conclusion

The intervention contributed positively to students' readiness to design and implement educational games, although students still needed further guided practice in playtesting and balancing fun with educational value.

## CUBA RESULTS

### PRE-COURSE QUESTIONNAIRE ASSESSMENT

| PERCEPTIONS OF GBL | | | |
|---|---|---|---|
| | MEAN | STD DEV | MEDIAN |
| usefulness in future practice | 4,14 | 1,25 | 5 |
| improved student engagement | 4,32 | 1,25 | 5 |
| enhanced learning outcomes | 2,82 | 1,44 | 3 |
| **GLOBAL SCORE** | **3,76** | **1,46** | **4,00** |
| **MOTIVATION TO USE OR DESIGN EDUCATIONAL GAMES** | | | |
| intend to integrate GBL next semester | 2,73 | 1,45 | 3 |
| recommend educational games to colleagues | 3,64 | 1,40 | 4 |
| look for opportunities to use game-based activities | 4,00 | 1,27 | 5 |
| continue developing games | 3,14 | 1,64 | 4 |
| doubt that I will ever use educational games *(reverse-coded)* | 1,45 | 0,80 | 1 |
| **GLOBAL SCORE** | **2,99** | **1,59** | **3** |
| **READINESS FOR FUTURE IMPLEMENTATION** | | | |
| I feel confident I can use GBL | 4,18 | 1,26 | 5 |
| I have skills to develop educational games | 3,18 | 1,44 | 3 |
| I can teach others how to apply GBL techniques | 2,09 | 1,19 | 2 |
| **GLOBAL SCORE** | **3,15** | **1,54** | **3** |

### POST-COURSE QUESTIONNAIRE ASSESSMENT

| PERCEPTIONS OF GBL | | | |
|---|---|---|---|
| | MEAN | STD DEV | MEDIAN |
| usefulness in future practice | 4,90 | 0,32 | 5 |
| improved student engagement | 4,80 | 0,42 | 5 |
| enhanced learning outcomes | 4,60 | 0,70 | 5 |
| **GLOBAL SCORE** | **4,77** | **0,50** | **5** |
| **MOTIVATION TO USE OR DESIGN EDUCATIONAL GAMES** | | | |

| | | | |
|---|---|---|---|
| intend to integrate GBL next semester | 3,70 | 1,06 | 3,5 |
| recommend educational games to colleagues | 4,50 | 0,53 | 4,5 |
| look for opportunities to use game-based activities | 4,70 | 0,48 | 5 |
| continue developing games | 3,60 | 1,43 | 3,5 |
| doubt that I will ever use educational games *(reverse-coded)* | 1 | 0 | 1 |
| **GLOBAL SCORE** | **3,50** | **1,57** | **4** |
| **READINESS FOR FUTURE IMPLEMENTATION** | | | |
| I am confident I can use GBL | 4,60 | 0,70 | 5 |
| I have skills to develop educational games | 4,00 | 0,82 | 4 |
| I can teach others how to apply GBL techniques | 4,10 | 0,74 | 4 |
| **GLOBAL SCORE** | **4,23** | **0,77** | **4,00** |
| **POST-COURSE SYLLABUS IMPACT** | | | |
| The activities in the syllabus were fun and engaging. | 3,78 | 1,39 | 4 |
| I found myself looking forward to each game-based session. | 3,50 | 1,43 | 4 |
| The course did not hold my attention during its duration. (R-C) | 1,90 | 1,20 | 2 |
| Working with educational games made the material more interesting. | 4,30 | 1,25 | 5 |
| I felt absorbed in the tasks when using the game-based approach. | 3,60 | 1,07 | 4 |
| I think the course was mostly boring. (R-C) | 2,20 | 1,40 | 2 |
| I feel I was unable to perform well in the game-based learning course. (R-C) | 1,90 | 0,88 | 2 |
| I was able to master the concepts presented in the GBL syllabus. | 4,10 | 0,74 | 4 |
| In comparison to others, I did pretty well in the course. | 3,40 | 0,84 | 3 |
| The game-based syllabus content is relevant to real classroom needs. | 4,10 | 0,99 | 4 |
| The skills I gained are worthwhile for my professional development. | 4,50 | 0,71 | 5 |
| It is easy for me to learn how to develop an educational game. | 3,50 | 0,97 | 4 |
| I found it straightforward to navigate the tools and resources. | 3,50 | 1,08 | 4 |
| Learning to develop games felt more frustrating than helpful. (R-C) | 2,00 | 0,94 | 2 |
| Interacting with the game-based modules required little effort. | 3,00 | 1,25 | 3 |

| | | | |
|---|---|---|---|
| I can quickly become skillful at using the syllabus materials. | 3,60 | 1,07 | 4 |
| **GLOBAL SCORE** | **3,30** | **1,34** | **4** |

## Perceptions of GBL

Students' perceptions of GBL were already fairly positive before the course, but they became markedly stronger after it. The global score increased from 3.76 to 4.77, a gain of 1.01 points. At pre-course stage, the strongest perception-related beliefs concerned usefulness in future practice (M = 4.14, Median = 5) and improved student engagement (M = 4.32, Median = 5). By contrast, belief that GBL enhances learning outcomes was noticeably weaker (M = 2.82, Median = 3). This suggests that before the intervention, participants were already inclined to see GBL as practical and engaging, but were less convinced of its impact on achievement or learning effectiveness.

After the course, all three indicators rose to very high levels: usefulness in future practice increased by 0.76 points, improved student engagement by 0.48, and enhanced learning outcomes by 1.78. The largest shift was clearly in beliefs about learning outcomes, indicating that the course seems to have been especially effective in strengthening participants' confidence that GBL is not only engaging but pedagogically meaningful. Variability also dropped substantially from pre- to post-test, as shown by the reduction in the global standard deviation from 1.46 to 0.50, which suggests a more convergent and stable positive view after the intervention.

## Motivation to use or design educational games

Motivation was moderate before the course and improved after it, though less dramatically than perceptions and readiness. The reported global score rose from 2.99 to 3.50, an increase of 0.51 points. Before the course, the strongest motivational tendency was "look for opportunities to use game-based activities" (M = 4.00, Median = 5), followed by "recommend educational games to colleagues" (M = 3.64, Median = 4). Lower values appeared for "intend to integrate GBL next semester" (M = 2.73) and "continue developing games" (M = 3.14), suggesting that general openness to GBL was stronger than concrete short-term implementation intentions. After the course, all positive intention items improved. The largest gains were in intention to integrate GBL next semester (+0.97) and recommending educational games to colleagues (+0.86). Looking for opportunities to use game-based activities also increased (+0.70), while willingness to continue developing games rose more modestly (+0.46).

## Readiness for future implementation

Readiness shows one of the clearest positive intervention effects. The global readiness score increased from 3.15 to 4.23, a gain of 1.08 points. Before the course, participants already felt reasonably confident that they could use GBL themselves (M = 4.18, Median = 5), but they were less certain about having the skills to develop educational games

(M = 3.18, Median = 3), and especially unsure about teaching others how to apply GBL techniques (M = 2.09, Median = 2). This pattern suggests baseline self-efficacy for personal use, but weaker professional and instructional confidence. After the course, all readiness indicators improved. Confidence in personal use rose modestly (+0.42), self-assessed skills to develop educational games improved substantially (+0.82), and ability to teach others how to apply GBL showed the largest increase of all readiness items (+2.01). This last shift is especially important because it suggests the course may have moved participants beyond simple acceptance or interest toward a sense of pedagogical agency and transferability. Standard deviations also declined across readiness items, indicating more consistent confidence levels after the intervention.

## Summary of the post-course evaluation

The post-course evaluation presents a generally positive picture of the syllabus and learning experience. The strongest areas were perceived professional value and pedagogical relevance. Participants rated "The skills I gained are worthwhile for my professional development" very highly (M = 4.50, Median = 5), and they also rated the syllabus as relevant to real classroom needs (M = 4.10, Median = 4). They felt able to master the concepts presented (M = 4.10), and working with educational games made the material more interesting (M = 4.30). Together, these results suggest that the syllabus was seen as meaningful, professionally useful, and educationally relevant.

Engagement was positive, though not uniformly strong. Participants generally found the activities fun and engaging (M = 3.78) and reported absorption in tasks (M = 3.60). They also somewhat looked forward to sessions (M = 3.50). The negative engagement items were low, which is favorable: "the course did not hold my attention" scored 1.90 and "the course was mostly boring" scored 2.20. This indicates that disengagement was not dominant, although enthusiasm was not maximal either.

Ease of use and cognitive effort received more moderate ratings. Participants found it only moderately easy to learn how to develop an educational game (M = 3.50), moderately straightforward to navigate tools and resources (M = 3.50), and only moderately easy to interact with the modules (M = 3.00). The frustration item was low at 2.00, which is favorable, but these results still imply that the course was somewhat demanding. In other words, the syllabus appears to have been valuable and effective, but not effortless.

## Overall conclusion

The pilot results suggest that the intervention was successful across all three main domains. Perceptions became strongly positive, readiness improved substantially, and motivation increased in a meaningful though somewhat smaller way. The strongest effects were on beliefs about learning outcomes and on confidence to teach others how to apply GBL. The post-course evaluation also supports the conclusion that the syllabus was relevant and worthwhile, even if some aspects of usability and workload may require refinement.

## QUALITATIVE DATA FROM CUBA STUDENTS

Research aim:

**To measure the impact of syllabi-based interventions on students' perceptions, motivation, and readiness related to GBL and EDG implementation, using students' reflective journals as qualitative evidence.**

The journals contain uneven participant entries, so the analysis was treated as reflective qualitative evidence of change over time, not as a balanced participant-by-participant longitudinal dataset. The results are presented in relation to the identified themes.

**Theme 1: Students moved from enthusiastic interest in educational games to a more realistic understanding of educational game design as a complex process**

At the beginning, students mainly responded to the course in affective and motivational terms. They described the lessons as enriching, fun, playful, interesting, and inspiring. They also frequently expressed curiosity about educational games and future sessions. However, already by Meetings 2 and 3, students began to articulate a more complex understanding of game design. They repeatedly stated that the target group must be clearly defined, that the educational objective must be specified, that a game must be appropriately challenging and engaging, and that mechanics need to fit the purpose. One student explicitly noted that the more they entered the process, the more they realized how complex creating a game concept actually is. This suggests a clear shift in perceptions: students did not simply remain at the level of seeing games as fun activities. They came to understand GBL and EDG as structured pedagogical design work. In this dataset, that shift is especially visible because enthusiasm and uncertainty develop side by side.

**Theme 2: Motivation was strongest when the course moved toward teamwork, idea ownership, and visible progress, but it weakened during lecture-heavy or unclear phases**

The second batch showed strong initial motivation, and this was reinforced whenever students could shape their own game ideas, work with peers, or see progress in their design. Students described teamwork as pleasant, motivating, creative, and productive. Several entries show that motivation increased once students started to form teams, assign tasks, design concepts, or prepare parts of the prototype. At the same time, this dataset shows more explicit motivational fluctuation than the UBB journals. Some students described certain lessons as boring, too lecture-based, insufficiently interactive, or not concrete enough. Motivation also dropped when students felt confused about how to proceed, when group agreement was difficult, or when the course seemed to remain at a general level instead of moving into practical design. One student explicitly noted that motivation returned only after receiving more concrete steps for how to proceed. This

suggests that the intervention supported motivation most effectively when students could act as designers, not merely listeners. Practical ownership, rather than theory alone, seems to have been the main driver of sustained engagement in this batch as well.

**Theme 3: Readiness developed gradually through concept clarification, teamwork negotiation, and later feedback-based revision**

Readiness in this dataset developed less through immediate confidence and more through a slow process of clarification. Early and middle entries show students learning to define target group, topic, purpose, and the general type of game. They begin to distinguish between broad and manageable topics and to understand that games need educational structure, not only ideas. Later entries show stronger readiness indicators. Students report presenting prototypes, receiving feedback, identifying mistakes, adapting rules to age group, revising unclear parts, and moving closer to final playability. At this point, readiness became practical rather than hypothetical. Students were no longer only imagining the game; they were evaluating and improving it.

**Theme 4: Feedback and presentation became the turning point from uncertainty to design maturity**

A particularly important pattern in the CUBA journals is the role of feedback. In the earlier meetings, students frequently requested examples, stronger guidance, or more concrete support. Many were unsure whether their concept was good enough, whether they were moving in the right direction, or how to adapt existing mechanics properly. Once presentations, peer review, and feedback sessions began, the tone of the reflections changed. Students began to describe feedback as beneficial, honest, motivating, and useful for identifying errors and improving their prototypes. They reported that feedback clarified unclear aspects of the game and helped them revise their design so that it would be more appropriate for the intended age group and more playable. This indicates that feedback served not only as evaluation, but as a developmental bridge. It helped transform confusion into direction and moved students closer to implementation readiness. In this batch, feedback seems to have been especially important because the earlier design phase contained more uncertainty than in the UBB set.

**Theme 5: Students still needed stronger support in examples, interactivity, and movement from abstract ideas to concrete mechanics**

A recurring issue in the journals is the request for more examples of educational games, more opportunities to play or observe games, more hands-on interaction, and clearer explanation of how to move from a general concept to a workable design. These requests appear very early and continue across the conceptual stage. Students also repeatedly ask for guidance with mechanics, adaptation, and the actual process of creation. This does not suggest weak engagement. On the contrary, it suggests that students wanted to proceed more concretely and were actively trying to connect theory with practice. Their

recurring requests imply that the course successfully stimulated design thinking, but that some stages of scaffolding could be strengthened further.

### Impact on perceptions

The intervention appears to have shifted students' perceptions from broad positive curiosity about games in education toward a more professional understanding of educational game design as a process involving target group, educational aim, mechanics, challenge, and implementation decisions. Students increasingly reflected not only on whether games are interesting, but on how they should function pedagogically and for whom they should be designed.

**Conclusion:** The intervention had a positive impact on students' conceptual understanding of GBL and EDG, especially by helping them see educational games as purposeful design systems rather than only enjoyable teaching tools.

### Impact on motivation

Motivation was strongly visible in words such as enriching, inspiring, interesting, motivating, creative, and pleasant. Students were especially motivated when they worked in teams, started shaping their own concepts, prepared prototype elements, or received useful feedback. However, motivation was more variable in this dataset than in UBB. It weakened during lecture-heavy, less interactive, or unclear sessions and strengthened again when the course became more practical and concrete.

**Conclusion:** The intervention supported motivation, particularly through teamwork, practical creation, and visible progress, but this motivation was sensitive to the degree of structure, interactivity, and concreteness provided by the syllabus.

### Impact on readiness

Readiness developed gradually and unevenly. Early entries show curiosity and openness, middle entries show conceptual struggle and design uncertainty, and later entries show more concrete evidence of readiness through presentation, feedback use, revision, and increasing awareness of rules, age appropriateness, and playability. Students became more capable of identifying target group, narrowing topic, shaping concept, revising based on feedback, and recognizing what still needs improvement before implementation.

### Conclusion

The intervention contributed positively to students' readiness to design and implement educational games, although this readiness depended strongly on guided support, examples, and structured opportunities for feedback and revision.

# ANALYTICAL FRAMEWORK AND PRELIMINARY RESULTS FOR THE PILOT PHASE RESEARCH FROM UMC

## FINAL ANSWERS IN PRE-COURSE ANALYSIS

| PERCEPTIONS OF EDUCATIONAL GAME DEVELOPMENT | | | |
|---|---|---|---|
| | **MEAN** | **STD DEV** | **MEDIAN** |
| the game-design skills I gained are worthwhile for my future career (Item 16) | 3,64 | 0,86 | 3 |
| designing games for learning could improve student engagement (Item 15) | 4 | 1,09 | 4 |
| applying the principles from this course will enhance learning outcomes (Item 17) | 3,36 | 0,70 | 3 |
| relevance to authentic classroom needs (Item 14) | 3,21 | 0,86 | 3 |
| **GLOBAL SCORE** | **3,55** | **0,93** | **3** |
| **MOTIVATION TO APPLY OR DESIGN EDUCATIONAL GAMES** | | | |
| enjoy creating educational games (Item 1) | 2,70 | 1,19 | 3 |
| designing game mechanics feels rewarding (Item 2) | 3,24 | 1,17 | 3 |
| the course did not hold my attention during its duration (R-C) | 3,06 | 0,97 | 3 |
| working on educational games keeps me engaged (Item 4) | 2,52 | 1,09 | 3 |
| I lose track of time when building game-based activities (Item 5) | 3,45 | 0,90 | 3 |
| I look forward to each session of developing educational content (Item 6) | 2,82 | 1,07 | 3 |
| I feel I was unable to perform well in the course (R-C) (Item 7) | 3,27 | 0,72 | 3 |
| I doubt that I will ever create educational games in my work (R-C) (Item 23) | 2,812 | 1,18 | 3 |
| I intend to publish at least one educational game in the next six months (Item 24) | 2,76 | 1,25 | 3 |
| I plan to share my game-based projects with the teaching community (Item 25) | 3,18 | 1,16 | 3 |
| **GLOBAL SCORE** | **2,98** | **1,11** | **3** |
| **READINESS FOR FUTURE IMPLEMENTATION** | | | |
| my games can meaningfully improve learner engagement (Item 8) | 2,85 | 0,94 | 3 |
| I can implement instructional design principles in my games (Item 9) | 3,09 | 0,91 | 3 |
| I am confident in my ability to code or configure game elements (Item 10) | 2,70 | 1,05 | 3 |
| the effort I put into game development will pay off in real-world use (Item 11) | 3,21 | 1,05 | 3 |
| creating educational games will enhance my professional portfolio (Item 12) | 3,94 | 1,22 | 4 |
| educational game design is not important for me (R-C) (Item 13) | 3,45 | 1,15 | 3 |

| | | | |
|---|---|---|---|
| **GLOBAL SCORE** | **3,21** | **1,12** | **3** |

## FINAL ANSWERS FOR POST-COURSE ANALYSIS

| **PERCEPTIONS OF EDUCATIONAL GAME DEVELOPMENT** | | | |
|---|---|---|---|
| | **MEAN** | **STD DEV** | **MEDIAN** |
| the game-design skills I gained are worthwhile for my future career (Item 16) | **3,25** | **1,19** | **3** |
| designing games for learning could improve student engagement (Item 15) | **4,04** | **1,00** | **4** |
| applying the principles from this course will enhance learning outcomes (Item 17) | **3,00** | **1,22** | **3** |
| relevance to authentic classroom needs (Item 14) | **3,21** | **0,93** | **3** |
| **GLOBAL SCORE** | **3,38** | **1,10** | **3** |
| **MOTIVATION TO APPLY OR DESIGN EDUCATIONAL GAMES** | | | |
| enjoy creating educational games (Item 1) | 3,00 | 1,22 | 3 |
| designing game mechanics feels rewarding (Item 2) | 3,17 | 1,31 | 3,5 |
| the course did not hold my attention during its duration (R-C) | 3,13 | 1,08 | 3 |
| working on educational games keeps me engaged (Item 4) | 2,63 | 1,24 | 2,5 |
| I lose track of time when building game-based activities (Item 5) | 2,75 | 1,26 | 3 |
| I look forward to each session of developing educational content (Item 6) | 2,67 | 1,17 | 3 |
| I feel I was unable to perform well in the course (R-C) (Item 7) | 3,38 | 1,17 | 3 |
| I doubt that I will ever create educational games in my work (R-C) (Item 23) | 3,67 | 1,17 | 4 |
| I intend to publish at least one educational game in the next six months (Item 24) | 1,96 | 1,04 | 2 |
| I plan to share my game-based projects with the teaching community (Item 25) | 2,79 | 1,32 | 3 |
| GLOBAL SCORE | **2,91** | **1,26** | **3,00** |
| **READINESS FOR FUTURE IMPLEMENTATION** | | | |
| my games can meaningfully improve learner engagement (Item 8) | 3,63 | 0,77 | 4 |
| I can implement instructional design principles in my games (Item 9) | 3,63 | 0,92 | 4 |
| I am confident in my ability to code or configure game elements (Item 10) | 3,33 | 1,55 | 4 |
| the effort I put into game development will pay off in real-world use (Item 11) | 3,13 | 1,12 | 3 |
| creating educational games will enhance my professional portfolio (Item 12) | 3,58 | 1,06 | 4 |

| | | | |
|---|---|---|---|
| educational game design is not important for me (R-C) (Item 13) | 3,04 | 1,20 | 3 |
| **GLOBAL SCORE** | **3,39** | **1,14** | **3,50** |
| **POST-COURSE SYLLABUS IMPACT / EVALUATION** | | | |
| it is easy for me to learn how to develop an educational game using the provided materials (Item 18) | 3,04 | 1,16 | 3 |
| I found it straightforward to navigate the game-development tools and resources (Item 19) | 3,46 | 0,93 | 3 |
| learning to develop educational games felt more frustrating than helpful (R-C) (Item 20) | 3,00 | 1,38 | 3 |
| working with the Educational Game Development modules required little effort (Item 21) | 3,00 | 1,02 | 3 |
| I could quickly become skillful at using the course's game-development materials (Item 22) | 3,42 | 1,10 | 3 |
| **GLOBAL SCORE** | **3,18** | **1,13** | **3,00** |

## Perceptions of educational game development

Participants' perceptions of educational game development were moderately positive before the course and became slightly less positive after the intervention. The global score decreased from 3.55 to 3.38, a decline of 0.17 points. Before the course, the highest-rated perception item was "designing games for learning could improve student engagement" (M = 4.00), indicating that participants already believed educational game design had value in engaging learners. The lowest-rated item was "relevance to authentic classroom needs" (M = 3.21), while future career value (M = 3.64) and enhanced learning outcomes (M = 3.36) occupied the middle range. After the course, the same general pattern remained. Student engagement stayed the strongest perception item and increased only marginally from 4.00 to 4.04. Relevance to authentic classroom needs remained unchanged at 3.21. However, future career value declined from 3.64 to 3.25, and enhanced learning outcomes declined from 3.36 to 3.00. Overall, this suggests that the course did not strengthen students' perceptions of the broader value of educational game development.

## Motivation to apply or design educational games

Motivation to apply or design educational games showed a slight overall decline after the course, with the global score decreasing from 2.98 to 2.91. This suggests that the intervention did not produce a broad increase in motivation. Before the course, participants were most motivated by flow-like engagement, perceived performance, reward, and sharing with the teaching community. The highest-rated item was losing track of time when building game-based activities (M = 3.45), followed by perceived course performance (M = 3.27), rewarding game mechanics (M = 3.24), and plans to share projects (M = 3.18). However, enjoyment, sustained engagement, and intention to publish a game were relatively lower. After the course, some items improved slightly. Participants reported greater enjoyment of creating educational games, stronger perceived performance, and

slightly better attention during the course. A notable increase was found in willingness to create educational games in future work, which rose from 2.81 to 3.67. However, several future-oriented motivation items declined. Intention to publish an educational game dropped sharply from 2.76 to 1.96, while plans to share projects and experiences of losing track of time also decreased. This suggests that participants may have become less idealistic and more aware of the practical demands of educational game development.

### Readiness for future implementation

Readiness showed the clearest improvement after the course, with the global score increasing from 3.21 to 3.39. This suggests that participants felt somewhat more prepared to apply educational game development in future practice. Before the course, participants most strongly agreed that creating educational games could enhance their professional portfolio (M = 3.94). However, they were least confident in their ability to code or configure game elements (M = 2.70), indicating initial uncertainty about the technical aspects of game development. After the course, the largest gains appeared in practical competence. Participants reported greater confidence that their games could improve learner engagement (2.85 to 3.63), that they could apply instructional design principles (3.09 to 3.63), and that they could code or configure game elements (2.70 to 3.33). These increases suggest that the course strengthened both pedagogical and technical readiness. However, some broader value-related items declined. Belief that game development would pay off in real-world use decreased slightly from 3.21 to 3.13, while portfolio value declined from 3.94 to 3.58. The perceived personal importance of educational game design also fell from 3.45 to 3.04. This suggests that although participants felt more capable after the course, they became slightly less convinced of its long-term professional value or personal relevance.

### Summary of the post-course evaluation

The post-course syllabus evaluation was moderately positive, with a global score of 3.18. This suggests that participants generally viewed the syllabus, tools, and materials as usable and supportive, though not especially strong. The highest-rated items focused on ease of use and learnability. Participants found it relatively straightforward to navigate the game-development tools and resources (M = 3.46), believed they could become skillful with the materials fairly quickly (M = 3.42), and felt that learning to develop an educational games using the provided materials was reasonably easy (M = 3.04). However, the more demanding aspects of the course received only middling scores. Items related to low effort and reduced frustration both scored 3.00, suggesting that participants did not experience the course as particularly easy or effortless. Overall, the syllabus appeared to be functional and manageable, yet, at this stage only moderately effective.

## Overall conclusion

The UCM game designers' data present a mixed but coherent pattern. The most positive outcome concerns readiness, which increased after the course, especially in terms of pedagogical and technical confidence. This suggests that the syllabus helped students feel more capable of developing educational games. At the same time, perceptions became slightly less positive and motivation declined marginally. In particular, students became less likely to express strong intentions to publish or share educational game projects. This may indicate that the course encouraged a more realistic understanding of the challenges involved in educational game development. The UCM results therefore suggest that the course may have helped students move from a more idealized view of educational game design toward a more grounded sense of both its possibilities and its demands.

## Qualitative Data from UCM students

Research aim:

**To measure the impact of syllabi-based interventions on students' perceptions, motivation, and readiness related to GBL and EDG implementation, using students' reflective journals as qualitative evidence.**

As before, the results are presented in relation to the identified thematic categories.

**Theme 1: Students moved from general interest in educational games to understanding them as a specialized design challenge**

At the beginning, students reacted to the course in broad positive terms such as interesting, fun, motivating, enriching, and inspiring. They appreciated the atmosphere and the basic premise of educational games. However, already in the second meeting, many entries show a shift toward more specific design concerns: target group, educational purpose, mechanics, flow, difficulty, and the balance between fun and learning. Students repeatedly note that it is important to know who the game is for, what it should achieve, and how broad or narrow the topic should be. As the course progressed, students increasingly perceived educational games as a demanding subtype of game design rather than as a simple or intuitive extension of general game development. One student explicitly notes that educational games are not simple if they are supposed to engage and educate simultaneously. Others focus on balancing, prototype state, testing, and adapting the game to pupils. This indicates that the intervention had a positive impact on students' perceptions by making them more precise and more professionally grounded. They came to see educational games as designed systems with pedagogical and production constraints.

**Theme 2: Motivation was strongest when the course supported prototyping, feedback, and visible project progress**

The journals suggest that motivation in the UCM group was closely tied to making. Students were most engaged when they were dividing tasks, building ideas, presenting progress, discussing prototypes, or receiving feedback on current states of development. They often describe teamwork as enjoyable, productive, and supportive, and they report substantial time spent on story, art, research, mechanics, and planning. This indicates that the course stimulated motivation most effectively when it positioned students as active developers. At the same time, motivation became weaker when lessons were perceived as too theoretical, too static, or insufficiently relevant to the concrete project needs of the teams. Several students describe some lecture-based sessions as boring, overly abstract, or something that "could have been an email." Others express frustration that there was too little practical help or too little substantial feedback. This is particularly important in the case of future game developers, because they appear to evaluate course value primarily in relation to development usefulness. Motivation was therefore not only a matter of enjoyment, but also of perceived practical relevance.

**Theme 3: Readiness developed through project management, prototyping, and iterative thinking**

Readiness in this dataset is especially visible in the language students use to describe project stages. They refer to concept stage, pre-production, balancing, missing art, prototype readiness, internal testing, and progress pacing. This shows that students are not only reflecting on what they are learning conceptually, but are also developing stronger project-management awareness. They increasingly assess where the project stands, what is missing, and what the next practical step should be. Readiness also grows through growing familiarity with design principles specific to educational games. Students mention narrowing the topic, defining the player age group, making rules understandable, ensuring the game is engaging without being too difficult, and recognizing that actual target-group testing is important. In this sense, the course contributed positively to implementation readiness by moving students from broad ideas toward more concrete design and revision practices. However, readiness was uneven. Some teams clearly moved toward functional prototypes and internal testing, while others remained in concept or pre-production stages for longer. This suggests that readiness in this cohort was strongly shaped by team organization, workload, and clarity of mentoring, not only by individual understanding.

**Theme 4: Playtesting became both a marker of design maturity and a major source of resistance**

One of the clearest findings in the UCM journals is that students increasingly understood playtesting as necessary. Later entries show stronger awareness of why testing matters, what kinds of players should be involved, and what kinds of methods can be used, such as observation, interview, or questionnaires. Students also begin to recognize that testing with the actual target group can reveal whether the game is too difficult, insufficiently engaging, or unclear. This indicates an important development in evaluation

readiness. At the same time, the requirement to organize testing with primary school pupils becomes one of the strongest negative themes in the dataset. Several students question why they have to organize school-based testing themselves, why the scope of the assignment has expanded, and why such demanding external implementation is required during a thesis-heavy final year. This is a distinctive feature of the UCM group: students do not reject testing as such, but they resist the organizational burden and perceived mismatch between course requirements and their broader academic workload. This means that playtesting functions simultaneously as a sign of design maturity and as a source of demotivation.

**Theme 5: Students still needed more practical examples, stronger mentoring, and clearer scope expectations**

A recurring concern across the journals is that students wanted more examples from practice, more concrete help with mechanics, more substantial feedback, and clearer knowledge of the true expected scope of the assignment. They repeatedly asked for real board games, examples of educational games, practice-oriented demonstrations, and stronger project problem-solving support. These requests appeared early and remained present as the semester progressed. Another important issue is expectation management. Some students explicitly stated that they initially thought only a concept or proposal would be required, but later understood that they were expected to deliver something functional and tested. This suggests that some frustration arose not only from the objective workload, but also from perceived expansion or ambiguity of requirements. This is particularly relevant for future game developers, who appear highly sensitive to scope, production timelines, and feasibility. These findings do not suggest a weak intervention. Rather, they show that the course successfully activated authentic design processes, but that its scaffolding and communication of expectations could be strengthened further, especially in relation to project scope and external testing requirements.

## Impact on perceptions

The intervention appears to have shifted students' perceptions from general curiosity about educational games toward a more differentiated understanding of them as specialized design products requiring pedagogical alignment, target-group specificity, mechanics selection, balancing, and testing. Because these students are future game developers, they tend to frame this shift in terms of production logic and professional design requirements.

**Conclusion:** The intervention had a positive impact on students' conceptual understanding of GBL and EDG by helping them perceive educational games not simply as attractive media, but as structured and demanding design systems with educational and usability constraints.

## Impact on motivation

Motivation was clearly present throughout the journals and was especially visible in relation to teamwork, prototyping, mentor discussion, and visible project progress. Students were most engaged when they could work concretely on their game rather than listen to theoretical input. At the same time, motivation weakened when the course felt insufficiently practical, when feedback was perceived as too limited, or when organizational demands seemed excessive.

**Conclusion:** The intervention supported motivation, particularly through active production, consultations, and prototype development, but this motivation was highly dependent on perceived practical usefulness and on the manageability of course demands.

## Impact on readiness

Readiness developed gradually through target-group specification, topic narrowing, concept development, project planning, prototyping, and growing awareness of playtesting. Students became increasingly capable of evaluating the status of their project, assigning tasks, recognising missing elements, and understanding what makes an educational game functional for a real target group. However, readiness remained uneven across teams, partly because of workload pressure and the complexity of external testing requirements.

## Conclusion

The intervention contributed positively to students' readiness to design and implement educational games, especially in terms of production-oriented thinking, prototype development, and evaluation readiness, although this readiness was constrained by perceived overload and by concerns about the scope of external testing.

## Limitations

The main limitation of the pilot phase is that entries were uneven across participants and meetings. Some students wrote detailed, reflective responses, while others answered briefly or not at all. Therefore, the findings should not be interpreted as equally strong evidence from all participants. A second limitation is that the journals were self-reported. They show students' perceptions of their own learning, workload, and readiness, but they do not independently verify the final quality or effectiveness of the games produced. A third limitation is that some parts of the later trajectory are represented more by attitudes toward workload, testing, and mentoring than by fully documented prototype outcomes. Even so, the journals, as we strongly believe, remain suitable for tracing perceived change over time and for generating qualitative evidence of intervention impact.

## Results from Focus Groups

**RQ1:** How do the Game-Based Learning (GBL) syllabi influence students' perceptions of GBL and EGD?

**RQ2:** To what extent does participation in GBL and EGD courses affect students' motivation to apply these approaches in their future professional practice (i.e., teaching or game development)?

**RQ3:** To what extent does participation in GBL and EGD courses affect students' readiness to apply these approaches in their future professional practice (i.e., teaching or game development)?

The focus-group data provide qualitative insight into how students experienced the Game-Based Learning syllabus after completing the course. Across the three focus groups, students discussed strengths, challenges, and suggested improvements to the course. The discussion shows a generally positive evaluation of the syllabus, especially in relation to its practical nature, teamwork, playtesting, and real-world relevance. At the same time, participants identified recurring difficulties connected with time pressure, conceptualization, inconsistent or overly critical feedback, and lack of clarity in instructions and expectations.

The analysis below is organized according to the three research questions.

**RQ1. How do the Game-Based Learning syllabi influence students' perceptions of GBL and EGD?**

The focus-group results suggest that participation in the course had a clearly positive influence on students' perceptions of GBL and educational game design. Students frequently described the course as practical, enjoyable, and meaningful, especially when they could see the direct educational value of the games they were creating. A central theme across the groups was that students came to see educational games not only as creative products, but as valuable pedagogical tools. This is particularly visible in comments about working with children, observing children play the games, and using games to communicate meaningful cultural or historical content. For several participants, the most valuable moments were those in which they could see that their projects had a real educational purpose. Statements such as "*see children play the games during playtesting was heartwarming*" and comments about *teaching children* or *cultural preservation* suggest that students increasingly perceived game design as a way of supporting learning rather than merely producing entertainment.

Another important theme was the value of playtesting and practical implementation. Students appreciated being able to test their games, observe what worked, and improve the design accordingly. In this sense, the course helped shift perceptions of GBL from a theoretical concept to an applied and testable educational practice. Students in more than one focus group also highlighted teacher presentations, mentoring, discussions of progress, and contact with industry perspectives as factors that helped them understand the design process more concretely. The focus groups also indicate that students viewed the course positively because it allowed for ownership and autonomy. Some participants appreciated choosing their own teams, working with classmates they already knew, and dividing responsibilities according to individual strengths. This contributed to a perception of the course as flexible and authentic. In addition, the combination of theory and practice was seen as useful, especially when theory directly supported game creation.

**Overall, the focus-group findings suggest that the syllabus strengthened students' perceptions of GBL and EGD by presenting them as engaging, educationally relevant, collaborative, and practically applicable approaches. However, these positive perceptions were strongest when students could connect course activities with real users, concrete products, and visible progress.**

**RQ2. To what extent does participation in GBL and EGD courses affect students' motivation to apply these approaches in their future professional practice?**

The focus-group data indicate that the course had a generally positive effect on students' motivation, although this motivation was shaped by both encouraging and frustrating experiences. A strong motivational factor was the hands-on nature of the course. Students repeatedly emphasized that it was enjoyable to make a game themselves, to work in teams, and to create something meaningful for children or other users. Practical work appears to have been especially motivating because students could see tangible results from their effort. The process of transforming an idea into a playable game, especially through testing and revision, gave participants a sense of purpose and accomplishment.

The experience of working with children or imagining future use in real educational settings was also highly motivating. Students described these moments as rewarding and emotionally meaningful. The fact that some participants explicitly stated that they wanted to work with games in the future suggests that the course contributed to future-oriented motivation. This is reinforced by one of the anonymized quotes from Focus 2: "*I am going to work with games in the future.*" Such statements show that the syllabus did not only support short-term engagement, but also encouraged some students to imagine game-based approaches as part of their future professional identity.

At the same time, motivation was weakened in some cases by frustration with the organization of the course. The strongest demotivating factors were harsh or inconsistent feedback, time pressure, and unclear expectations. Several participants reported that feedback was confusing, overly critical, or inconsistent across mentors. This appears to have reduced confidence and, in some cases, enjoyment. Comments such as "*feedback was weird - sometimes everything was ok sometimes I had to change everything*" and "*he kills joy in you*" reveal that some students experienced feedback not as constructive support, but as an obstacle to progress.

Nevertheless, even where frustration was visible, the focus-group data suggest that motivation remained tied to creation, teamwork, and visible impact. Students were especially motivated when they felt supported, when feedback helped them improve, and when the project was clearly connected to real learners or professional practice. **Overall, the focus-group findings indicate that participation in the course generally increased students' motivation to apply GBL and EGD in the future, particularly by giving them direct experience of designing and testing games. However, this motivation was strongest when the course environment was supportive and expectations were clear.**

**RQ3. To what extent does participation in GBL and EGD courses affect students' readiness to apply these approaches in their future professional practice?**

The focus-group results suggest that the course contributed positively to students' readiness, but in a qualified way. Students appear to have developed a clearer understanding of what is required to design and implement educational games, yet they also became more aware of the practical difficulties involved. One clear sign of readiness development was the value students attached to playtesting, progress discussions, and feedback during development. These elements helped them refine prototypes and make design decisions more consciously. Students frequently identified specific moments that helped them move from idea to playable prototype, such as testing games with children, receiving feedback on first versions, or discussing development progress with teachers and peers. These experiences suggest that students became more ready to apply GBL not simply because they learned about it, but because they participated in an iterative design process.

Teamwork also played an important role in readiness. Being able to choose team members and divide work according to strengths appears to have supported both productivity and confidence. In this sense, readiness was not only an individual construct, but also a collaborative one. Students felt more capable when they could rely on peers, compare ideas, and receive practical help. At the same time, the focus-group findings clearly show that readiness remained incomplete. Students repeatedly mentioned difficulties with the concept phase, agreeing on ideas as a team, balancing quality with time constraints, and understanding the expected form of the final product. The question of whether they were meant to produce a demo, a prototype, a vertical slice, or a full game was not always clear. This indicates that while the course developed readiness, it also exposed the limits of students' preparation.

Another important issue affecting readiness was the balance between board games and digital games. Some students felt that the course placed too much emphasis on board games, despite their background in digital game design. Others suggested that future versions should allow students to choose between digital and tabletop formats. This shows that readiness was shaped not only by skill development, but also by alignment between the course design and students' disciplinary context. **Taken together, the focus-group data suggest that the course improved students' readiness by giving them experience in planning, creating, testing, and refining educational games. However, readiness was constrained by limited time, conceptual uncertainty, and inconsistent guidance. Thus, the course seems to have supported emerging readiness, rather than full confidence or mastery.**

**Across all three focus groups, several broader themes emerged.**

**1. Practicality and real-world relevance were the strongest strengths**

Students consistently valued the practical dimension of the course. Designing games, testing them, and seeing others use them made the experience meaningful. Working with children was especially powerful because it connected course tasks to a real educational context.

**2. Teamwork was mostly positive, but not always smooth**

Students appreciated being able to choose their teams and work according to their strengths. However, some groups struggled with communication, agreement, and uneven task division. Teamwork was therefore both a strength and, at times, a source of frustration.

**3. Playtesting was central to learning**

Playtesting appears to have been one of the most influential elements of the course. It helped students see what worked, what did not, and what needed to be changed. It also strengthened both motivation and readiness by making the design process concrete.

**4. Time pressure was the most consistent barrier**

All three groups highlighted limited time as a major problem. Students felt rushed, overburdened, and unable to develop their projects to the level they wanted. This affected quality, confidence, and enjoyment.

**5. Feedback was important, but often problematic**

Students valued feedback in principle, but several comments suggest dissatisfaction with its tone, consistency, or usefulness. The issue was not feedback itself, but the way it was delivered and the lack of coherence across mentors.

**6. Instructions and expectations needed to be clearer**

Students wanted clearer explanations from the beginning, especially concerning the concept phase, final product expectations, milestones, and the difference between board-game and digital-game pathways.

## Summary of course evaluation from the focus groups

The focus groups show that students generally evaluated the course positively, especially in relation to its practical orientation, collaborative design work, and opportunities for playtesting. The course appears to have strengthened students' perceptions of GBL and EGD as meaningful educational approaches, increased their motivation to use such

methods in the future, and contributed to their developing readiness to design and implement educational games. At the same time, the course also revealed important barriers. The most significant problems were limited time, unclear instructions, difficulty

during the concept-development stage, and feedback that was sometimes experienced as overly critical or inconsistent. These issues did not erase the benefits of the course, but they did affect how confidently and smoothly students could move through the design process.

## Quick synthesis of strengths, pain points, and recommendations

### Main strengths

- practical, hands-on nature of the course
- playtesting, especially with children
- teamwork and role division based on strengths
- relevance to real educational contexts
- mentoring, presentations, and progress discussions

### Main pain points

- insufficient time for development and revision
- difficulties in the concept and early design phase
- unclear instructions and expectations
- inconsistent or discouraging feedback
- imbalance between board-game and digital-game orientations

### Quick wins

- clearer written instructions from the start
- more structured and more frequent playtesting opportunities
- more opportunities for feedback across groups and schools
- dedicated sessions for progress sharing and troubleshooting

### Structural changes

- extend course duration
- introduce clearer milestones: concept → mechanics → prototype → testing → refinement
- better align the course with students' disciplinary background by allowing board-game or digital-game options
- improve consistency of mentoring and feedback across instructors and countrie

## SUGGESTIONS FOR SYLLABUS IMPROVEMENT

**For future educators (UBB + CUBA)**

**1. Add a structured GBL planning framework early in the course**

A recurring issue in the teacher cohorts was that students valued GBL but needed more support translating general enthusiasm into classroom-ready implementation. Research with pre-service teachers shows that explicit GBL methods and frameworks help them evaluate and integrate games more effectively, especially when these frameworks are tied to real classroom use during practicum or simulated teaching tasks. What follows, is that we should introduce a reusable lesson-planning template with fixed steps such as:

- learning objective
- target group
- game type/mechanics
- scaffolding plan
- assessment/evidence of learning
- classroom management risks
- adaptation/reflection

This would directly address the finding that students needed more guidance in moving from abstract appreciation of GBL to practical implementation.

**2. Increase modelled examples before independent design**

In both UBB and especially CUBA, students repeatedly asked for more examples of educational games and clearer demonstrations of how theory becomes a playable, teachable activity. That is well aligned with research showing that pre-service teachers benefit when teacher education includes not only principles, but modelled cases and opportunities to compare multiple GBL methods rather than relying on one generic approach. A good imporovement would be to add a short “worked examples” block in Weeks 1–3:

- one finished classroom game
- one adapted commercial game
- one student-made prototype
- one weak example for critique

That will help students see quality differences and reduce conceptual vagueness early on.

**3. Build in teacher scaffolding explicitly, not implicitly**

The results show that teacher scaffolding affects learners' knowledge, engagement, skills, and enjoyment in GBL, and that scaffolding is needed at different stages, especially orientation and gameplay. We should consider adding a mini-module called "How teachers scaffold gameplay" covering:

- pre-game orientation
- rule explanation
- in-game prompts and monitoring
- debriefing questions
- linking play back to learning goals

This is especially important for the future teachers, because the course should prepare them not only to value GBL, but to facilitate it pedagogically.

**4. Add more structured playtesting and debrief cycles**

The qualitative results strongly suggest that students' confidence and understanding increased once they tested ideas and received feedback. Research on educational game design similarly emphasizes alignment between educational goals and game mechanics, and warns against assuming that enjoyable gameplay automatically produces learning. That means, we must make playtesting cyclical and required:

- low-fidelity prototype test
- peer test with observation sheet
- revision
- second test
- post-test debrief linked to learning outcomes

This should help teacher students become more critical and pedagogically precise.

**For future game developers (UCM)**

**1. Make pedagogy-to-mechanics alignment a formal design requirement**

UCM results suggest that students became more realistic about educational game design, but not necessarily more positive about its value. That often happens when students experience design complexity without enough structure for integrating pedagogy and gameplay. It would be a good idea to require each team to submit a one-page design alignment brief before production:

- target learner

- learning objective
- core mechanic
- feedback loop
- assessment evidence
- reason this mechanic supports this objective

This will help students avoid building “interesting games” that are only loosely educational.

**2. Break the syllabus into clearer production milestones**

The UCM pattern suggests that readiness improved, but motivation weakened when tasks felt too large, unclear, or demanding (but this was also connected with general student workload). Maybe the course should be split into assessed milestones:

- concept pitch
- learning-design brief
- paper prototype
- playable prototype
- internal test
- revision log
- final showcase

This may reduce overload and makes progress visible, which should also support motivation.

**3. Strengthen mentoring during the concept-to-prototype transition**

The teacher cohorts and UCM alike show that the transition from idea to workable design is the most fragile phase. In UCM, that seems especially important because students are evaluating the course in relation to production realism. Adding short weekly design clinics 😊 where each team gets feedback on:

- mechanic fit
- scope
- player experience
- clarity of rules
- educational value

should help reduce the drop in motivation linked to uncertainty and stalled progress.

**4. Introduce formal user-testing earlier and more than once**

The qualitative findings also suggest that playtesting was a turning point for learning. We should all require at least three testing rounds:

- peer usability test
- target-user or proxy-user test
- post-feedback revision test

Each round should produce a short evidence-based revision memo. That would make testing part of the learning architecture rather than a final-stage extra task.

**5. Clarify scope and workload expectations explicitly**

Results suggests that some motivation loss may reflect increased realism about the demands of educational game development rather than failure of the course itself. That means scope management is a curriculum issue, not only a student issue. Maybe we could show three example project scopes:

- minimum viable educational prototype
- medium-scope prototype
- advanced prototype

Then require teams to choose one and justify it. This may reduce the risk that students equate educational value with overproduction.

## SOME REVISIONS SHOULD BE MADE IN BOTH THE TEACHER AND GAME-DEVELOPER TRACKS

First, we need to add more examples and exemplars. Second, we must make feedback more iterative and visible. Across both groups, the strongest developmental movement happened once students began testing, receiving comments, and revising. Third, we should preserve challenge but scaffold it better. The issue with the pilot is not that the courses were too demanding; it is that some demanding phases needed more support, especially concept development, mechanics selection, and implementation planning. Fourth, we should align assessment with process, not only product. Since educational game work develops through iteration, students should get credit for design rationale, feedback use, and revision quality, not just the finished prototype. That fits project-based game development education and user-centered design logic.

For **future educators**:

1. add a structured gbl lesson-planning template.
2. provide more worked examples of classroom games.
3. Teach teacher scaffolding explicitly.
4. add micro-teaching or practicum-linked implementation.
5. build in repeated playtesting and debrief cycles.

6. add a session on balancing fun and learning.

For **future game developers**:

1. require a pedagogy-to-mechanics alignment brief.
2. use milestone-based production stages.
3. add weekly design clinics.
4. require multiple user-testing rounds.
5. clarify project scope from the start.
6. use interdisciplinary review criteria.



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