



INCREASING INTRINSIC MOTIVATION IN BLENDED LEARNING THROUGH DIGITAL PLAYLISTS

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ABSTRACT

Blended learning has become one of the most frequently used instructional pedagogy today. Increasingly, it is rising in importance in many educational organizations. However, there are still several challenges faced by teachers, specifically in the online component of blended learning. One prevalent challenge that had been identified was students' intrinsic motivation. Adopting from self-determination theory, the current study aims to address this by investigating the relation between intrinsic motivation with perceived autonomy, competency and relatedness for primary school students. At the same time, it examined the use of a digital online playlist in increasing the level of intrinsic motivation in blended lessons. A total of 95 primary school students (50 boys, 45 girls) across three classes in Singapore participated in the research. Results indicated that perceived autonomy was the main significant predictor of intrinsic motivation. Perceived competence and relatedness did not play a significant role in blended learning. Additionally, the use of a digital playlist had a mixed impact. Some students showed an increase in intrinsic motivation, autonomy, competence and relatedness whilst others did not. The main implication to education is that whilst digital playlists is a simple and effective tool that can assist teachers in creating personalised tasks, it is not a panacea and learner's characteristics would need to be considered in planning lessons.

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Introduction

With the advent of technological enhanced tools, blended learning has become one of the most frequently used instructional pedagogy in educational institutes today (Ashraf et al. 2021). For example, 61% of students globally have taken at least one online course or participated in a completely online competency-based program in their life (Bouchrika, 2023). Commonly defined as the "thoughtful integration of face-to-face experiences with online learning experiences" (Garrison and Kanukah 2004), blended learning aims to combine learning technologies into established pedagogies to create a flexible environment, in the hope of higher learner engagement and achievement. Whilst the use of

blended learning had generated many benefits that are readily apparent from past studies, teachers and students still struggle with challenges in the enactment of blended learning in the classroom. Specifically, one prevalent challenge that had often been identified across cultures was students' motivation (Beaudoin, Kurtz, and Eden 2009). It is necessary for students to be self-motivated in blended lessons as they are required to manage their learning at their own pace. Students who are motivated may be more likely to engage and persist in online activities. Moreover, intrinsically motivated students tend to be more self-regulated in their learning (Zheng et al. 2018). On the other hand, students who have difficulties in self-regulation

may have poor time management and procrastinate in their activities (Rasheed, Kamsin, and Abdullah 2020).

Adopting from the tenets of self-determination theory, the current study therefore aims to address the issue of motivation in a primary school setting through 1) investigating the relation between intrinsic motivation with perceived autonomy, competency and relatedness in a blended learning context and 2) examining the use of an online tool – a digital playlist in increasing the level of intrinsic motivation in blended lessons.

Self-determination Theory

For blended lessons to be effective, it is important that students are intrinsically motivated. Students who are intrinsically motivated pursue activities out of interest and enjoyment (Ryan and Deci 2020). They are driven by internal forces and do not depend on external incentives or pressure. A 30-year meta-analysis conducted by Howard et al. (2020) showed that intrinsic motivation was a strong predictor of adaptive learning outcomes such as academic achievement, positive affect and engagement. When transferred to an online context, Hsu et al. (2019) demonstrated that intrinsic motivation was directly related to learning gains, course grade and perceived knowledge transfer. Self-determination theory (SDT) postulates that educators would need to create an environment to satisfy the learners' psychological needs of autonomy, competence and relatedness (Ryan and Deci 2020). Autonomy refers to the need to feel ownership of one's behaviours. Competence refers to the need to feel a sense of possible success and growth. Relatedness refers to the need to feel a sense of belonging and connectedness with others. When students perceived that these psychological needs are satisfied, they would develop a sense of intrinsic motivation in their schoolwork (e.g. Hsu, Wang, and Levesque-Bristol 2019).

SDT is particularly applicable to blended learning environments as students are mostly left to their own devices in the online component of blended learning. When the teacher creates the stimuli based on SDT tenets, it is essential that elements in the intervention lead to intrinsic motivation. However, whilst the relation between perceived autonomy, competency and relatedness with intrinsic motivation have been well-established in conventional settings (Ryan and

Deci 2020), there had been relatively little research on whether the relations hold for primary school students in a blended learning environment. These may be due to other factors that may confound the study, thus leading to mixed results. For example, relatedness may not contribute towards intrinsic motivation because only there are limited uses of sight and hearing. Students may be restricted to seeing text messages and hearing voice recordings. On the other hand, in a normal face-to-face lesson, students get to immerse themselves in learning dynamics. They may enjoy watching their classmates learn and respond to questions.

Digital Playlist

Teachers play an essential role in meeting the psychological needs of students by providing autonomy support and structure in their lessons (Ryan and Deci 2020). Autonomy-supportive teacher behaviours begin with an attempt to understand and acknowledge student's perspectives. Students are given opportunities to take ownership of their learning. A key element to achieve this is the provision of meaningful choices to engage their interests. Where choice is not possible, the rationales for the assigned activities are supplied. Autonomy structure entails setting clear goals, creating optimal scaffolding in the activities and providing useful feedback. Although there is substantial evidence on the effectiveness of autonomy support and structure (e.g. Hornstra, Stroet, and Weijers 2021), studies on interventions that were informed by self-determination theory pertained largely to the health domain (Ntoumanis et al. 2021). Studies describing actual interventions in the classroom are relatively few.

As an emerging research direction in SDT lies in the intersection of learning and technology, it is timely for educators to investigate what tools and their corresponding features are suitable for motivational interventions (Ryan and Deci 2020). One possible tool that can incorporate these strategies is the digital playlist. A digital playlist is akin to a personalized flowchart of operations in a lesson (Bohol and Prudente 2020). At the outset, teachers would break down the learning objectives into a series of micro-tasks. Each "operation" in the playlist would then comprise of specific micro-tasks to be completed, which may be in the form of reading articles, quizzes, video streams, formative assessments and so on. These tasks were usually created in a sequential, yet

personalized manner that provided students some degree of flexibility in selecting a preferred format of activity. Completion of each task moved students a step towards achieving the learning objectives. As digital playlists are in an online environment, students were given the leeway to work at their own pace and progress monitoring would be done through automated means. Although the digital playlist offers opportunities for blended learning, very little research has been conducted on its effectiveness. One possible challenge may be the time needed to prepare the digital playlist for lessons, as it would involve a lot of effort on the teacher’s part.

Research Questions

RQ1: Do perceived autonomy, perceived competency and perceived relatedness predict the level of intrinsic motivation in blended lessons for primary school students?

RQ2: Can the use of a digital playlist in a blended class significantly increase the level of perceived autonomy, competency, relatedness and intrinsic motivation in primary school students?

Methods

Participants and Measures

A total of 95 students (50 boys, 45 girls) across two government schools in Singapore participated in the research. The classes were selected as if they were representative of a typical class in a government school. Furthermore, they were taught by teachers who were interested in using a digital playlist in their lessons. The breakdown of the students in their classes is summarized in Table 1. The teachers who taught the classes were experienced classroom teachers with more than 20 years of teaching experience.

Table 1
Profile of classes

Class	Level	Boys	Girls	Profile of teacher
A	Primary (Year 6 equivalent)	6	14	17 Female (24 years of experience)
B	Primary (Year 6 equivalent)	6	12	15 Same as Class A
C	Primary (Year 5 equivalent)	5	24	13 Female (21 years of experience)

The Perceived Locus of Causality scale (Goudas, Biddle, and Fox 1994) was used to assess the level of intrinsic motivation of the students. The scale was selected as it had been previously validated in Singapore (Wang et al. 2009). It comprised of three items and used a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) in which a higher score indicated a higher level of intrinsic motivation. The scale demonstrated adequate to good internal consistency across the three classes in the pre and post questionnaires. The alpha coefficients are indicated in Table 2.

The Basic Psychological Need Satisfaction scale for children (Van der Kaap-Deeder et al. 2015) was adapted to assess the level of perceived satisfaction of autonomy, competence and relatedness in students. The scale was selected as it has been validated and adapted in many cultures and countries (e.g., Heissel et al. 2019). The items were modified such that they pertained to needs satisfaction in class. Each of the subscales had four items and used a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) in which higher scores indicated higher levels of perceived need satisfaction. The subscales demonstrated acceptable to excellent internal consistency across the three classes in the pre and post questionnaires. The alpha coefficients are indicated in Table 2.

Table 2

Alpha Coefficients for Intrinsic Motivation, Perceived Autonomy, Perceived Competence and Perceived Relatedness scales

Class	Pre (IM)	Post (IM)	Pre (PA)	Post (PA)	Pre (PC)	Post (PC)	Pre (PR)	Post (PR)
A	.91	.86	.84	.75	.78	.89	.85	.88
B	.84	.76	.71	.75	.80	.69	.86	.82
C	.83	.87	.65	.71	.74	.86	.93	.80

Pre = Pre-survey, Post = Post-survey, IM =intrinsic motivation, PA = perceived autonomy, PC = perceived competence, PR = perceived relatedness

Procedure

Design of the Digital Playlist

The digital playlist was designed to be used by students as part of their lessons in English Language. At the end of the lessons, students were expected to understand and apply the use of

characterization to highlight and explain details about a character in a story. The playlist was planned by breaking down the learning objectives into several manageable tasks that contributed towards achieving the learning objectives. The digital playlist was uploaded into a shared learning management system used by all government schools in Singapore. Instructional tasks in the playlist were planned such that there was a common sequence of actions across the classes. Students had to go through the tasks in the playlist in order. There were also certain choices within each task that the students could make, depending on their preferences. Finally, specific activities in the digital playlist were modified to cater for the different levels. Table 3 illustrates the common sequence of actions with a specific example of how it was carried out in Class A. The lessons took place over the span of 1 week.

Table 3

No.	Action	Example of digital playlist
1.	Introduction	1) Read the objectives of the lesson.
2.	Starter activity	2) Attempt a fun quiz to see how helpful students are.
3.	Activating prior knowledge	3) Examine their past experiences and feelings on giving help. 4a) Watch a video on giving help and comment on the main character's feelings OR 4b) Read an article on giving help and comment on the main character's feelings.
4.	Teaching activity	5) Plan a story using the thinking tool "See, Think, Wonder". The thinking tool was meant to structure some writing points based on a picture. 6) Watch a video on a writing technique "Show Not Tell", whereby characters showed their feelings through actions. 7) Apply the "Show Not Tell" writing technique to a part of their story. 8a) Draw OR 8b) Narrate OR 8c) Act out the story on Flipgrid.
5.	Closing activity	9) Reflection on learning

Administration of survey

The digital playlist lessons took place in the middle of the term. The pre-surveys on the level of intrinsic motivation, perceived autonomy, competence and relatedness were administered in class prior to the introduction of the playlist. The post-surveys were administered in class after the use of the playlist. The time interval between the pre and post surveys was approximately one week.

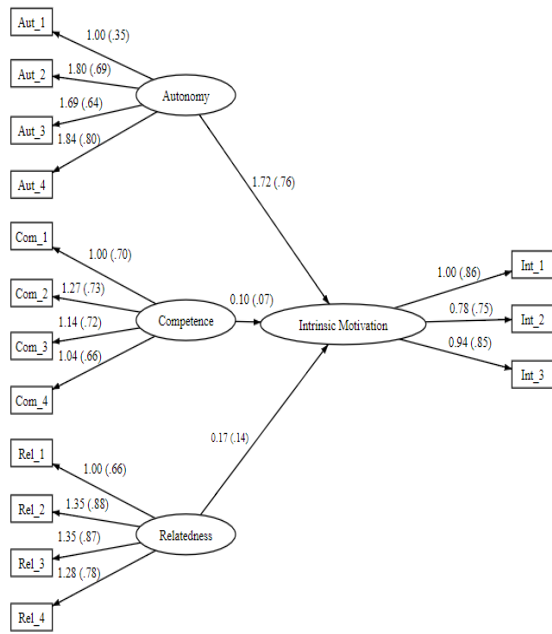
Data Analysis and Results

To examine the relation between perceived autonomy, perceived competency, perceived relatedness with intrinsic motivation, the data was first stacked by combining the pre-survey data with the post-survey data, resulting in a sample size of 190. The data was stacked as the relationships between the constructs would be similar regardless of pre or post interventions. The structural model was subsequently analyzed using the lavaan package in R. To cater for multivariate non-normality in the data, a maximum likelihood estimation with robust standard errors was used to compute the path coefficients. To evaluate model fit, we examined the Satorra-Bentler scaled χ^2 test statistic, robust comparative fit index (CFI), robust Tucker-Lewis's index (TLI) and the robust root mean square error of approximation (RMSEA). The criteria for a good fit are a non-significant χ^2 statistic, CFI > .95, TLI > .95 and RMSEA < .06 (Hu and Bentler 1999). However, as the χ^2 statistic is sensitive to large samples, it is usually not relied on to determine model fit.

Figure 1 shows the structural model with its factor loadings and path coefficients. Factor loadings on the latent constructs were all significant and ranged from .78 to 1.84. However, intrinsic motivation was predicted solely by perceived autonomy ($\lambda_{aut} = 1.72, p = .017$). Intrinsic motivation was not predicted by perceived competence ($\lambda_{com} = .10, p = .733$) or perceived relatedness ($\lambda_{rel} = .17, p = .093$). The model fit indices indicated an excellent fit for the data, $\chi^2(82) = 109.75, p = .022, CFI = .97, TLI = .97, RMSEA = .049$.

Figure 1

Structural Model with Factor Loadings and Path Coefficients



Note: 1) Aut = perceived autonomy, Com = perceived competence, Rel = perceived relatedness, Int = Intrinsic Motivation. 2) Values in parentheses show the standardized loadings and coefficients.

To investigate the impact of using a digital playlist, paired sample t-tests were conducted on the respective means using SPSS ver 26. To counteract the problem of multiple comparisons, a Holm-Bonferroni correction was applied to adjust the rejection criteria for each class. That is, the p-values for the four t-tests were first sorted in ascending order. The p-values were then compared to the cutoff values of .0125 (= .05/4), .0167 (= .05/3), 0.025 (= .05/2) and 0.05 (= .05/1). When the differences are statistically significant, effect sizes were computed using Cohen’s d. We conducted the analysis for each class separately as there was a possibility that the impacts of the digital playlist could vary for each class. Table 4 shows the results from the paired sample t-tests. Figure 2 shows the results in graphical form for the various classes.

Table 4

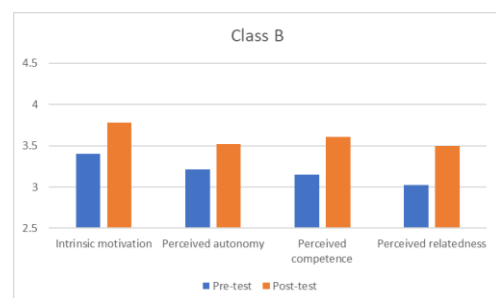
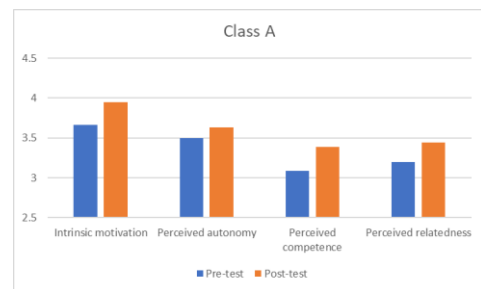
Results from paired sample t-tests for the different classes

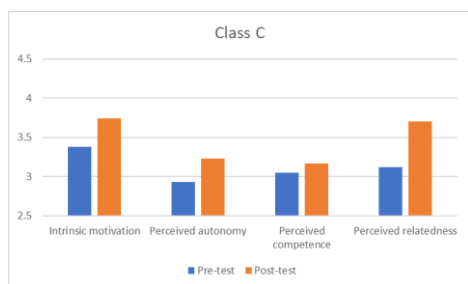
No.	Variable	Mean (SD) Pre-test	Mean (SD) Post-test	t	df	P	d
Class A							
1	Intrinsic motivation	3.66 (.90)	3.95 (.77)	2.37	30	0.024	
2	Perceived autonomy	3.50 (.79)	3.63 (.69)	0.94	30	0.354	
3	Perceived competence	3.09 (.67)	3.39 (.85)	2.17	30	0.038	
4	Perceived relatedness	3.20 (.78)	3.44 (.84)	1.87	30	0.071	
Class B							
5	Intrinsic motivation	3.40 (.83)	3.78 (.66)	3.15	26	0.004**	.60
6	Perceived autonomy	3.21 (.70)	3.52 (.61)	2.24	26	0.034**	.44
7	Perceived competence	3.15 (.85)	3.61 (.54)	2.81	26	0.009**	.54
8	Perceived relatedness	3.02 (.89)	3.50 (.83)	2.63	26	0.014**	.50
Class C							
9	Intrinsic motivation	3.38 (.90)	3.74 (.86)	3.75	36	0.001**	.61
10	Perceived autonomy	2.93 (.74)	3.23 (.75)	2.45	36	0.019**	.40
11	Perceived competence	3.05 (.67)	3.17 (.79)	1.40	36	0.171	
12	Perceived relatedness	3.12 (1.21)	3.70 (.91)	3.64	36	0.001**	.60

** Differences are statistically significant after applying the Holm-Bonferroni correction.

Figure 2

Results showing differences between the pre and post tests for the different classes





Discussion

The results of the study indicated that 1) perceived autonomy was the main predictor of intrinsic motivation and 2) the use of a digital playlist had a mixed impact on perceived autonomy, perceived competence, perceived relatedness and intrinsic motivation.

Perceived autonomy as the main predictor

It was no surprise that perceived autonomy emerged as a key predictor of intrinsic motivation. Aligned with the tenets of SDT and previous empirical studies (Ryan & Deci 2020), students were more likely to engage in learning activities out of interest and enjoyment when they felt that they had ownership of their own learning. Our findings extended this relation to primary school schools in a blended setting. A wholly unexpected result was that perceived competence did not contribute significantly towards intrinsic motivation in our study. This contradicts the established notion that students who feel a sense of mastery were more likely to enjoy their learning activities. Instead, our study indicated that regardless of how students perceive their mastery level in the subject, it had no impact on their interest and enjoyment in the blended lessons. We offer a plausible explanation for this. In a traditional lesson, perceived competence during lessons were usually associated with activities that were relevant to the subject being taught. However, in a blended setting, competence may have had an additional dimension of technical proficiency, such as the ability to navigate onscreen. Therefore, it was possible that perceived competence did not predict intrinsic motivation in this instance.

Along similar lines, perceived relatedness was also not a predictor of intrinsic motivation in the online environment. Previous studies had shown that relatedness with friends and teachers had little connection with intrinsic motivation as the impact of relatedness may be lessened by other sources (Guay et al. 2017). In a traditional lesson where learning takes place in a social

context, it was reasonable to assume that face to face interactions between students and teachers that led to genuine feelings of connectedness would inevitably increase intrinsic motivation. However, in a blended lesson, interactions between students and teachers would be unlikely to lead to the same feelings of connectedness. Rather, it may be more likely to lead to greater control over learning. For example, interactions in blended lessons may be through online text comments, whereby students had the opportunity to do so at their own pace. Similar to the conclusions made by Guay et al. 2017, if autonomy had not been a variable in the study, there may have been a significant impact of perceived relatedness.

Impacts of a digital playlist

We had expected a significant increase in autonomy because of the main features of choice provision and personalization in the tool. Indeed, two out of the three classes experienced an increase in autonomy when the digital playlist was introduced into their lessons. However, class A had no significant increase in feelings of autonomy. Upon reflection, we surmised that the disparity occurred due to the substantial moderating roles of the student characteristics in the class. For example, the digital playlist may not be effective in promoting autonomy for students who had low self-efficacy and were accustomed to following specific instructions from teachers. These students may have viewed the personalization aspects as an imposition on their energy and time, rather than as attempts to engage their interests.

Along the same lines, we had anticipated a significant increase in perceived competence because of scaffolding elements embedded in the digital playlist. However, classes A and C did not experience an increase in their feelings of competence. We surmised that this may be due to two possible reasons. First, similar to above, measuring perceived competence in a blended setting had an additional dimension of technical proficiency. As the lessons did not involve any technical training, it would not be unusual to obtain mixed results. Second, there may be other aspects of language writing that were not included in the activities, such as the use of vocabulary associated with the topic. Students may have felt that they have not improved in their overall competence.

The results were also mixed in terms of perceived relatedness. In the blended setting, there were many opportunities for students to converse with and elicit support from their peers and teachers. Thus, we had also predicted an increase in their sense of support and connectedness in the lesson. However, class A had no significant increase in feelings of relatedness. As this was the same class that did not experience an increase in perceived autonomy, we conjectured that the disparity was again due to student characteristics that were present in the class. For example, students with low self-efficacy may be reluctant to seek peer or teacher support for fear of exposing their weaknesses. At the same time, they may also have been waiting for instructions from teachers by force of habit.

Taken together, the digital playlist is an useful tool that educators can adopt in their blended learning lessons. The playlist offers a personalized and sequential list of activities that scaffold students towards the intended learning outcomes. However, care must be taken when adopting the playlist to increase student motivation. It seems that the implementation may be more effective when conducted in high self-efficacy classes, but more research would have to be carried out to ascertain this.

Limitations

In this study, the sample comprised solely of primary school students in Singapore and hence the findings were not generalizable to other groups. For example, students in a higher age group may have a different perspective on the digital tool used due to a greater level of maturity. Furthermore, differences in culture and technology adoption in the school may also result in divergent findings. Next, due to practical constraints, it was not possible to use an experimental design for the study. Thus, we were unable to control extraneous variables, such as technical competence, in the intervention. Nor were we able to control potential external variables, such as student socio-economic status, that may have influenced students' motivation.

Conclusion

The use of a digital playlist is a viable option for teachers to increase intrinsic motivation in blended lessons. It is a simple but effective tool that can assist teachers in creating personalised tasks that scaffold students towards learning

outcomes. Using a digital playlist, teachers can offer differentiated learning pathways to students and at the same time, enable easy access to digital or web-based resources. However, it is not a panacea for blended lessons and may not be suitable for classes with certain characteristics. It may be beneficial if future studies could incorporate individual differences that moderate the effectiveness of pedagogical interventions. Nevertheless, this adds credence to one of the most basic principles of teaching – teachers need to know their students well before any effective teaching can be conducted. Finally, blended learning is here to stay in the foreseeable future, and its use will only increase with time. It is imperative that the direction of educational research should focus actively on the associations between traditional learning theories and new technologies for education. As blended learning evolves, technological tools such as the digital playlist can serve as a nexus to impart knowledge and skills to students. It makes sense to look closely at how traditional models and opportunities afforded by technology can be successfully co-opted into workable strategies.

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