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LEVERAGING SELF-DETERMINATION THEORY IN THE DESIGN OF AN ONLINE TRAINING MODULE FOR VIRTUAL AND BLENDED INTERNATIONAL COLLABORATION IN HIGHER EDUCATION

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ABSTRACT

Virtual and blended modalities of international collaboration—such as Collaborative Online International Learning and Blended Intensive Programmes—represent inclusive and sustainable alternatives to traditional mobility initiatives. To strengthen the capacity of higher education institutions to adopt these approaches, effective professional development for both teachers and administrative staff is essential. This paper presents an online training module designed to equip higher education personnel with the necessary skills to implement virtual and blended international collaboration activities. The module is designed according to the principles of the Self-Determination Theory and the INVITE Learning Design Framework. The paper explores whether the design of the module is effective in creating a valuable learning experience, if there are differences between the teachers' and staff's perception of effectiveness and appreciation of the training modalities, and what the strengths and areas for improvement are. Results were derived from 150 responses to the final survey questions filled by participants who completed the online training module (108 teachers and 42 staff members), analysed qualitatively and quantitatively. Findings show that the autonomy, structure, and involvement support were perceived as effective in achieving the desired learning outcomes, and the results did not depend on the participants' role in their institution. The results offer valuable insights into the design of training modules for higher education teachers and institutional staff to develop international collaboration modalities.

KEYWORDS

Higher Education, International Collaboration, Learning Design Framework, Professional Development, Self-Determination Theory, Teacher Training

1. INTRODUCTION

Internationalisation in higher education has emerged as a pivotal focus for institutions worldwide, reflecting the growing importance of integrating global perspectives into academic experiences. Defined by Knight (2008) as "the process of integrating an international, intercultural, or global dimension into the purpose, functions, and delivery of post-secondary education," this trend emphasises creating opportunities for students to engage with diverse cultures and ideas (Vahed and Rodriguez, 2021). Besides traditional physical mobility programmes, more inclusive and sustainable mobility forms have recently been introduced: among them, virtual and blended international collaboration modalities stand out. They are academic modalities that involve teachers and students from at least two different countries participating in collaborative academic activities (Garcés and O'Dowd, 2021; Perfölz and López-Varela, 2022). We refer to them as virtual international collaboration activities when they are shaped exclusively through online platforms and communication tools. The most famous form is Collaborative Online International Learning (COIL), where students engage in collaborative projects in a digital learning environment without leaving their home institutions (Hackett et al., 2024). We refer to them as blended international collaboration activities when they combine virtual interactions with face-to-face activities. A recent form of blended international collaboration activity is the Blended Intensive Programme (BIP), promoted by the EU Erasmus+ Programme (European Commission, 2023). Examples of BIPs are described in a previous publication by the authors (Barana et al., 2024).

Virtual and blended international collaboration modalities should adopt innovative educational practices and collaborative learning environments. For example, COIL projects usually include collaborative work in intercultural teams, project-based learning, and synchronous and asynchronous discussions (Hackett et al., 2023). BIPs should include challenge-based activities, flexible blended learning design; the online phase should focus on cooperative tasks and discussion on suitable platforms, not only on online lectures, videos, or videoconferences, and the in-person part include social and intercultural experiences (European Commission: Directorate-General for Education, Youth, Sport and Culture, 2022).

Due to their innovative design, developing virtual and blended collaboration modalities requires noticeable effort and collaboration by higher education teachers and staff. Based on interviews with experts, Barana and Marchisio Conte (2024) identified eight drivers for the implementation of similar international formats: among them, enhancing collaboration opportunities, training teachers and staff members, and activating practice communities stood out. There is little research in the literature on teacher training and faculty development in higher education on international activities and virtual mobility. According to O'Dowd and Dooly (2022), COIL activities are formative not only for students but also for teachers. Buchem et al. (2018) describe a learning hub aimed at providing students and teachers with competences to tackle virtual mobility experiences. They suggest that online courses can be an optimal format for training university staff since they offer flexibility. Still, there is a need for studies about the

engagement of higher education staff in training programmes about the design of virtual or blended modalities of international collaboration.

The INVITE Erasmus+ Project aims to develop teaching and learning competencies for designing and implementing new virtual and blended modalities of international collaboration in European higher education institutions. The INVITE consortium, composed of Aalborg University (Denmark), Columbus Association (France), Hellenic Mediterranean University (Greece), and University of Turin (Italy), organised an online training module for teachers and institutional staff to prepare them to design and implement activities such as COILs and BIPs. This paper extends the paper entitled "Designing an online training module to develop virtual and blended international modalities in higher education" (Barana et al., 2025) presented at the 10th International Conference on Educational Technologies. It aims to present and discuss the training programme's structure and show the proposed activities' effectiveness in achieving their goals, according to the participants' perspectives. This extended paper provides more details about the methods and results, as well as an investigation into whether the perceived effectiveness and appreciation of activities depend on the participants' role within their institution. The paper is structured as follows: Section 2 presents the theoretical framework on which the training module is built, namely, Self-Determination Theory, the Analysis, Design, Development, Implementation, Evaluation (ADDIE) model, and the INVITE Learning Design Framework. Section 3 presents the training module, its structure and the kinds of activities included. Section 4 provides details about the research method. In Section 5, the results of this study are presented and discussed. Lastly, Section 6 draws the conclusions of the study.

2. THEORETICAL FRAMEWORK

2.1 Self-Determination Theory

Self-determination Theory (SDT) is a theory of motivation and human development often used in the design of blended and virtual learning environments (Chen and Jang, 2010; Chiu, 2022). It proposes that all individuals have three innate psychological needs: the need for autonomy, the need for relatedness, and the need for competence. Autonomy is the need to feel in control of one's own life and to make one's own choices. Relatedness is the need to feel connected to others and to experience a sense of belonging. Competence is the need to feel capable of achieving one's goals and mastering new skills (Chen and Jang, 2010). SDT suggests that when these three needs are satisfied, individuals are more likely to be motivated, engaged, and successful in their endeavours. Conversely, when these needs are not satisfied, individuals are more likely to experience amotivation, disengagement, and failure (Chen and Jang, 2010). Teacher support influences students' motivation and engagement in online and blended learning. SDT distinguishes three dimensions of teacher support (Chiu, 2022):

- autonomy support, which enhances students' feeling of being in charge of their goals and behaviour;
- structure support, which enhances students' ability to accomplish tasks and experience mastery;
- involvement support, which enhances students' relatedness and the sense of social belonging.

Autonomy-supportive online learning environments will consider student perspectives, allow for choices around learning, give a rationale when choice is constrained, avoid controlling language, and reduce unnecessary stress and demands on the learners. For example, teachers should provide learners with access to varied educational resources in several languages, support students to choose from various learning materials, or provide personalised learning opportunities by respecting and accepting students' interests and allowing flexibility to customise learning activities. Enhancing students' autonomy during online training enables them to make their own choices and make decisions about their personal goals and self-efficacy, empowers them to use their voices to seek help, fosters student engagement, allows them to have better concentration and advance their time management skills, helps them to enjoy their lessons and communicate more, and gives students the latitude to choose their learning goals, which results in more cognitive engagement (Chiu, 2022).

The structure involves communicating clear expectations concerning student behaviour; in online learning, it entails designing well-structured activities with demarcated boundaries, providing strong guidance and competence-relevant feedback, expressing confidence in students' abilities, and delivering effective learning materials to achieve desired outcomes. A suitable learning structure helps students feel competent, effective, and challenged. Hence, it is considered a critical motivating factor for student cognitive engagement. When this need is met, students develop a sense of mastery of the topic, feel encouraged to actively participate in course activities, and feel positive about the course. This will lead to better behavioural and emotional engagement (Chiu, 2022).

Involvement pertains to the types of behaviour shown by teachers, including warmth, affection, and enjoyment, which have been shown to encourage a close and caring teacher-student relationship. In online learning, involved teachers will provide students with emotional and motivational support such as pedagogical caring, involvement closeness, acceptance, and help, and foster trust relationships among students in collaborative learning environments and small discussion groups (Chiu, 2022). Involvement enables students to feel more welcome, safe, efficacious, and autonomous, and will internalise their experience and evince greater engagement. Good teacher-student relationships can encourage students to participate in course activities, foster positive feelings toward the course and its activities, give students the confidence to complete challenging tasks, and encourage them to speak up regarding their learning needs. Thus, relatedness can influence student behavioural, emotional, cognitive, and agentic engagement.

2.2 ADDIE Model and INVITE Learning Design Framework

The ADDIE model is a widely used framework for designing and developing online and blended courses, often used in digital education (Spatioti, Kazanidis and Pange, 2022). It is flexible and robust, and it helps define the learning outcomes and pursue them systematically. It includes five phases: Analysis, Design, Development, Implementation, and Evaluation (Peterson, 2003). These phases are used to cyclically approach instructional design, allowing for continuous improvement and refinement of instructional materials over time. Based on SDT and the ADDIE model, the INVITE project's consortium proposed a Learning Design Framework (LDF) for designing and developing virtual or blended international collaboration activities (Hildebrandt et al., 2025). The LDF is based on six phases, which are in line with the ADDIE model, with

the addition of an introduction phase: the preparation phase, indicated with the number zero to keep the alignment with the ADDIE model. The six phases are the following:

0. Preparation phase: it includes the project ideation and partner identification;
1. Analysis phase: this phase includes assessing the international participants' needs and analysing the tasks by identifying learning objectives and outcomes. During this phase, the international and intercultural added value of the activity should be identified;
2. Design phase: this phase involves choosing active learning methodologies in accordance with SDT and selecting digital platforms and tools;
3. Development phase: it consists of creating culturally sensitive and relevant learning materials, selecting open educational resources, and integrating with digital technologies, with a focus on active learning;
4. Implementation phase: it includes mentorship, promoting intercultural collaboration, and monitoring students' progress;
5. Evaluation phase: it includes designing formative and summative assessment forms, collecting data about learning achievements and feedback on the activity, and adjusting accordingly.

3. THE INVITE TRAINING MODULE

The INVITE training module was designed based on the SDT and the INVITE LDF. The module's primary goal is to provide higher education teachers and staff with the competences to design and develop blended and virtual international collaboration activities in line with the INVITE LDF. The module's target is composed of two distinct groups, which we call "Teachers" and "Staff". The teachers' group included all those interested in developing digital international teaching and learning activities. The staff group included all those interested in creating international bridges among institutions and supporting teachers and/or students in developing or implementing digital international activities. The training module was fully online, self-paced, and asynchronous, and it was delivered through an online course hosted on the University of Turin's Moodle platform. It opened in April and closed in October 2024, lasting six months. The course was conceived as an interactive guide to designing virtual or blended activities of international collaboration, like COILs or BIPs, according to the INVITE LDF framework. The course included two paths, one for teachers and one for staff, with different learning outcomes. The module's learning outcomes for teachers were: identifying student needs, integrating active learning, using digital tools, diagnosing challenges, and assessing learning; formulating objectives, planning activities, fostering intercultural collaboration, utilising technology, and evaluating outcomes; adopting context-aware, intercultural strategies, choosing effective tools, and reflecting on teaching practices. Those for Staff were: understanding activity design, active learning challenges, digital tools, student difficulties, and assessment methods; supporting teachers and students in planning, implementing, and utilising digital tools for international activities; addressing challenges; mentoring teachers, proposing improvements; and critically reflecting on practices. The two paths shared the learning materials, which included parts more focused on administrative information and others related to pedagogical design: we reckoned that all the information was relevant to both groups since, when designing a similar experience, teachers and staff should collaborate and be aware of each other's needs. However, tasks for Teachers and Staff were different, in line with the different

learning outcomes of the two paths. Once they reached the end of one path, participants received a Moodle badge and could download a certificate of attendance.

The course's main content had a modular structure, with six sections, one for each of the six phases of the INVITE LDF. Access to a section was conditioned on completing the previous one. In each of the sections, participants could find:

- Two reflection questionnaires (one for teachers and one for staff) aimed at introducing the phase and asking participants to reflect on their experiences in that part of the process.
- A brief introductory video which highlights the main features of the phase.
- One or two readings, in the form of slideshows, on the main steps of each phase. The slides included some stimulus questions that participants were encouraged to answer through the forum.
- A forum that participants could use to share doubts and reflections on the content, and to share their answers to the stimulus questions included in the slide shows. It was moderated by the members of the INVITE project team.
- Additional resources and external links to deepen the content.
- Two case studies, one about a virtual activity (a COIL) and one about a blended activity (a BIP) of international collaboration, which shows the theory applied to real cases. In each section, the specific phase of design and development of the activities is presented.
- A quiz with automatically graded questions about the content.
- Two final tasks (one for teachers and one for staff) where they were asked to design a virtual or blended international activity (for teachers) or to identify their potential role in supporting the development of such activities (for staff), thus putting into practice what they learnt in the section. The tasks included a self-assessment form.

In the preparation phase, teachers could share a draft idea for an activity to create, and the other participants (including staff) could contact them to collaborate on developing the activity. The tasks were mainly conceived as individual work, looking to achieve learning outcomes and foundational understanding; however, they could be completed collaboratively. The submissions were shared with all participants so that everyone could get inspiration from the other activities for their work.

Before starting the module and at the end, participants were asked to complete a survey. The survey was different based on the path since it included questions related to the two different roles. Participants could complete both paths (teachers and staff); in this case, they had to fill in questionnaires and tasks both for Teachers and for Staff.

The ADDIE model and the SDT are both the training module's content and basis since they were used to develop and structure it. The activities were carefully designed to provide participants with the three support dimensions (Chiu, 2022). Autonomy is fostered through the self-paced modality, the possibility of choosing the path, and the provision of materials to explore. Structure is fostered through the fixed structure of the sections and clear and concise materials. Involvement is fostered through active tasks, automatic assessment, self-assessment, the possibility of collaboration, and forum discussions. The training module also included an initial and a final survey for all participants.

4. RESEARCH METHOD

The study aims to answer the following research questions (RQ):

- (RQ1) Were the online training module's autonomy, structure, and involvement support effective in creating a valuable learning experience?
- (RQ2) Was there any difference between the Teachers and Staff groups in terms of perceived effectiveness of the support dimensions and appreciation of the module?
- (RQ3) According to participants, what were the module's strengths and areas for improvement in terms of autonomy, structure, and involvement support?

To address the RQs, the answers to the final survey of the participants who completed the training module were collected and analysed. Of the 163 participants who completed the module and received a badge, 143 accepted that their survey answers were used for research purposes. The sample was then restricted to the answers of these participants. Considering that 7 participants followed both paths and completed the survey twice, one per path, the sample was composed of 150 answers, of which 108 were given by participants who followed the path for teachers and 42 by those who followed the path for staff. Both the answers to the questionnaires filled by participants who followed the two paths were included since the paths were slightly different. The final survey consisted of 19 questions with a total of 80 items. Only the 18 items listed in Table 1 were considered for this study.

Table 1. Items of the final survey used in the study

Item	Question	Item text	Answers
Q1a	How much do you agree with the following statements?	This experience was relevant to my career and/or professional development.	1-5 scale (5=to a great extent)
Q1b		The module provided me with ideas that could be used in my teaching/professional activity.	1-5 scale (5=to a great extent)
Q1c		The course was an opportunity for personal enrichment.	1-5 scale (5=to a great extent)
Q1d		Participating in this training was a good investment of my time.	1-5 scale (5=to a great extent)
Q1e		The overall training experience was adequately interactive/engaging.	1-5 scale (5=to a great extent)
Q1f		I took advantage of the international interaction and collaboration with teachers and staff from other countries/institutions.	1-5 scale (5=to a great extent)
Q2	Did you achieve the learning outcomes of this module?		In an 80-100%/In a 50-70%/In a 30-50%/In a 10-20%/The activities were not consistent with the learning outcomes.
Q5a	To what extent do you think that the following methodologies were effective in helping you fulfil the module's outcomes?	Exploration of videos and resources	1-5 scale (5=to a great extent)
Q5b		Case study and application	1-5 scale (5=to a great extent)
Q5c		Learning materials and activities	1-5 scale (5=to a great extent)
Q5d		Project-based learning	1-5 scale (5=to a great extent)
Q5e		Interaction with other participants	1-5 scale (5=to a great extent)
Q5f		Collaboration with other participants	1-5 scale (5=to a great extent)
Q5g		Self-reflection	1-5 scale (5=to a great extent)
Q5h		Self-assessment	1-5 scale (5=to a great extent)
Q5i		Automatic assessment	1-5 scale (5=to a great extent)
Q17	What did you like the most about this experience?		Open answer
Q18	What frustrated you about the training module?		Open answer

To address the impact of autonomy, structure, and involvement (RQ1), the answers to items Q5a-i were considered: Q5a was related to autonomy support; Q5b, Q5c, and Q5d referred to structure support; Q5e, Q5f, Q5g, Q5h, and Q5i referred to involvement support. For structure and involvement support, and for each participant, the average of the answers to the items related to the support dimension was computed. This way, indices of the effectiveness of the three support dimensions were created. Descriptive statistics were then computed. Moreover, the involvement index was cross-checked with items Q1e and Q1f to verify if the interaction with others influenced the effectiveness of involvement support. Then, the autonomy, structure, and involvement support indices were cross-checked with the participants' self-assessment rates about the achievement of the course learning outcomes, extracted from the answers to Q2. The answers were coded through numbers from 5 to 1, where 5 corresponds to the answer "In an 80-100%" and 1 to "The activities were not consistent with the learning outcomes" to have a numeric self-assessment rating of the achievement of the course learning outcomes. Pearson's correlation coefficients between this variable and the three indices of the support dimensions were computed to understand if the support dimensions were correlated with the achievement of learning outcomes. Lastly, the answers to items Q1a-d from the final survey were examined to refine the analysis. They were used to create an index of appreciation of the module in relation to personal and professional development. The appreciation index was correlated with the autonomy, structure, and involvement support indices to investigate if the perception of the effectiveness of support influenced the appreciation of the learning experience.

To investigate differences between the Teachers and Staff groups (RQ2), the ANOVA test was run on the variables identifying the three support indices and the appreciation index, using group belonging as the independent variable. Moreover, the ANOVA test was conducted on items Q1e, Q1f, and Q2 to investigate differences between the two groups in the level of engagement reported by participants in carrying out the activities, in their use of collaboration with participants from other institutions, and in their self-assessment regarding the achievement of learning outcomes.

To investigate the strengths and weaknesses of the training module (RQ3), the open-ended items Q17 and Q18 were analysed. All answers were carefully read and labelled with "S", "A", or "I" if they referred to aspects of the structure support, autonomy support, and involvement support. Answers could be characterised with two or three labels if two or three dimensions of support were mentioned. The percentages of occurrence of the three support dimensions were then computed, and data were also analysed by group. Exemplifying responses from both groups were selected.

The research obtained ethical approval from the Bioethical Committee of the University of Torino. All participants subscribed to a privacy policy and were asked if they agreed to be included in the study. For this study, we used only data from participants who agreed to be included. All data were anonymised before the analyses.

5. RESULTS

To address RQ1, descriptive statistics of the indices of perceived effectiveness of the three support dimensions were computed. The results are listed in Table 2.

Table 2. Statistics of the items. The answers were given on a scale from 1 to 5, where 5 is the highest agreement value

Statistics	Autonomy	Structure	Involvement
Mean	4.39	4.27	3.89
Median	5	4.33	3.80
Standard deviation	0.74	0.60	0.72

The results show that all three dimensions of support included in the INVITE training module were considered effective in achieving the learning outcomes. We also report the descriptive statistics of the single items Q5a-i to help better interpret the results. They are shown in Table 3.

Table 3. Statistics of the items on the effectiveness of perceived support. The answers were given on a scale from 1 to 5, where 5 is the highest agreement value

Statistics	**Q5a**	**Q5b**	**Q5c**	**Q5d**	**Q5e**	**Q5f**	**Q5g**	**Q5h**	**Q5i**
Support dimension	**Autonomy**	**Structure**			**Involvement**				
Mean	4.39	4.26	4.34	4.29	3.38	3.33	4.26	4.16	4.19
Median	5	4	4	4	3	3	4	4	4
St. dev.	0.74	0.85	0.68	0.76	1.12	1.18	0.75	0.76	0.83
Percentage of 5	52.3%	46.9%	45.0%	45.3%	20.4%	21.2%	41.6%	36.1%	41.7%
Percentage of 4	36.2%	36.7%	44.3%	39.6%	23.4%	22.0%	44.3%	46.3%	40.3%
Percentage of 3	9.4%	12.2%	10.1%	14.4%	33.6%	30.3%	12.1%	15.6%	13.9%
Percentage of 2	2.0%	3.4%	0.7%	0.7%	19.0%	21.2%	2.0%	2.0%	4.2%
Percentage of 1	0%	0.7%	0%	0%	3.6%	5.3%	0%	0%	0%

The autonomy support, fostered through the possibility of autonomously exploring the learning materials in a self-paced way, was particularly appreciated by higher education teachers and staff, who usually have little time to dedicate to professional development due to many other commitments. Participants also indicated a high agreement level with the effectiveness of the structure support in achieving the learning outcomes; the average answers to the three items in this category (case studies and applications, learning materials and activities, project-based learning) were in line with the mean, with a preference for "learning materials and activities". At the same time, the perceived effectiveness of involvement support is slightly lower than that of the other two dimensions, while it remains considerable. As visible in Table 3, items Q5e and Q5f (which refer respectively to interaction and collaboration with other participants) obtained lower values. We hypothesised that the reason could be that many participants did not take the opportunity to interact with others and preferred to work autonomously. To test this hypothesis, we analysed the answers to items Q1e, "The overall training experience was adequately interactive/engaging" and Q1f, "I took advantage of the international interaction and collaboration with teachers and staff from other countries/institutions". Results are shown in Table 4.

Table 4. Statistics of items Q1e and Q1f. The answers were given on a scale from 1 to 5, where 5 is the highest agreement value

	Mean	Median	St. dev.		1	2	3	4	5
Q1e	4.12	4	0.83	Percentage of answers	0%	4.7%	15.4%	43.0%	36.9%
				Cumulative percentage	0%	4.7%	20.1%	63.1%	100%
Q1f	3.24	3	1.212	Percentage of answers	7.0%	23.1%	22.4%	22.4%	19.6%
				Cumulative percentage	7,0%	30.1%	58.0%	80.4%	100.0%

Firstly, we notice that 58% of participants gave a negative or neutral answer to item Q1f, affirming they took little opportunity to interact with other participants. The analysis of the Pearson coefficient between the index of involvement and the participants' answers to item Q1f shows that the participants' perception of the effectiveness of the involvement support in achieving the course outcomes is aligned with their level of interaction with other participants in the course. The value of the Pearson coefficient is 0.499, with a p-value <0.001. This result indicates a good level of correlation between the two variables. However, about 80% of participants agreed or strongly agreed with item Q1e. This means that involvement support was activated even if the level of interaction among the participants was not so high: active learning methodologies, such as self-assessment, self-reflection, and automatic assessment, contributed to its effect.

The indices of perceived support were cross-checked with the participants' self-assessment of learning achievement (Q2). Almost all the participants declared that they had achieved at least 50% of the learning outcomes through the course activities. In particular, out of the 150 participants, 67.3% rated as having achieved 80% to 100% of the learning outcomes, and 30% rated as having achieved 50% to 70%. Only 3 participants (2%) said to have reached 20% to 40%, and 1 participant (0.7%) 30% or below. No participants selected the answer "The activities were not consistent with the learning outcomes". These results indicate that the activities included in the training module allowed participants to achieve the learning outcomes. The participants' answers were translated into numbers from 1 to 5, where 5 is the highest achievement, and correlated with the indices of perception of support. The Pearson coefficients obtained were 0.418 (p-value: <0.001) for autonomy, 0.411 (p-value: <0.001) for structure support, and 0.315 (p-value: <0.001) for involvement. These values indicate moderate to good levels of correlation between the perception of support and the achievement of learning outcomes. They show that the methodologies used in the online activities provided support that facilitated the achievement of learning outcomes.

Lastly, items Q1a-d were analysed to investigate the module's appreciation. Table 5 shows the percentage of answers to the four items and the statistics of the appreciation index, built by computing, for each participant, the mean of the answers to the four items. The answers are very high: participating in the module was considered a good investment of time and an occasion for personal and professional enrichment. For all items, neutral answers are below 10%, and there are no or hardly any negative responses. The appreciation index is very high, too, with mean and median equal to 4.5 on a scale from 1 to 5 and with a small standard deviation, indicating that the index values are concentrated between 4 and 5.

Table 5. Statistics of the appreciation items. The answers were given on a scale from 1 to 5, where 5 is the highest agreement value

Statistics	Q1a	Q1b	Q1c	Q1d	Appreciation
Mean	4.38	4.58	4.62	4.41	4.50
Median	4	5	5	4.5	4.5
Standard deviation	0.65	0.62	0.67	0.66	0.51
Percentage of 5	47.3%	63.8%	70.7%	50.0%	
Percentage of 4	43.3%	30.9%	22.0%	40.7%	
Percentage of 3	9.3%	4.7%	6.7%	9.3%	
Percentage of 2	0%	0.7%	0.7%	0%	
Percentage of 1	0%	0%	0%	0%	

The appreciation index was correlated with the indices of perception of the effectiveness of autonomy, structure, and involvement support. Pearson's coefficients are statistically significant ($p<0.001$ in all three cases): 0.607 for structure, 0.461 for involvement, and 0.511 for autonomy. They show a moderate to high level of correlation. This result indicates that the more participants felt supported in structure, involvement, and autonomy, the more they appreciated the learning path, which was thus considered valuable.

To address RQ2, we conducted the ANOVA test on the support and appreciation indices to check if the results are the same for the Teachers and Staff groups. The results are shown in Table 6. They show no significant differences in the four indices between the Teachers and the Staff groups. This means that the autonomy, structure, and involvement support were perceived as effective in both paths, and participants expressed the same level of appreciation for the two paths. In particular, the two groups perceived the involvement and structure support equally. It seems that the Teachers appreciated the autonomy support slightly more, but in a non-significant way. This could reflect the preference for those who, in higher education institutions, hold teaching roles or are involved in instructional activities, for asynchronous and self-paced modalities, which offer greater flexibility and better accommodate the many commitments they often have. Indeed, this consideration guided the design of the training module.

Table 6. Results of the ANOVA tests run on the indices of support and appreciation, considering the group as the independent variable

Group	Statistics	Autonomy	Structure	Involvement	Appreciation
Teachers	Mean	4.41	4.29	3.89	4.54
	Standard deviation	0.75	0.61	0.73	0.51
Staff	Mean	4.33	4.24	3.90	4.38
	Standard deviation	0.72	0.57	0.71	0.52
	F	0.331	0.202	0.025	2.903
	p-value	0.566	0.654	0.874	0.090

The ANOVA test was also conducted to check if the answers to items Q1e, Q1f, and Q2 depend on group belonging, that is, if the two groups had different opinions about how the module experience was engaging, how much they interacted with others, and the level of achieved learning outcomes. Results are summarised in Table 7. The results show that Teachers found the course more engaging and interactive compared to the Staff group. This difference is

statistically significant. However, both groups made similar use of collaboration with others, with the staff group reporting slightly higher levels, although this difference is not statistically significant. This suggests that the Teachers' path was likely more engaging in terms of activities, regardless of collaborative elements. Despite being statistically significant, the difference is moderate, as indicated by the Eta Squared value of 0.032, which points out that 3% of the variance is explained by belonging to one of the two groups. As for the achievement of learning outcomes, although teachers reported slightly higher levels, the difference did not reach statistical significance.

Table 7. Results of the ANOVA tests run on items Q1e, Q1f, and Q2, considering the group as the independent variable

Group	Statistics	Q1e	Q1f	Q2
Teachers	Mean	4.21	3.21	4.68
	Standard deviation	0.79	1.22	0.54
Staff	Mean	3.88	3.32	4.55
	Standard deviation	0.93	1.21	0.593
	F	4.876	0.242	1.600
	p-value	0.029	0.623	0.208

To address RQ3, the participants' responses to Q17 and Q18 were qualitatively analysed. In Q17, among the most appreciated aspects of the training module, 71 participants (47.3%) referred to the structure support dimension. Of them, 18 (25%) belonged to the Staff group and 53 (75%) to the Teachers group. Twenty-one participants (14%) referred to the autonomy support dimension; 9 of them (43%) belonged to the Staff group and 12 (57%) to the Teachers group. Lastly, 50 participants (33.3%) referred to the involvement dimension; of them, 21 (42%) belonged to the Staff group and 29 (58%) to the Teachers group. 20% of answers to Q17 did not mention any aspects related to the support dimension, but other aspects related to their personal experience, such as learning new things, or were too general (e.g., "everything"). Among the Teachers group, Structure support emerges as the most frequently mentioned dimension, whereas among the Staff group, Involvement support appears to be the most prominent.

Comments on the structure support included the module's organisation, which reflected the content, the well-focused materials, rich examples, and clear explanations. Examples of answers to this question that mention the structure support are as follows: "*I liked the structure: it accompanies you in all steps, reflective questions and tasks foster creativity*" (Staff group member); "*The quality and the variety of the instructional and supplementary materials. The tasks were small, affordable and connected to each other, so that they are relevant but not cumbersome*" (Teachers group member).

Positive comments on the autonomy support mainly referred to the asynchronous and flexible format that allowed participants to complete the module at their own pace. Examples of answers in this direction are: "*The asynchronous dimension of the class, which I suppose it helped most of us work at our own pace*" (Staff group member); "*The flexibility of the online format, which gave me the freedom to manage my time while still participating actively in discussions and group projects*" (Teachers group member).

Strengths referring to the involvement dimension mainly mentioned the possibility of interacting with participants from other countries and institutions, and the interactive tasks and activities, which pushed participants to put into practice what they had learnt. Examples of answers are: "*It was very interesting to have this learning experience in an international*

framework. I read about the concerns of others and thought about my own and various solutions. I browsed other project ideas/titles and found everything interesting and novel because the content surpassed community barriers and country/teaching system barriers" (Teachers group member); "*The possibility to collaborate with peers and colleagues in projecting a BIP on a topic very close to the one I teach in my courses, which rendered this experience very useful*" (Teachers group member); "*I like the quizzes since I had a chance to see if I really grasped the meaning of the intervention*" (Staff group member).

Q18 provided us with insights into the improvement areas of the design of the training module according to the participants. Out of the 150 answers collected, 33 (22%) mentioned the structure support; of them, 10 belonged to the Staff group (30%) while 23 to the Teachers group (70%). 8 answers (5.3) mentioned the autonomy support; of them, 2 (25%) belonged to the Staff group and 6 (75%) to the Teachers group. Finally, 26 answers (17.3%) mentioned the involvement support; of them, 7 belonged to the Staff group (27%) while 19 (73%) to the Teachers group. 86 answers (56.3%) did not mention any aspects related to support. Still, they said that nothing frustrated them or indicated other aspects related to their personal experiences, such as having too little time to dedicate to the module. It emerges that very few comments mentioned Autonomy in the areas for improvement. Moreover, in contrast to the dimensions most frequently cited as strengths, the responses concerning areas for improvement reveal an opposite pattern: Involvement support is more commonly mentioned by the Teachers group, whereas Structure support is the dimension most frequently highlighted by the Staff group.

Comments related to structure support mainly mentioned an excessive quantity of materials, which, in some cases, resulted in being repetitive. In many cases, similar comments refer to the additional materials or to eligible activities (such as posting in the forum), which were not mandatory to complete the course: probably, the distinction between mandatory and eligible activities was not clear. In some cases, participants expressed their preference for videos instead of slideshows to read. In contrast, others preferred the slideshows since they allowed them to move through the pages autonomously. Examples of answers mentioning the structure support are: "*I felt frustrated by the repeated prompts at the beginning of each new module asking for my personal experience, as they disrupted the flow of learning. While I understand the importance of reflection, a more streamlined approach could have allowed for deeper engagement with the content without constant interruptions*" (Staff group member); "*There was too much material to read, and the external resources were too long as well*" (Staff group member); "*The INVITE modules require a significant investment of time and attention to fully benefit from their comprehensive content. Unfortunately, I couldn't dedicate so much time. However, I really enjoyed it*" (Teachers group member).

Comments related to autonomy support mainly referred to the restrictions on access to activities based on the completion of previous ones and the impossibility of downloading the slideshows. Examples are: "*The requirement to complete each activity in sequence... even though I acknowledge that it is often necessary*" (Staff group member); "*The fact that I could not download slides and videos provided on the platform. This could be very useful for teachers*" (Teachers group member).

Comments related to involvement support mainly referred to the lack of synchronous sessions, which resulted in a lack of perception of human presence and little interaction between participants. This was due to the asynchronous format, which was appreciated as a source of autonomy support. Examples of answers are: "*It would be helpful to include more opportunities for live interactions, such as webinars or real-time discussions, to foster a deeper exchange of ideas*" (Staff group member), and "*The low interaction in the forums*" (Teachers group member).

6. CONCLUSION

This study aimed to present the design of the INVITE training module, which is based on the INVITE LDF and the SDT, and investigate its effectiveness in helping Higher Education teachers and institutional staff participating in the training achieve learning outcomes. The data collected and analysed allowed us to answer the three research questions. Regarding RQ1 (Were the online training module's autonomy, structure, and involvement support effective in creating a valuable learning experience?), the quantitative and qualitative evidence showed that autonomy, structure, and involvement support were appreciated by participants, even if a relevant percentage did not avail themselves of the possibility of interaction with others, and that the perception of effectiveness of the three dimensions of support was positively correlated with the achievement of learning outcomes and with the appreciation of the training module as a valuable learning experience. In the various analyses, the statistics related to structure and autonomy support are slightly better than those related to involvement support, probably due to the fact that many participants did not actively interact with others. In designing the course, the choice was made to favour the self-paced and asynchronous mode over the collaborative mode, which would have necessitated a timetabling of the tasks and reduced the possibility of university teachers participating. Regarding RQ2 (Was there any difference between the Teachers and Staff groups in terms of perceived effectiveness of the support dimensions and appreciation of the module?), we did not observe any statistically significant differences in the perceived effectiveness of autonomy, structure, and involvement support and in the appreciation of the overall training module among the two groups. Even if in a not significant way, Teachers appreciated the autonomy support and the overall experience slightly more than the Staff group. Both groups declared that they had interacted with the other participants and achieved the learning outcomes at the same level; however, the Teachers found the activities more engaging and interactive than the Staff group. These results indicate that both training paths—designed respectively for Teachers and Staff—were effective in achieving the intended learning outcomes and provided a valuable learning experience through the support of the three Self-Determination Theory dimensions. The observed difference in teachers' engagement, considering that both pathways shared the same learning materials and that both groups reported similar levels of interaction, may be attributed to the nature of the tasks, which were tailored to the specific learning objectives of each group. In fact, teachers were asked to design potential international collaboration activities, while staff were required to identify ways to support such activities. This difference likely resulted in greater engagement among teachers, who may have perceived the tasks as more practical and directly applicable to their professional context.

Regarding RQ3 (According to participants, what were the module’s strengths and areas for improvement in terms of autonomy, structure, and involvement support?), participants appreciated the asynchronous self-paced modality (autonomy support); the quality and variety of materials and the guidance provided by the structure (structure support); the possibility of interacting with colleagues worldwide and the active-learning approach (involvement support). Areas of improvement, based on comments by participants, are the presence of too rigid restrictions on accessing materials and the impossibility of downloading some materials, which hindered autonomy, lack of clarity in the distinction between compulsory and non-compulsory activities, which hindered structure support, and the low level of interaction, which hindered involvement. From these answers, it seems that Teachers had a general preference for aspects

related to the Structure dimension, while the Staff group for aspects related to the Involvement dimension.

The INVITE consortium plans to revise the training module's materials and structure, considering the strengths and weaknesses identified, and transform it into an open online course. This study's main limitations include the fact that the data used are based on self-assessment, and the sample is not particularly wide. More refined analysis will be repeated using more reliable data from participants' activities and cross-checking them with other data. Moreover, the results of a follow-up survey will be analysed to investigate how the knowledge gained through the online module was used to design and implement virtual or blended international collaboration activities. This study can offer relevant insights to higher education institutions that desire to train teachers and staff to develop international collaboration activities, whose diffusion is increasingly relevant in the higher education landscape.

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