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TEACHER EDUCATION

Supporting Pre-service Teachers to Motivate Students in Physical Education: A Pilot Study

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Abstract

To help pre-service PE teachers reflect on how to sustain students' motivation, this study employed a mixed-methods approach to evaluate a pilot training course titled "Learning How to Motivate." Its content covers 19 empowering motivational strategies that pre-service PE teachers can adapt to support students' motivation according to their needs and abilities. Four participants followed the training course during the third year of teacher training in complementary to their other theoretical and practical courses. They completed an online questionnaire before and after the training course, and participated in individual interviews. Results indicate that their beliefs about empowering and disempowering motivational strategies, as well as their intention to use some of them, tended to evolve after taking the course. Furthermore, participants appreciated the added value of the training and recognized its relevance as preparation for high school internships. Recommendations are offered to improve this training as a complement to teacher education. Funding: This work was supported by the

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Introduction

Both in-service and pre-service teachers face difficulties in sustaining students' motivation and addressing their lack of engagement (de Guise, 2024; Dias-Lacy et al., 2017; Ensign et al., 2018; Girard & Boulanger, 2024). Specifically, in the context of physical education (PE), teachers often encounter students showing little interest in physical activities and sports (Doolittle, 2016; Tannehill et al., 2015). This issue can be attributed, in part, to specific pedagogical strategies employed by teachers. For instance, some PE teachers use competitive situations to encourage students' engagement (Bernstein et al., 2013) even though it is widely recognized that such conditions may negatively impact students' motivation, particularly when they feel incompetent (Ryan & Deci, 2020). As another example, some teachers use external regulation to motivate students to engage in the proposed tasks (Reeve, 2006; 2009), but this approach has also been acknowledged as one that may undermine students' interest (Ryan & Deci, 2020).

In response to these challenges, professional development training for in-service PE teachers is effective, particularly in influencing their beliefs and the motivational climate they establish (Aelterman et al., 2014; Sum et al., 2022). However, similar efforts have not been extended to pre-service PE teachers. Despite undergoing a four-year training program, pre-service teachers still express concerns about how they will handle students' lack of motivation and engagement in PE classes (de Guise, 2024; Girard & Boulanger, 2024). Thus, the primary goal of the current study is to assess the impact of a training program designed to address these concerns regarding students' motivation.

Theoretical Framework

To understand effective ways to sustain students' motivation, the combined concepts of two motivational theories need to be taken into account: self-determination theory (SDT; Ryan & Deci, 2000) and achievement goal theory (AGT; Ames & Archer, 1988). The SDT

postulates that individuals of all ages and cultures are motivated to engage in an activity when it meets their three basic psychological needs: autonomy, competence, and relatedness. Indeed, when these needs are satisfied, individuals engage in autonomous forms of motivation, experience well-being, and persevere in the long term (Ryan & Deci, 2020). Situations that frustrate these needs, on the other hand, lead to controlled forms of motivation and early withdrawal from the task or activity (Ryan & Deci, 2020).

Specifically, autonomy refers to the need to make choices based on one's personal values and personality. Relatedness is the need to develop and maintain positive relationships with others. Competence refers to the need to feel successful and capable of meeting the expectations of the social environment. Regarding AGT, the need for competence involves mastering a task based on the individual's own capacity and self-referenced evaluation criteria (mastery), as opposed to comparing their ability with others or with normative standards (performance). In the context of PE, this means that, to motivate students, teachers must employ strategies that satisfy students' basic psychological needs and thereby create an empowering motivational climate (Desbiens et al., 2023; Girard, 2023; Mastagli et al., 2022; Milton et al., 2018). Strategies that frustrate students' needs, on the other hand, create a disempowering motivational climate and negatively impact motivation insofar as such strategies promote controlled forms of motivation (Casillo-Jiménez et al., 2022; Duda et al., 2018).

Beliefs About Motivational Strategies

The challenge both in-service and pre-service PE teachers face when motivating students may be attributed to their beliefs about motivational strategies (Bernstein et al., 2013), which are sometimes inaccurate (de Guise, 2024; Girard, 2024; Lemoyne et al., 2024). It is well-known, for example, that the concept of motivation is often misunderstood (Murayama, 2018). Moreover, an individual's beliefs about the efficacy, ease of implementation, and normalcy of an action determine their intention to engage in it (Aelterman et al., 2014; Ajzen et al., 2018). Accordingly, if teachers favour strategies that frustrate students' psychological needs, it may result in decreased engagement in their classes. Specifically, efficacy refers to the individual's attitudes towards the performance of a behavior. Simply put,

the individual may have more intention to perform the behavior if they anticipate positive rather than negative outcomes. Beliefs about ease of implementation or control refer to the extent to which an individual believes they have control over the behavior (perceived behavioral control). Put differently, the intention to engage depends on whether the individual considers it easy or difficult to perform, whether they believe they can or cannot perform it, and whether they can handle obstacles. Finally, normalcy, or normative beliefs, refers to how one perceives their social environment's approval of a behavior, which is described as the individual's subjective norm. Individuals are more likely to adopt a behavior they perceive as being more acceptable to peers (Ajzen et al., 2018). Typically, these beliefs are influenced by various background factors, including individual factors (e.g., personality or prior experience), social factors (e.g., education or age), and informational factors (e.g., knowledge or media exposure). These factors contribute to the diversity of beliefs among individuals and help explain variations in behaviors from one person to another.

In the context of PE, if a (pre-service) teacher holds mistaken beliefs about how to sustain students' motivation (i.e., holding favourable beliefs towards strategies that frustrate students' needs), they may have the intention to use motivational strategies that are not optimal to deal with students' disengagement with predictably negative results (Bernstein et al., 2013; Reeve, 2009). Reasons for this include their beliefs in potential positive outcomes, their perception of their ability to act in such a way, and the expectation of acceptance by their peers. A rather telling example is the use of rewards to motivate students (Murayama et al., 2017). According to SDT, the use of rewards frustrates the need for autonomy: the individual engages in the task to gain a prize rather than to engage for internal motives, such as understanding the usefulness and importance of the task or to achieve a personal goal (Ryan & Deci, 2020). The use of rewards, therefore, generates controlled forms of motivation; after the reward is withdrawn, the individual no longer sees a reason to engage in the task. Nevertheless, it appears that teachers believe this strategy may have a favorable impact on their students' engagement, perhaps because of PE teachers' experiences before entering the profession (de Guise et al., accepted, 2024; Desbiens et al., 2009), when the strategy's

direct positive results showed it to be effective and easy to implement. Moreover, they may be aware that the strategy is commonly used in the school to "control" students' behavior (Plante, 2005), contributing to a belief in its normalcy and efficacy for students' motivation. In sum, PE teachers may hold favorable beliefs towards strategies that may potentially discourage students' engagement in PE classes and their adoption of a healthy, active lifestyle outside of PE classes (Berstein et al., 2013; de Guise, 2024; Girard, 2024; Lemoyne, et al., 2024; Reeve, 2006; Torok et al., 2004). Because the determinant role of beliefs is related to the intention to use specific strategies and their persistence over time (Ajzen et al., 2018), the subject of (pre-service) teachers' beliefs should be addressed as early as possible in their professional development (e.g., initial teacher training).

Evolution of Beliefs During Initial Training

Although initial teacher training is a major step in PE teachers' professional development, its contribution to the evolution of pre-service teachers' beliefs is, for many reasons, insignificant (Adamakis & Zounhia, 2016; Berger & Girardet, 2016). Indeed, according to pre-service PE teachers, initial teacher training programs address motivational strategies mainly in theoretical courses, and the different concepts of motivational support are not adequately explained (Girard et al., 2023). Furthermore, there appears to be a lack of pedagogical continuity in the content of theoretical and practical courses (Desbiens et al., 2019), a fact underscored by pre-service PE teachers in a recent qualitative study (de Guise et al., 2024). From their point of view, university trainers have different understandings of how to sustain students' motivation, resulting in pre-service PE teachers feeling the need to choose between various practices, which may negatively affect the development of their beliefs.

Study Objectives

To address the anticipated challenges reported by pre-service PE teachers regarding sustaining students' motivation in PE (de Guise et al., 2024**),** a training course titled "Learning How to Motivate" has been designed for pre-service teachers (Girard & de Guise, 2024). The aim was to help them reflect on different ways of creating an empowering motivational climate during PE lessons to meet students' varied needs and abilities. The present study evaluates the pilot

training course based on three objectives: 1) examine pre-service PE teachers' evolution of beliefs (efficacy, ease-of-implementation and normalcy) regarding empowering and disempowering motivational strategies as well as their perceived competence in sustaining student motivation (in primary and high school) subsequent to taking the course; 2) describe pre-service PE teachers' appreciation of the training and the knowledge acquired together with their intention to use the empowering motivational strategies learned; and 3) identify ways to improve training from their perspective.

Methodology and Methods

This study employs an exploratory descriptive design and a mixed-methods approach to achieve its three objectives, and is part of a larger-scale project approved by the university's ethics board. A mixed-methods approach was chosen due to the small sample size of participants who took part in the training to be evaluated (Creswell & Creswell, 2022). Additionally, adopting a pragmatic stance, both quantitative and qualitative data were incorporated to enhance the validity of the methodological approach (Anadón, 2019).

Sample and Procedure

Participants included four pre-service PE teachers (M_{age} = 23,75; SD = 0,5; women = 3) who attended the same francophone university in Quebec (Canada). They were randomly selected from those who participated in the first phase of the larger-scale project and indicated an interest in participating in the second phase by providing their email address at the end of an online questionnaire. In the context of the study, after their third year of initial training (May 2022), participants[1] took the training course "Learning How to Motivate," which was conducted via Zoom by the second author and recorded. To assess fidelity of implementation, the principal investigator reviewed the recordings and ensured that all theories and exercises were explained and conducted as expected. Before and after the training (April and May 2022), all participants completed a questionnaire regarding their motivational beliefs and appreciation

1 As part of their regular curriculum, participants were introduced to concepts related to motivational climate during their first year of initial training in a classroom management theoretical course in February 2020.

of the training. Finally, all took part in individual interviews in June 2022.

Development and Delivery of Training

The development of the training course "Learning How to Motivate" and the associated pedagogical tools (e.g., diagnostic tasks, a website, videos popularizing theoretical concepts and practical applications, and teaching scenarios) was financially supported by a pedagogical innovation fund from the university. It was created based on the results of individual interviews conducted with 18 pre-service PE teachers from five universities who took part to the first phase of the larger project to respond to their needs and anticipated challenges about sustaining students' motivation (de Guise et al., 2024). The content encompasses an inventory of 19 empowering motivational strategies (see Appendix A), which can be implemented in various ways, depending on the reality and professional context of the teachers, and, above all, on the diverse needs and abilities of the students. All activities aimed to support pre-service PE teachers in developing their reflective practice in applying these motivational strategies for the benefit of their students in accordance with their professional realities. In order to make the course accessible within the framework of the courses already offered in initial training, it was designed to last 3 hours, with additional activities that pre-service teachers could carry out to prepare for the course or consolidate learning.

Measures

In line with the first objective, participants completed a questionnaire to measure their beliefs about motivational strategies and their perceived competence in sustaining student motivation (T1). They completed a second questionnaire after taking the training course, which measured the same concepts (T2), along with their intention to use the empowering motivational strategies learned during the training. In line with the second objective, participants also completed a questionnaire assessing their appreciation of the training and participated in individual interviews to elaborate on their responses. During the interview and consistent with the third objective, they were also asked for suggestions on how to improve training.

Questionnaires

To assess beliefs about the 19 empowering motivational strategies (Appendix A) and 12 strategies likely to frustrate students' needs (Appendix B), a questionnaire designed by Reeve et al. (2014) and Aelterman et al. (2014) was used. For each strategy, participants were asked to rate their level of agreement on a Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*) regarding efficacy (e.g., *This strategy is effective for motivating students in PE classes*), ease-of-implementation (e.g., *This strategy is feasible for motivating students in PE*) and normalcy (e.g., *This strategy is normal among PE teachers*).

To measure perceived competence about sustaining students' motivation in PE (in primary and high schools) we used the Competence scale (α = .80; Williams & Deci, 1996), which includes four items (e.g., *I feel confident in my ability to motivate students in primary/high school PE*). Participants responded on a Likert scale ranging from 1 (*totally disagree*) to 5 (*totally agree*).

To assess pre-service PE teachers' appreciation of the training, we used the same 11 questions as Aelterman et al. (2013): seven addressed the training's acceptability in terms of interaction, innovation, interest, intelligibility, and essentiality, while the four others concerned practical usefulness, feasibility, intention to implement, and willingness to recommend to colleagues. Answers were rated on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The intention to use the motivational strategies (Appendices A and B) was measured using the intention questionnaire developed by Aelterman et al. (2016). Participants responded on a 5-point Likert scale ranging from 1 (*no intention*) to 5 (*definitely have the intention*).

Interviews

Interviews were conducted via video conference using the Microsoft Teams network by a research assistant unfamiliar to the participants, who introduced himself before each interview and explained how he would help participants explore their feelings about the training. He listened to each answer, ensuring that respondents were comfortable voicing their opinions and sharing what they learned.

Interviews lasted approximately 60 minutes, and all data were recorded. All statements were transcribed, and personal information was retrieved (pseudonyms were used to ensure anonymity during analysis). Interview guides were designed with reference to research questions divided into three sections: learned motivational concepts during training, appreciation of the training, and intention to implement the motivational strategies learned.

Data Analyses

Quantitative Data

Descriptive statistics were calculated for each variable at each measurement time. Due to the small sample size, non-parametric tests were employed to analyze the quantitative data. To compare the scores (evolution of beliefs between T1 and T2), the Wilcoxon signed-rank test was used for related samples (Siegel & Castellan, 1988). To avoid type 2 errors, results trending toward significance ($p \leq .10$) were considered results of interest to the same degree as those reaching significance ($p \leq .05$), as in previous studies (Smith et al., 2017; Wahl-Alexander et al., 2017).

Qualitative Data

Data were analyzed using Nvivo 10 software according to L'Écuyer's model (1990) as is suggested for descriptive studies (Fortin & Gagnon, 2016): 1- Data were read multiple times, making it possible to provide a list of statements (and establish the meaning of each statement); 2- Data were divided based on the meaning of the statement (data codification); and 3- Statements were categorized using a mixed approach (Creswell & Creswell, 2022). This type of approach was privileged because categories about learned motivational strategies were pre-established based on the theoretical framework; however, other categories were inducted through analysis since it was impossible to predict which types of answers would emerge (L'Écuyer, 1990). In sum, the data yielded four main categories: 1) beliefs about the learned motivational strategies, 2) intention to apply learned strategies, 3) appreciation of the training, and 4) recommendations to improve the training. The first category comprised three subcategories: beliefs about efficacy, ease of implementation, and normalcy, based on Ajzen's (1991) framework. The second and

fourth categories had no subcategories, while the third category had the subcategories: appreciation of the knowledge acquired during training and appreciation of the training methods.

Results

Participants' Beliefs About Motivational Strategies

Quantitative Results

Table 1 shows changes in participants' beliefs about motivational strategies before (T1) and after the training (T2). A positive trend ($p \leq .10$) was observed for beliefs about efficacy and normalcy regarding the strategy "engage in non-instructional conversation" (relatedness support). Negative trends ($p \leq .10$) were observed regarding the efficacy belief about the strategies "use controlling strategies," "rely on authority in response to students' complaints/requests" (autonomy frustration), and "is distant from students" (relatedness frustration). A negative trend was also observed in the ease of implementation of the strategy "use controlling strategies" (autonomy frustration). There were no significant differences as regards participants' perceived competence about sustaining students' motivation in PE in primary school ($M_{\text{time 1}} = 4.08$; $M_{\text{time 2}} = 4.75$; $p = .09$) and high school ($M_{\text{time 1}} = 3.50$; $M_{\text{time 2}} = 3.50$; $p = 1.000$) before and after the training[2].

Qualitative Results

Concerning efficacy beliefs, the results suggest that training influences participants' beliefs about a specific learned strategy associated with the need for autonomy. They expressed how the training enhanced their understanding of the effectiveness of using rational explanations to increase students' interests and understanding of assigned tasks. For instance, Participant 1 (P1) says:

2 Post-hoc analyses (Wilcoxon signed rank test for related samples) were performed to check for a significant difference between pre-service PE teachers' perceived competence in primary and high schools at both measurement times. Results pointed to a trend ($p \leq .10$) at Time 2 ($Z_{\text{time1}} = -1.604$; $p = .109$; $Z_{\text{time2}} = -1.826$; $p = .068$), suggesting that participants' perceived competence to sustain students' motivation in high schools tended to be lower than for primary schools after the training.

Table 1
Changes in Pre-service Teachers' Beliefs About Motivational Strategies

Motivational strategies	Beliefs	*Z*	Mean (T1 / T2)
Engage in non-instructional conversation			
	Efficacy	-1.633; $p = .102$	2.75 / 4.50
	Normalcy	-1.732; $p = .083$	3.25 / 4.00
Use controlling strategies			
	Efficacy	-1.732; $p = .083$	2.00 / 1.25
	Ease-to-implement	-1.633; $p = .102$	2.75 / 1.50
Rely on authority in response to students' complaints/requests			
	Efficacy	-1.890; $p = .059$	3.25 / 1.75
Is distant from students			
	Efficacy	-1.633; $p = .102$	2.00 / 1.00

> To name why we do things, the benefits from the proposed exercise and just like giving more information to students because they don't know, if they don't like the activity to say 'why we do baskets?' Because it can help you with many other things […]. It means their level of engagement, of motivation, keeps increasing because they trust us (teachers) […] and they see you want them to feel good and to enjoy what they're doing.

With regard to strategies addressing the need for relatedness, participants noticed that sarcasm was not an effective way to maintain positive relationships with their students, something they had not considered before the training. As P2 observes:

> I know I tend to be sarcastic, […] and I used sarcasm because it's funny and students love it. But it's true that maybe sometimes, some students I don't know very well took it the wrong way […]. Maybe they laughed about it, but later when they went home they didn't find it funny at all, but all the other students laughed in front of me. It (the training) led me to think about that.

And by P3:

> Sarcasm was discussed (during the training). I know now that it's important to be careful when using it […] because

> not all children react well to this kind of intervention, and not all children understand it either. So, even if a student is sometimes receptive (to sarcasm), maybe other times, when he's not in a good mood, he won't handle it well. So sarcasm isn't the right way to get a message across, and that's why I understood we should think twice about using it.

As for the beliefs regarding the ease of implementing the learned strategies, participants reported that while they understood the importance of planning variations for a task, they find it especially challenging and unrealistic to do so when dealing with diverse abilities and levels of progress. In P4's words:

> To plan a lot of variations in advance, sometimes, it can be a little unrealistic, for example, in the case of a teacher who works full time. Maybe in the beginning of the year, there's time to plan courses and all, but time gets away from you as the year goes on.

In a broader sense, participants perceived the difficulty of supporting all three psychological needs at once. P2 reported specifically that:

> I'd like my students to say it was the best course they had, but were they motivated? Did they get in touch with their feelings and their needs for achievement? Did I enable them to progress both physically and cognitively? I feel like that's a lot to manage in addition to creating a climate where everybody has a sense of safety and well-being.

Participants noted that some strategies learned during training were not very common among PE teachers. Similarly, they addressed concerns about the ease of implementing diverse task variations and suggested that planning such variations was not a widespread practice. P4, for instance, noted that some PE teachers "come to a point where they stop identifying the signs of a student who finds it too easy or too difficult. They propose a task, get them started and that's that." Similarly, participants observed that teachers didn't usually establish connections with students, especially in high school. P1 indicated that they were "really surprised (to learn) that it's impor-

tant to chat about things unrelated to teaching to establish a stronger relationship with them (students), that the stronger the relationship, the better the motivational climate." This strategy was unexpected since they hadn't seen their colleagues establishing connections with students during his high school internship.

Participants' Intention to Apply Learned Strategies

Quantitative Results

Table 2 shows changes in participants' intention to implement motivational strategies before (T1) and after (T2) the training. A positive trend ($p \leq .10$) was observed for the intention to "engage in non-instructional conversation" (relatedness support), while a negative trend ($p \leq .10$) was observed for the intention to "use sarcasm" (relatedness thwarting).

Table 2

Changes in Pre-service Teachers' Intention to Apply Motivational Strategies

Motivational strategies	*Z*	Mean (T1/T2)
Engage in non-instructional conversation	-1.633; $p = .102$	3.00 / 4.00
Use sarcasm	-1.633; $p = .102$	2.25 / 1.25

Qualitative Results

Participants expressed appreciation for learning how to incorporate students' interests and perceptions into their teaching practices. P1, in particular, emphasized how "this, it really held his (my) interest, and it's really something he (I)'d like to do later on." Next, they discussed allowing students to learn on their own and at their own pace. P2 shared how this aligned with his current approach to working with students:

> Everything that involves learning by experience […]. You know, just guiding the students. Yes, you establish a structure, but only to guide them so they can learn by themselves. I really like that idea, and it supports the need for autonomy […]. I know because I've been using it for many years and I really like it.

They also reported their intention to establish an environment where students feel safe. P2, again, said how working collaboratively was a way to promote the inclusion of all students and how this "would be something he (I) would like to reproduce." Finally, because participants understood that sarcasm was not the right way to maintain a good relationship with students, all said they intended to use it less or not at all. One participant, for example, stated that: "using sarcasm, it's not something I tended to do, but let's just say that now I'll be more careful" (P3).

Appreciation of the Training

Quantitative Results

Table 3 presents descriptive statistics regarding participants' appreciation of the training, with scores being quite high for all items.

Table 3
Participants' Appreciation of the Training

Appreciation	Mean (*SD*)	Min–Max
Acceptability of the training		
Interaction	4.75 (.50)	4.00 – 5.00
Innovation	4.75 (.50)	4.00 – 5.00
Interest	4.88 (.25)	4.50 – 5.00
Intelligibility	4.88 (.25)	4.50 – 5.00
Essentiality	5.00 (.00)	5.00 – 5.00
Practical usefulness	5.00 (.00)	5.00 – 5.00
Feasibility	4.50 (.58)	4.00 – 5.00
Intention to implement	5.00 (.00)	5.00 – 5.00
Recommendation	4.75 (.50)	4.00 – 5.00

Qualitative Results

Participants expressed their appreciation for the training based on two key aspects: knowledge acquired and training methods. In terms of knowledge, participants strongly valued the opportunity to consolidate existing knowledge from previous courses in their teacher training program and develop new insights. They particularly appreciated the review of the definitions of the four dimensions of an empowering motivational climate and the various types of motivation (e.g., "Honestly, I think the training was awesome. There

were concepts we already talked about, but the course let me go a little deeper and learn how to apply the concepts in practice" [P4]). Additionally, all participants reported their appreciation for the strategies they learned during training. Table 4 presents the strategies they considered important for their future practice, as identified during the interviews. For example, one participant stated that: "I liked that it's important to listen to students' needs and demands and take them into consideration when planning (your lesson) […]. I feel that's really important" (P4).

In summary, the data indicate that participants learned a wide range of strategies related to the three psychological needs. They particularly valued the training for offering various approaches to support their students' motivation within the context of PE.

Participants appreciated the training methods for various other reasons as well. First, everyone found that the tools employed facilitated integration of the learning content presented during the training. The teaching scenarios, in particular, were highly valued, as reported by P4:

> It was a chance to broaden my knowledge because it gave concrete examples of certain types of situations and certain concepts that were in the training […]. It was good because

Table 4
Reported Learned Strategies During Training

Autonomy support strategies
Explain rationale
Consider students' interests and perceptions
Ask students questions
Allow students to learn at their own pace
Give students choices
Competence support strategies
Use variation
Emphasize progress
Use cooperative learning
Relatedness support strategies
Establish a safe climate
Take an interest in students' life
Chat with students about subjects unrelated to teaching
Make sure all students feel included

> it showed what we should say as teachers, what types of behavior, what changes to make in how we talk, in what we say to students to implement the strategies, it's subtle too sometimes. […]. It also lets you show how, OK, it's not really that complicated; it showed that it was realistic.

Furthermore, P1 noted how the tools prompted him to "really think about the different types of situations they would face and how they could react appropriately to these situations." Second, participants highly appreciated the synchronous nature of the training. They felt that the discussions, both among participants and with the trainer, allowed them to broaden their knowledge and "better understand different points of view" (P2). They also felt that the live format facilitated direct feedback on their opinions or uncertainties about certain aspects of the training. Finally, all participants expressed their appreciation for the trainer's delivery and the quality of the visual content. P3 summed it up as follows:

> It was clear, the colors were cute, it seems silly but these are things that get us to pay attention in my opinion. It was well presented, it was clear, and the trainer was dynamic, which made it fun. It was fun having a presentation with her […], it made us want to listen. And she notices when we've had enough.

Recommendations to Increase the Quality of the Training

A common point among participants was the desire for practical application of the concepts learned. P1 proposed incorporating into the training "live situations, concrete situations that only happen during gym period in high school." Participants emphasized that such additions would help in the practical application of their learning and that direct feedback from the trainer would enhance their understanding of how to implement the strategies. Similarly, they expressed the need for post-training follow-up, suggesting discussion groups to share experiences or having the trainer visit their gym for observation and feedback on their ability to support students' psychological needs. Finally, all participants discussed the importance of conducting the training before their high school internships, emphasizing its greater relevance in this context.

Discussion

This pilot study used a mixed-methods procedure to evaluate the first delivery of the training course "Learning How to Motivate" to pre-service PE teachers. Although there were only four participants, the combination of quantitative and qualitative results indicated that beliefs about efficacy and normalcy, as well as the intention to apply some of the learned motivational strategies, tended to evolve after the completion of training. It would therefore seem that the addition of training that offers explicit strategies on how to create an empowering motivational climate during PE initial training (e.g., *Learning how to motivate*) could effectively contribute to the evolution of pre-service PE teachers' beliefs about, and intention to use, empowering motivational strategies. Furthermore, based on Ajzen's framework (1991), one can reasonably assume that participants would attempt, at least, to apply more empowering motivational strategies in their practice. If so, this would suggest that the training could help provide useful tools to meet the challenges anticipated by pre-service PE teachers regarding students' lack of engagement and motivation in PE (de Guise et al., 2024). Even after the training, however, pre-service teachers still had difficulty understanding how to implement some of the strategies they had learned. Thus, in view of how the belief about ease of implementation can predict perceived competence rather than mere intention to apply the strategy (Ajzen et al., 2018), it would be interesting to offer additional opportunities for practice during teacher training. Theoretical and practical courses would then be coordinated, as recommended by CAPFE (2022), much to the appreciation of pre-service PE teachers (de Guise et al., 2024).

PE teachers are also concerned with classroom management (de Guise et al., 2024; Dias-Lacy & Guirguis, 2017; Mäkelä et al., 2014), an issue sometimes explained by students' lack of motivation (Rodrigues et al., 2020). Accordingly, it is interesting to note that, subsequent to the training, participants were less likely to believe in the effectiveness of disempowering motivational strategies such as the use of control or reliance on authority in response to students' lack of motivation, since these strategies are known to frustrate students' needs. This suggests that the training helped pre-service PE teachers better understand how these strategies inhibit, rather than support, students' motivation.This is a meaningful finding considering that

high school PE teachers often tend to use a controlling approach in response to students' disturbing behaviors (Bonniot-Paquien et al., 2009; Reeve, 2009). Finally, although participants' perceived competence did not change significantly after the training, it appears that their perceived competence in high schools was lower than in primary schools following the same training. This result is consistent with the well-documented decrease in motivation observed between primary and high school students as they get older (Dishman et al., 2018; Mercier et al., 2017). In this sense, if the training was offered prior to pre-service teachers' high school internship (as the participants suggested), it could address the challenges they anticipate regarding teenagers' lack of motivation (de Guise et al., 2024).

Among the strategies discussed with participants during training, and with regard to both quantitative and qualitative results, two motivational strategies—empowering and disempowering—regarding the need for relatedness attracted our attention. First, to support this need, the recommendation is to engage in non-instructional conversations with students (de Guise et al., 2024). Indeed, a study by Rousseau et al. (2009) reports that teenagers who present academic difficulties say they develop better teacher-student relationships with teachers who demonstrate an interest in their lives outside of school and who share their own life experiences. It appears this aspect was enlightening for participants in the present study, as their beliefs about efficacy and normalcy, along with their intention to apply it, tended to evolve positively. This was the case even though participants reported that such a teacher-student connection seemed unusual for PE teachers, especially in high schools. Second, after completing the training, participants understood how the use of sarcasm, which can frustrate the need for relatedness, was ineffective. Their intention to use it thus tended to evolve negatively. The pre-service teachers even mentioned they would try to use it less or not at all, although they first reported doing it to make students laugh. In our view, this learning is very important as a way to distinguish humor from sarcasm. Indeed, according to Instructional Humor Processing Theory (Wanzer et al., 2010), the relationship between teachers' humor and students' learning is a complex process: if the student fails to grasp the incongruity of the teacher's message, as can be the case when sarcasm is used, the student will not understand the humor

and may be distracted or confused by it (St-Amand et al., 2021). Consistent with this, a recent study indicates that humor related to course content, which is considered appropriate, is positively associated with students' sense of relatedness, while other-disparaging humor, which is inappropriate, is negatively related to it (St-Amand et al., 2023). For these reasons, we believe that initial training is a good opportunity to develop pre-service teachers' skills in using humor as a pedagogical strategy when dealing with unmotivated students, as recommended by St-Amand et al. (2021). In light of our results, the training course "Learning How to Motivate" appears effective for discussing this aspect with pre-service PE teachers.

Participants appreciated the training for several reasons consistent with some of the characteristics of effective professional development (Darling-Hammond et al., 2017). Based on our results, for example, the training:

- Was content focused (e.g., *definitions of the dimensions of the motivational climate*, *types of motivation*, *motivational strategies supported by empirical evidence*);
- Prompted active learning (e.g., *teaching scenarios*) and collaboration (e.g., *synchronous aspect of the training, discussions among participants and with the trainer*);
- Included a trainer who acted as a model in meeting the needs of participants during training (e.g., *autonomy = provision of various approaches; competence = offering guidance through the strategies, tools helped integrated the learning content; relatedness = trainer was energetic, and held participants' attention*);
- Included a trainer who provided feedback (e.g., *direct feedback*) and reflection (e.g., *opportunities to think about how to react in different realistic situations*);
- Included a trainer who provided coaching and expert support (e.g., *the trainer was able to explain the application of the motivational theories clearly and identify when participants needed more support*).

Even if the training was appreciated, there were recommendations for improvement. First and foremost, the sustained duration aspect of the training was not achieved, as more than three hours of training are needed, a fact reflected in participants' wish for post-

training follow-up. This element is all the more important because the participants in our sample had already been introduced to these motivational concepts during their first year of initial training. The training was therefore an opportunity to consolidate their learning while building on the experience gained in previous theoretical courses (e.g., classroom management) and internships. This aspect was appreciated owing to the absence of pedagogical continuity during initial training (Desbiens et al., 2019). However, participants who had not previously been introduced to these concepts may well have viewed this differently.

To better address the ease-of-implementation belief, and in keeping with participants' suggestions, it is recommended to provide more opportunities for practice with "expert support" (e.g., teacher trainers, cooperative teachers, internship supervisors), thereby allowing pre-service teachers to develop sufficient confidence to apply what they learned in theoretical courses (Aelterman et al., 2016; Fleitz, 2004). These attempts should be done in conjunction with reflective practice (Campanale, 2007; Rondeau & Jutras, 2019) on their experiences (e.g., during internships or practical courses). For example, using an analysis grid for self-assessment or co-observation between colleagues could be a low-cost strategy (Girard & Hogue, 2023). Participants also offered interesting suggestions about sustaining the duration of the training, including follow-up discussions after implementing the learned strategies (e.g., in internship seminars) during which motivational challenges encountered in realistic situations and possible solutions could be addressed.

Limitations

This study is not without its limitations. The small sample size is largely the result of post-pandemic realities, which affected our capacity to recruit participants: pre-service teachers were, in fact, tired of being asked to participate in Zoom meetings. Furthermore, due to the small sample size, conclusions drawn from the quantitative data were limited. Nevertheless, the mixed-methods procedure employed allowed us to use qualitative data to further our understanding of the quantitative data, thereby helping to overcome this limitation. Finally, all participants were from the same university and were introduced to the subject earlier in their program. Results may therefore have differed for pre-service PE teachers from other universities

following another curriculum. Future studies using a larger sample from different universities would consequently be necessary to generalize our conclusions.

Conclusion

This pilot study offers interesting insights into how pre-service teachers can be supported in creating an empowering and motivational climate. Indeed, the training course "Learning How to Motivate" appears to be a promising way to consolidate pre-service teachers' understanding of empowering motivational strategies. For university trainers, this training, along with the accompanying pedagogical tools, could provide significant consistency and continuity across and within courses during the four years of initial training, thereby enhancing pre-service teachers' professional development.

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Appendix A

Empowering Motivational Strategies Addressed in the Course, Learning How to Motivate

Motivational climate dimensions	Empowering motivational strategies
Autonomy support	1. Acknowledges students' interests, feelings and perspective. 2. Provides reasons for pedagogical choices, constraints, tasks and organizational decisions. 3. Provides meaningful choices to students. 4. Allows students autonomy and a sense of control regarding their learning. 5. Provides opportunity for students input (e.g., give their opinion, make changes to tasks, make suggestions).
Competence support – mastery (AGT)	1. Uses cooperative learning. 2. Demonstrates the tasks himself (herself) and/or uses students as positive "role model". 3. Emphasizes task-focused positive competence feedback. 4. Emphasizes/recognizes effort, improvement and/or engagement in the learning process rather than student performance. 5. Allows students to progress according to their strengths and weaknesses.
Competence support – structure (SDT)	1. Gives clear instructions about the content and structure of the lesson. 2. Monitors if students consequently live up to the instructions. 3. Reviews with students the overall lesson content and structure.
Relatedness support	1. Values students. 2. Is enthusiastic and eager. 3. Develops and maintains good relationships with students. 4. Shows care and concern for students. 5. Addresses students by their first name when the opportunity occurs. 6. Is involve in students live outside of PE hours.

Note: Inspired by Girard, Desbiens et al. (2023), Girard, de Guise & Boulanger (accepted, 2024) and Ahmadi et al. (2023)

Appendix B

Dismpowering Motivational Strategies

Motivational climate dimensions	Disempowering motivational strategies
Autonomy frustration – Control	1. Uses controlling strategies. 2. Uses extrinsic rewards. 3. Relies on authority in response to students' complaints/requests.
Competence frustration – Chaos (SDT)	1. Gives few or no explanations or they are imprecise. 2. Leaves students to themselves during the task. 3. Demonstrated little consistency and coherence/is unpredictable.
Competence frustration – Performance (AGT)	1. Emphasizes/recognizes inferior/superior performance and ability. 2. Encourages rivalry between students. 3. Emphasizes errors and/or performance.
Relatedness frustration	1. Restricts opportunities for interactions and conversation 'with' and 'between' students. 2. Is distant from students 3. Uses sarcasm

Note: Inspired by Girard, Desbiens et al. (2023)