



Development of a systematic humor pedagogical framework to enhance student learning outcomes across different disciplines in Hong Kong

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ABSTRACT

Teachers' content-related humor is highly relevant for student outcomes in higher education (HE). Yet, teachers' use of different types of humor and frequency and other factors make generalizations about the effective use of humor on students' learning hard to establish. Specifically, little research attention has been paid to the impact of the use of a systematic humor pedagogical framework across different disciplines in HE. Here, we developed a standardized planned humor pedagogical framework, termed Planned Humor Incorporation System for Teaching and Learning Enhancement (PHISTLE), to systematically incorporate content-related humor into teaching practices to consistently generate beneficial learning outcomes across different disciplines. To evaluate the effectiveness of the system, we investigated the impact of content-related humor as exhibited in the identification with teachers' teaching style on students' learning outcomes in the sciences, humanities and social sciences disciplines. Retrospective pre-post surveys were distributed and semi-structured interviews were conducted to gain insights into the ways humor was used and their effects. Pearson correlation analysis of the surveys and thematic analysis of interview transcriptions indicate that content-related humor as exhibited in the teaching style was positively correlated to students' learning competence, personal attributes, and future behaviors, and may contribute to a more relaxed and stress-free classroom environment. Therefore, the strategic use of PHISTLE can likely generate positive learning outcomes in a replicable and generalizable manner.

1. Introduction

Humor is a powerful communication tool with considerable pedagogical potential (Neff & Rucynski, 2021). Almost half a century of research has been dedicated to investigating how the instructional use of content-related humor influences students' learning and emotional outcomes, contributing to teaching and learning effectiveness (Banas et al., 2011; Bieg & Dresel, 2018; Daumiller et al., 2020; Garner, 2006; Wanzer et al., 2010). Specifically, content-related humor is linked to positive affect, increased student motivation, attention and learning (Banas et al., 2011; Bieg et al., 2017; Bieg & Dresel, 2018; Goodboy

et al., 2015; Wanzer & Frymier, 1999; Wanzer et al., 2010). Nonetheless, there is scarce research on how humor is systematically applied or planned (i.e. types of humor and frequency) in lessons across different disciplines in higher education (HE) to enhance students' learning.

Higher education teaching involves teaching complex concepts and theories (Daumiller et al., 2020), so the use of instructional content-related humor rather than spontaneous humor is needed to better foster learning outcomes. Previous studies support the proposition that instructional humor promotes learning (Bieg & Dresel, 2018; Goodboy et al., 2015; Wanzer & Frymier, 1999; Wanzer et al., 2010). According to the literature, humor is regarded as "anything that the

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teacher (lecturer) and/or students find funny or amusing” (Wanzer et al., 2006, p.82). More specifically, for our study, humor is defined as the intentional use of verbal communication that results in laughter or joyful emotions and involves the communication of incongruous meanings that bring laughter (Booth-Butterfield & Booth-Butterfield, 1991; Martin, 2007). Different theories can explain why some content is regarded as funny, with the incongruity theory and arousal theory being the most influential ones (Alsop, 2015). Incongruity theory posits that a contradiction is needed for humor (Berlyne, 1960; Martin, 2007), and therefore, people find something humorous when it is considered absurd and are able to identify and resolve the incongruity. The arousal theory regards humor as involving an interaction between emotions and cognition (Berlyne, 1960, 1972), and humor arises from cognitive appraisal as well as physiological arousal. This suggests that humor can create positive affect and provoke laughter, which may help reduce stress (Wanzer & Frymier, 1999; Wanzer et al., 2010).

1.1. Theories on humor

To offer clarity on how instructional humor can enhance learning, Wanzer et al. (2010) proposed the Instructional Humor Processing Theory (IHPT), an integrative theory that draws on the elaboration likelihood model of persuasion (Petty & Cacioppo, 1986) and incongruity theory (Berlyne, 1960). The IHPT states that when students recognize and resolve the incongruity in an instructional content-related humorous message, this recognition of humor can increase students’ attention and motivation to learn, provided that the humorous message is appropriate and relevant to the course content (Wanzer et al., 2010).

Drawing on the IHPT, content-related humor can increase learning, motivation, and attention while the appropriateness of humor influences the affective responses of students (Wanzer et al., 2010). Previous studies have categorized teacher humor into different types and have found that employing content-related humor to teach course materials was the most appropriate type of humor as this enhanced students’ learning while humor that is offensive or involved disparaging others was inappropriate (Bieg & Dresel, 2016; Frymier et al., 2008; Wanzer et al., 2006). Synthesizing the above studies, specific types of content-related teacher humor have been found to be effective in teaching, such as word play (i.e. playing with words like double meaning words called puns and acronyms) (Bryant et al., 1980), exaggerated/absurd descriptions, analogies, and anecdotes (i.e. a humorous story used as an example to explain course content) (Booth-Butterfield & Wanzer, 2016; Frymier et al., 2008; Wanzer et al., 2006), whereas other types, including aggressive, offensive, unrelated, other-disparaging, and sarcasm have been found to be mostly ineffective in teaching (Banas et al., 2011; Bieg & Dresel, 2016; Frymier et al., 2008; Torok et al., 2004).

While the usefulness of instructional humor has been acknowledged in prior studies, it should be stressed that learning in the classroom involves interaction between teachers and students; research studies indicate that the relationship between the teacher and students can foster learning (Egeberg & McConney, 2018; Yoon et al., 2018). The Relational Process Model of Humor (RPMH) (Cooper et al., 2018) offers an understanding of how humor can help develop good relationships between teachers and students. Humor can help establish rapport, reduce the boredom of students, create more interaction, and develop teacher-student relationships, which in turn can promote students’ learning and influence their behavior (Cooper et al., 2018; Mu et al., 2023). We argue that teacher content-related humor can favor more interaction between teachers and students and create a positive, affective learning atmosphere (Mu et al., 2023), enabling students to connect with teachers.

Deci and Ryan’s (1985) self-determination theory (SDT), rooted in psychology, may offer insights into how students’ connection with their teachers and the positive affect created by instructional humor may impact their learning outcomes. According to SDT, the fulfilment of the

three innate psychological needs for competence, autonomy and relatedness (Ryan & Deci, 2002) is “necessary and sufficient for growth, integrity, and wellness” (Jang et al., 2009, p.645) and can affect students’ engagement and school outcomes (Jang et al., 2009). Students with these needs fulfilled are self-determined and experience benefits such as better academic performance (Fortier et al., 1995), higher classroom engagement, greater motivation (Jang et al., 2009), and greater persistence and learning (Guay et al., 2008). We contend that in line with Bolkan and Goodboy (2015), instructional humor can generate positive affect through the increase in self-determination and this is because of the relationship between students’ affective learning (i.e. their identification with their teacher or good feelings towards the teacher) and their needs for relatedness, competence, and autonomy. As alluded to earlier, students’ relationships with their teachers may be associated with their affective learning (Frisby & Martin, 2010). Relatedness refers to “providing a sense of belongingness and connectedness to the persons, group, or culture disseminating a goal” (Ryan & Deci, 2000, p.64), which may be reflected in students’ relationships with their teachers (Ryan et al., 1994). Research has shown that instructional humor serves to promote group cohesion and minimize the psychological distance between teachers and students, enabling teachers to develop meaningful student-teacher relationships. In other words, affective learning through the use of instructional humor can enhance students’ perceptions of relatedness with their teachers (Banas et al., 2011; Frisby & Martin, 2010) and impact their learning through the fulfilment of their needs for relatedness. Competence is defined as students’ perceptions of their ability to do well in tasks and attain outcomes (Van den Broek et al., 2020). As applied to SDT, positive affect created through the use of content-related humor may promote students’ perceptions of their own capability to accomplish tasks (Williams & Niemiec, 2012), solve problems (Isen et al., 1987), and set goals. This positive effect may have a beneficial impact on their perception of competence (Bolkan & Goodboy, 2015). According to SDT, affective learning is connected to autonomy too. Autonomy refers to “individuals’ inherent desire to feel volitional and to experience a sense of choice” (Van den Broek et al., 2010, p.982). This means students can self-initiate and self-regulate and have a sense of ownership over their learning (Van den Broek et al., 2010). It is contended that being connected to teachers may increase students’ volition in their academic tasks; in fact, empirical studies have found that students who have a connection with their teachers had a higher sense of autonomy in their schools (e.g. Ryan et al., 1994).

Considering the empirical evidence that teacher content-related humor can foster an affective learning environment for students (Bolkan & Goodboy, 2015), it is posited this humor as exhibited in the teaching style may influence students’ learning, motivation, and future behaviors through its impact on students’ affective learning and ultimately, help fulfil students’ needs for competence, relatedness, and autonomy. A caveat is that the frequency of using humor in lessons should be carefully considered. Ziv (1988) found that three to four jokes or content-related humor per lesson were optimal since more than that may divert students’ attention from the lesson. Other studies have rarely delved into the optimal frequency of the use of humor in each lesson, so this is an area worth exploring.

1.2. Beneficial impact of humor on students’ learning, personal attributes, and future behaviors

Prior studies have documented the effects of instructional humor and provided empirical support for their impact on enhancing students’ cognitive, emotional, and behavioral outcomes (Bieg & Dresel, 2018; Goodboy et al., 2015; Wanzer & Frymier, 1999; Wanzer et al., 2010; Ziv, 1988). The cognitive component refers to how students respond to teachers’ instruction and their understanding and recall of the concepts taught (Fredricks et al., 2004). The behavioral component relates to how students behave in learning activities or engage in future behaviors such

as participating in activities while the emotional aspect is concerned with students' positive and negative attitudes to learning activities (e.g. showing motivation) (Fredricks et al., 2004).

Instructional humor has been found to enhance learning or cognitive outcomes (Bieg & Dresel, 2018; Violanti et al., 2018; Wanzer & Frymier, 1999; Ziv, 1988), with students gaining a deeper understanding of the topic when content-related humor is used (Miller et al., 2017; Wanzer et al., 2010). Content-related humor helps students learn better, promotes clarity and understanding of the topic (Wanzer et al., 2010), and aids attention and retention of knowledge (Bieg et al., 2022; Ziyaemehr et al., 2011). Regarding behavioral outcomes, Ziv (1988) and Wanzer and Frymier (1999) conducted studies on teacher content-related humor and found a relationship between students' perceptions of teacher humor and students' perceptions of effective learning behaviors (e.g. learning more about the topic, etc.). In the workplace setting, leaders' humor can evoke positive emotions and is positively linked to organizational citizenship behavior (Cooper et al., 2018), but research on students' future behaviors in this aspect (i.e. helping their peers) is lacking. In terms of emotional outcomes, enjoyment of learning provides psychological support (Fredrickson, 2001), fostering learning and performance (Pekrun et al., 2018). Humor allows teachers to engage students' attention owing to its entertainment value (Davis & Arend, 2013; Strick et al., 2010). In this regard, student-perceived content-related humor of teachers is positively associated with increased attention, motivation, interest, and confidence in the topic (Garner, 2006; Goodboy et al., 2015; Wanzer et al., 2010). Extending this further, researchers have found that a more relaxing learning environment resulting from humor helps to reduce anxiety and stress (Bieg et al., 2019, 2022; Torok et al., 2004; Wellenzohn et al., 2018).

Drawing on the above studies, we contend that student-perceived content-related humor of teachers as exhibited in their teaching style is positively associated with changes in students' learning competence (i.e. better understanding and recall) (Bieg et al., 2022, 2017; Bolkan & Goodboy, 2015; Wanzer et al., 2010), personal attributes (i.e. higher motivation and confidence) (Bolkan & Goodboy, 2015; Garner, 2006; Martin, 2007), and future behaviors (i.e. effective learning behaviors and helping other students) (Cooper et al., 2018; Wanzer & Frymier, 1999).

1.3. Research gap and aims of the study

While it is generally recognized that teachers should be strategic in their implementation of content-related humor (e.g. Banas et al., 2011; Ziv, 1988), to the best of our knowledge, no prior studies have attempted to standardize a humor pedagogical approach for HE in Asia. Teachers should not make a joke too frequently; restraint is needed, and as Banas et al. (2011) highlighted, "it is not simply the use of humor, but how humor is used, that determines its effectiveness in the classroom" (p.126).

Therefore, in this study, we aimed to develop a standardized planned humor pedagogical framework to systematically incorporate content-related humor into teaching practices that can consistently achieve beneficial learning outcomes in a replicable, generalizable, and sustainable manner. Specific types of humor were utilized to create instructional humor that was integrated into lecture PowerPoint presentations with specific modes and frequency of incorporation. Thus, the content-related humor can act as transferrable "add-ons" that can be broadly utilized by different teachers as long as appropriate guidelines are provided. This system, which we termed Planned Humor Incorporation System for Teaching and Learning Enhancement (PHISTLE), is underpinned by IHPT in that the employment of content-relevant and appropriate types of humor can facilitate learning and create positive affect (Booth-Butterfield & Wanzer, 2016; Frymier et al., 2008; Wanzer et al., 2010). Further, it is in line with the RPMH to facilitate more interaction between teachers and students, fostering a positive learning atmosphere (Cooper et al., 2018). PHISTLE is also underpinned by SDT

(Deci & Ryan, 1985) given that content-related humor can influence learning competence, personal attributes, and future behaviors through its impact on affective learning and based on students' connection with their teachers, and subsequently, help fulfil students' needs for relatedness, competence, and autonomy (Bolkan & Goodboy, 2015).

Most prior studies on instructional humor on student learning have been conducted in western contexts, lacking applicability to Asian contexts. Since styles of humor vary greatly among different cultures (Teslow, 1995), prior findings regarding instructional humor do not necessarily apply to Eastern cultures. Here, we focused on the Hong Kong HE context, where scant research on this aspect has been conducted. Our study explored the effectiveness of PHISTLE in both sciences and humanities subjects, thereby impacting HE in a cross-disciplinary manner. Furthermore, results from this study can provide unique insights into the mediating factors that affect how content-related humor influences students' learning competence, personal attributes, and future behaviors in a real-life setting.

To determine whether student-perceived content-related humor of teachers as exhibited in their teaching style through the use of PHISTLE can result in beneficial outcomes as we predicted, the following two research questions were posed:

RQ1: What is the relationship between students' change in learning competence, personal attributes, future behaviors and their identification with their teachers' teaching style?

RQ2: What are the effects of content-related humor of teachers as exhibited in their teaching style on students' learning experience and classroom environment?

2. Material and methods

2.1. Incorporation of planned humor into subject design

Three types of humor were selected for PHISTLE as they are well-suited for incorporation into lecture PowerPoint presentations: (1) analogy, (2) wordplay, and (3) absurdity/ exaggeration (Booth-Butterfield & Wanzer, 2016; Bryant et al., 1980; Frymier et al., 2008; Wanzer et al., 2006) (Supplementary Materials). Each content-related humor may be associated with one or more of the types of humor listed above. Although anecdotes, self-deprecating, and physical/slapstick have been deemed suitable for teaching as well, these humor types were excluded from our study. This was because anecdotes may vary greatly in length, self-deprecating humor is often personalized, and physical/slapstick humor requires involvement of body language. Satire/sarcasm, dark and aggressive humor were also excluded due to their risks in being offensive to some students (Banas et al., 2011; Bieg & Dresel, 2016; Frymier et al., 2008; Torok et al., 2004). Two modes of humor incorporation were employed: (1) pre-topic and (2) post-topic incorporation. In pre-topic incorporation, the content-related humor was presented before the educational content. For this mode of incorporation, a "Point of Return to Reality" (PRR) was always introduced after the content-related humor to mark the end of a joke and to signal the transition out of the humor (e.g. a text box that appeared on the screen saying, "Just kidding!") (Supplementary Materials). The PRR allowed students to clearly distinguish the humor from the serious educational content and to avoid confusion. In post-topic incorporation, the educational content was presented to students first, followed by the humor. In this case, a PRR was not included. Regarding the frequency of humor incorporation, at least one but not more than three content-related humor were integrated into every 50 min of lecture. Integration of humor on the first or last slide of a PowerPoint presentation was avoided, since students tend to be highly focused at the beginning of a lecture, and drawing their attention on the last slide of a lecture likely has a minimal effect on their learning. In total, over 100 different content-related humor slides were designed for this study. Topics covered included molecular biology, immunology, neuroscience, stem cell biology, microbiology, virology, nutritional science, ecology,

corporate communication, and English studies (i.e. films and short stories).

2.1.1. Procedures

Eight courses from five major universities in Hong Kong were included, with six courses in the sciences discipline and two courses in humanities and social sciences (Table 1). Students were unaware that content-related humor was intentionally incorporated into the lectures in a systematic manner. To evaluate the impacts of the planned humor on students and their learning experiences (RQ1 & RQ2), students were invited to complete a retrospective pre-post survey and a semi-structured interview after the lectures. Since each survey assessed two to three course topics per course, a total of 859 surveys (on a topic basis) were sent to students attending the eight courses from five participating universities in Hong Kong from March 2023 to April 2024. 570 (66 %) survey results (mastery of a topic) were collected. Of these surveys, 94 had missing data. Since the majority of these incomplete surveys were due to students missing one particular question at the end of the survey for one particular course, it would be inappropriate to estimate the missing values based on other courses using multiple imputation. Therefore, we employed the listwise deletion method to remove the incomplete surveys (Allison, 2009; Little & Rubin, 2002), which allowed us to work with a more stable and complete dataset. After filtering out the surveys with missing data, 476 survey results were yielded. Although the design of PHISTLE allows the humor-incorporated lectures to be delivered either face-to-face or online, all courses were delivered face-to-face in this study.

2.2. Data collection

2.2.1. Participants and recruitment

This study recruited students from five major universities in Hong Kong from September 2023-June 2024. These students varied in their age groups, but all participants were at least 18 years old. The first language of the students was either Cantonese or Putonghua (Chinese), apart from four students (i.e. other minority languages). Of the 340 students, 225 (66.2 %) signed an informed consent form and participated in the study. 64.2 % of the participants were female and 35.8 % were male undergraduate students, undertaking studies from Year 1–4. 63.1 % majored in science, while 36.9 % majored in humanities and

social sciences.

2.2.2. Survey and interview

In the first stage of data collection, students were asked to complete a retrospective pre-post survey to evaluate their learning in the lectures incorporated with planned humor. This type of survey avoids the problems of response-shift bias and internal invalidity (Howard & Daley, 1979; Howard et al., 1979; Klatt & Taylor-Powell, 2005). A set of six questions were used to assess students' self-perceived learning on a course topic in three different dimensions: (1) changes in competence, (2) changes in personal attributes, and (3) changes in future behaviors (Hiebert & Magnusson, 2014), with two questions addressing each dimension respectively (Table 2). For each question, students rated their mastery of the topic twice – one rating for “Before the Lectures” and one rating for “After the Lectures” using a 5-point Likert-scale. Each survey assessed students' mastery of either two or three different course topics delivered by the same teacher in a particular course. The same set of six questions were used for each topic. In addition, a final question was asked at the end of the survey to assess students' identification with the

Table 2

List of questions in the retrospective pre-post survey to evaluate students' learning outcomes and their identification with the teacher's teaching style.

Dimensions of Learning	Questions
Changes in Competence (CC)	Q1: I had/have a good understanding of this topic. Q2: I was/am confident in explaining this topic in front of my classmates.
Changes in Personal Attributes (CPA)	Q3: I was/am motivated to learn more about this topic. Q4: I was/am confident in leading a discussion on this topic.
Changes in Future Behaviors (CFB)	Q5: I was/am willing to participate in activities related to this topic in the future. Q6: Given the opportunities, I was/am willing to mentor my junior classmates on this topic in the future.
Identification with the teacher's teaching style (ITS)	If there are differences in the ratings between “Before the Lectures” and “After the Lectures”, to what extent are these differences due to the teacher's teaching approach/style/method?

Table 1

List of courses included in this study.

Institution	Discipline	Course code & course name	Enroll-ment no.	Teaching topics incorporating humor elements
City University of Hong Kong (CityU)	Sciences	CHEM2013 Microbiology	40	(1) Microbial Growth and Control (2) Antimicrobial resistance (3) Virology
The Chinese University of Hong Kong (CUHK)	Sciences	MBTE2000 Introduction to Molecular Biotechnology	54	(1) Transposable Elements
		BIOL4610 Foundation for Secondary School Biology Teaching	17	(2) Fruit Fly as model system
		CMBI3010 Cell and Molecular Biology Laboratory	10	(1) Nervous & hormonal coordination
		FNSC2002 Nutrition for Health	70	(2) Immunity
				(1) Site-directed mutagenesis
The University of Hong Kong (HKU)	Sciences	CCST9006 Chasing Biomedical Miracles: Promises and Perils	62	(2) Transgenic plant cells and confocal microscopy
				(3) Planarians and stem cells
				(1) Nutrition and Immunity - An Overview
Hong Kong Baptist University (HKBU)	Humanities & Social Sciences	LANG2036 English through Films and Short Stories	20	(2) Nutrition and Immunity in the Elderly
				(1) Scientific progresses overcoming technical concerns
Hong Kong Polytechnic University (PolyU)	Humanities & Social Sciences	CBS5401 Corporate Communication: And Present	67	(2) Impacts of ethical dilemmas to stakeholders and society in transplantation
				(1) Analyzing films
				(2) Analyzing short stories
				(1) Principles of corporate communication
				(2) Trends and practices of corporate communication
				(3) Theories on functional areas of corporate communication in the 21st century
Total no of surveys sent (on topic basis):				859
Total no of surveys collected (on topic basis):				570

teacher’s teaching style. Therefore, a total of either 13 (two topics) or 19 questions (three topics) were present in each survey. The survey questions deliberately avoided mentioning anything about humor since the students were unaware of the intentional incorporation of planned humor into their lectures.

In the second stage of data collection, individual semi-structured interviews were conducted to explore the extent of the planned instructional content-related humor as exhibited in the teacher’s teaching style on students’ learning and engagement. The interviews were conducted by trained student helpers and research assistants instead of teachers to avoid a potential conflict of interest. A total of 45 participants were interviewed (6 from City University of Hong Kong, 7 from the Chinese University of Hong Kong, 18 from the University of Hong Kong, 7 from Hong Kong Baptist University, and 7 from the Hong Kong Polytechnic University). The interviews consisted of 10 key questions (Table 3). The participants were first asked to describe their learning experiences, followed by successive questions regarding the factors or aspects exhibited in the teacher’s teaching approach/style that facilitated their learning or engagement. Similar to our survey questions, the interview questions deliberately avoided mentioning anything about humor. However, if a participant initiated a discussion on humor as a factor or aspect of the teacher’s teaching style, then the trained interviewer followed up on that discussion to obtain further details regarding the impact of humor.

2.3. Data analysis

To address the RQs, both quantitative and qualitative methods were employed. For RQ1 which inquired into whether the incorporation of instructional humor had an effect on students’ learning competence,

Table 3
List of questions in the semi-structured interviews to explore the impact of the planned instructional content-related humor as exhibited in the teacher’s teaching style on students’ learning and engagement.

Dimensions	Interview questions
Learning improvement-related	Q1: Would you please describe your learning journey or learning experience with Dr. [Last Name of Teacher]?
	Q2: Did you find your learning experience with Dr. [Last Name of Teacher] different from other teachers? How? Can you give some examples?
	Q3: Did you find Dr. [Last Name of Teacher]’s teaching approach/style helpful with your learning? How? Can you please elaborate more (explain in more detail)?
Cognitive engagement-related	Q4: Did Dr. [Last Name of Teacher]’s teaching approach/style motivate you to learn more about the topics? Did it motivate you to study more?
Behavioral engagement-related	Q5: Have you attended all of Dr. [Last Name of Teacher]’s lectures/lessons in this course? What’s the reason? Did it have anything to do with how he/she delivered the lectures?
Relational engagement-related	Q6: Did you find Dr. [Last Name of Teacher] to be approachable when you had a question in class? Did you find him/her to be approachable outside the classroom too? Can you explain why you think Dr. [Last Name of Teacher] is approachable (or not)?
	Q7: Does Dr. [Last Name of Teacher] seem like a friendly person to you? Why do you think he/she is a friendly person (or not)? Does it have anything to do with how he/she delivered the lectures/lessons?
	Q8: How much academic stress did you experience this semester/term? Did you find Dr. [Last Name of Teacher]’s way of teaching helpful with reducing the stress you experienced in class?
Stress relief-related	Q9: How was the overall learning atmosphere in the classroom? Do you think Dr. [Last Name of Teacher]’s teaching approach/style helps with maintaining this atmosphere? How did this atmosphere help with your learning?
	Q10: Do you think more teachers should try out Dr. [Last Name of Teacher]’s teaching approach/style in the future?

personal attributes, and future behaviors, statistical analysis was performed to analyze the retrospective pre-post survey data collected where students were asked to report on their identification with the teaching style, their perceived competence, personal attributes, and future behaviors. To examine the relation between students’ identification with the teaching style (ITS) and the use of content-related humor on their changes in competence (CC), changes in personal attributes (CPA), and changes in future behaviors (CFB), Pearson Correlation Analysis (2-tailed) was performed using SPSS.

To investigate the impact of instructional humor on students’ learning experiences and classroom environment (RQ2), we conducted a thematic analysis of interview transcriptions. This analysis aimed to identify recurring, prominent themes related to the effects of a humorous teaching style. Our approach was guided by the six-phase analytic procedure for thematic analysis outlined by Braun and Clarke (2006). We began by labeling students’ perceptions of a humorous teaching style and their perceptions of how this style influenced their learning experiences. The labeled data were then thematically organized to review the humorous teaching style, the extent of student involvement, and the effects on students’ learning experiences and classroom environment (Ritchie et al., 2013). By examining these associations, we sought to identify recurring semantic patterns and relationships related to instructional humor as perceived by students, which were crucial for understanding their impact on their learning experiences.

3. Results

3.1. Identification with the teaching style is positively correlated to students’ learning competence, personal attributes, and future behaviors

Results from our surveys suggest that identification with the teacher’s teaching style (ITS) had a moderate positive relationship with the mean score of students’ changes in competence (CC) ($r = 0.4$, $p < 0.0001$, $CI [0.32, 0.47]$, $N = 476$), changes in personal attributes (CPA) ($r = 0.32$, $p < 0.0001$, $CI [0.24, 0.4]$, $N = 476$), and changes in future behaviors (CFB) ($r = 0.3$, $p < 0.0001$, $CI [0.22, 0.38]$, $N = 476$). Additionally, a positive and strong correlation was witnessed between the mean score of students’ CC, CPA, and CFB (see Table 4 for more information on the correlation between CC, CPA and CFB).

3.2. Student-perceived effects of a humorous teaching style on students’ learning competence, personal attributes, and future behaviors

Four key themes emerged from the data. The themes are elaborated below with an illustration and interpretation of participants’ experiences. Analysis of the interview transcriptions revealed firstly that

Table 4
Correlation between ITS, CC, CPA and CFB.

		CC Mean	CPA Mean	CFB Mean	ITS
CC Mean	Pearson	1	.705**	.653**	.394**
	Correlation				
	Sig. (2-tailed)		0.000	0.000	0.000
CPA Mean	N	476	476	476	476
	Pearson	.705**	1	.757**	.318**
	Correlation				
CFB Mean	Sig. (2-tailed)	0.000		0.000	0.000
	N	476	476	476	476
	Pearson	.653**	.757**	1	.303**
ITS	Correlation				
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	476	476	476	476

participants recognized and valued the presence of instructional humor in the classroom. This appreciation was evident for both verbal and visual humor, which was balanced with teachers' instructional professionalism. Verbal humor, such as jokes, fostered classroom interactions and created a positive learning environment. Visual humor, often delivered through multimedia resources like cartoons, pictures, memes, and videos, also played an important role. Participants responded positively to content-related humor and were encouraged by teachers' friendly attitude. This positive reception led to enhanced engagement, enjoyment, and knowledge retention, thereby improving learning outcomes (e.g. learning competence and personal attributes).

In particular, we observed a positive effect of a humorous teaching style on participants' learning competence, particularly their understanding of the subject knowledge. Humor could make difficult concepts more accessible and memorable, as illustrated in Extract 1:

Extract 1:

Interviewee 1: *"I think humor can help me to learn better. (Teachers) use some humorous pictures and add them into the slides, which have really helped us to understand better."*

Interviewee 2: *"I think ... is quite humorous. His teaching style is quite humorous so I think I can focus on his pace to learn that knowledge."*

Extract 1 illustrates how content-related humor aided comprehension and retention of knowledge. The interviewee indicated that humorous elements, such as funny pictures in slides, improved their understanding of the teaching materials. The second interviewee emphasized that a humorous teaching style helped them focus better, suggesting that humor effectively engages students, maintains their attention, thereby improving their learning outcomes.

The second most common theme was that humor affected participants' personal attributes in their learning process, particularly their motivation and interest. While this effect might not be direct, a positive and engaging classroom environment fostered by humor enhanced participants' motivation and interest in the subject matter. Their motivation to learn was often mentioned alongside learning. Extract 2 below illustrates how content-related humor increased participants' motivation and interest by immersing them in a relaxing learning atmosphere.

Extract 2:

Interviewee 3: *"I think one reason that I really like her PowerPoint was because for our other lectures, the PowerPoint would be usually with white backgrounds and just words. And most of the time, the wording would be too much to take in ... And especially with the memes or some short clips that would make me understand what she's saying. And I think in a way that the memes and the stuff that she would put in would kind of encourage me and motivate me to like, listen to her more than other classes."*

Interviewee 4: *"...the approach of using memes is really helpful with students focusing. And it will relax and motivate (our) attendance (on the) course. We will no longer think the course is too difficult to learn, ..."*

In this extract, the interviewees highlighted that incorporating both verbal and visual aids of content-related humor, such as memes and short video clips, facilitated comprehension of the material and made the class more engaging and enjoyable. Although they might not always use the term "atmosphere," they reported that a positive, relaxing classroom setting increased their motivation and interest in the course. This engaging environment was created through humor-infused teaching tools, resulting in motivation that led to a more proactive learning attitude.

For the third theme, participants expressed that a comparison of the humorous teaching style to other less engaging ones showed the importance of humor in sustaining their motivation to learn. This observation aligned with our expectations on the effects of a humorous teaching style on students' future behaviors. A forward-looking perspective emerged, where participants felt more capable and willing

to engage in further learning or showed a readiness to invest more time in self-study when motivated (see Extract 3).

Extract 3:

Interviewee 5: *"I think it surely did (help) because his lecture makes us feel more interested about the knowledge and makes us want to learn more about it after class. And we will do it ourselves."*

The willingness to engage in self-directed learning reflects participants' intrinsic motivation. The interviewee's comment in Extract 3 suggests that motivated and engaged students were more likely to seek additional information and learn independently outside of class. We thus observe that a humorous teaching style was related to students' future learning behaviors. The analysis suggests that ITS enhanced participants' learning by improving comprehension and retention of knowledge, bolstering motivation and interest, and fostering future learning behaviors.

3.3. Student-perceived effects of a humorous teaching style on the classroom environment

The thematic analysis also revealed a fourth theme: incorporating content-related humor contributed to a more relaxed and stress-free classroom environment. This atmosphere was simultaneously fostered by teachers' friendly attitude, which encouraged interaction, created an environment conducive to learning and helped alleviate academic stress. These findings are supported by interviewees' accounts of their positive learning experiences in a relaxed classroom setting (see extracts 4 and 5).

Extract 4:

Interviewee 6: *"Yeah. I think her teaching style can definitely reduce stress. And because she is always approachable and has an interest in teaching, her teaching style will not let us feel bored during the class and she will relax us, in her own way."*

... Yeah. Because he is funny, and he also talks about humor in class, I think it reduced the stress."

Extract 5:

Interviewee 7: *"Actually, I think I noticed that there is some humor or comics in the slides, ... Dr. XX will tell some jokes to us when we do not understand or during the class. And I think that those kinds of jokes can help us to release our study stress or let you feel that this lecture is not as difficult as we think, and which can make us feel more relaxed when learning this content."*

In Extract 4, the interviewees attributed stress reduction to the teacher's approachable style and passion for teaching. This ability to maintain student engagement and create a relaxing learning environment highlights the positive impact of humor on classroom dynamics. Similarly, Extract 5 demonstrates the practical application of content-related humor through comedic elements in educational materials and the teacher's timely delivery of jokes. This approach not only reduced stress but also made the subject matter appear less daunting and more accessible to participants.

Overall, the thematic analysis data aligned with the relationships obtained from the Pearson correlation analysis, indicating that ITS helped build positive teacher-student relationships, reduced stress, and fostered a learning environment where students showed increased motivation and interest. These elements were interconnected, contributing to positive learning experiences, as illustrated in Fig. 1.

4. Discussion

In this study, we explored the impact of content-related humor used by teachers as exhibited in their teaching style on students' learning competence, personal attributes, future behaviors, stress reduction, and

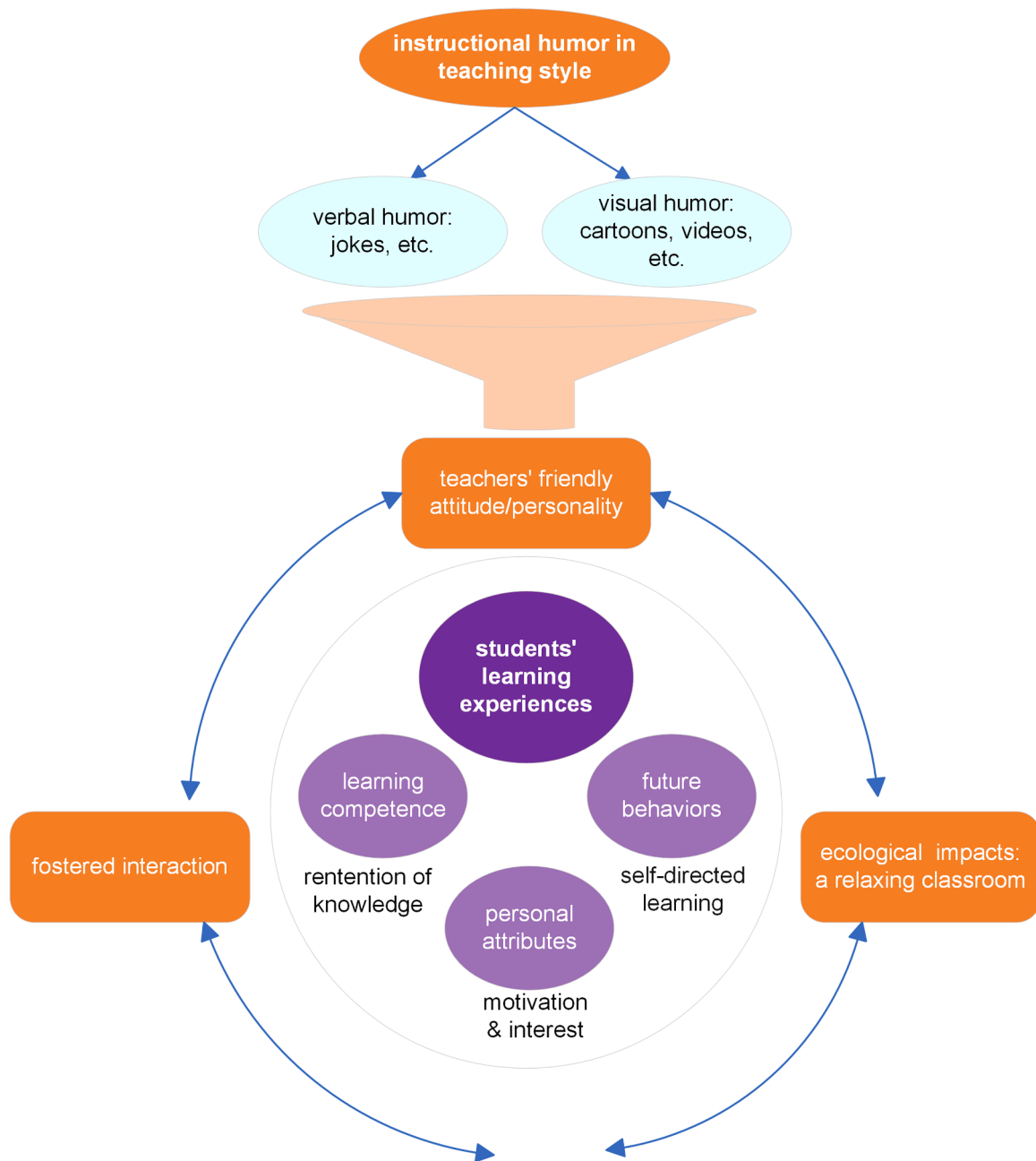


Fig. 1. Working model of humor-enhanced student learning outcomes. Content-related instructional humor in teaching style, which may comprise both verbal and visual humor, contributes to the teachers' friendly attitude/personality, fosters interactions and promotes a relaxing learning environment, which in turn enhances students' learning experience, including learning competence, personal attributes and future behaviors.

fostering a better classroom environment. Strengths of our study lie in the two different methods used (i.e. Pearson correlation and thematic analysis) to further offer insights into the results gained from the quantitative method. Our results firstly pointed out that ITS had a positive effect on all these aspects in eight courses of the five HE institutions in Hong Kong. Specifically, ITS enhanced students' engagement, comprehension and retention of subject knowledge, motivation and interest in class, and willingness to engage in self-directed learning. These results are consistent with prior studies (e.g. Bolkan & Goodboy, 2015) that content-related humor can create positive affect through increasing self-determination, and this is brought by students' affective learning (i.e. identification with their teacher) (Frisby & Martin, 2010) and their needs for relatedness, competence, and autonomy (Ryan & Deci, 2000). Positive affect created via the use of content-related humor

can increase students' perceptions of relatedness with their teachers (Frisby & Martin, 2010), students' perceptions of competence (Bolkan & Goodboy, 2015), and their sense of autonomy in academic tasks (Ryan et al., 1994). We also explored the salient themes embedded in participants' accounts through thematic analysis to obtain a rich understanding of participants' experiences; four key themes emerged from the data. Firstly, the most common theme was that humorous elements in the form of jokes using wordplay, exaggerated descriptions, analogies, and visual aids/memes, made difficult topics seem more accessible and memorable, thereby enhancing students' learning competence. The second key theme was that a positive and engaging classroom environment fostered by ITS and content-related humor increased students' motivation in the course, while the third theme was that motivated students were more likely to learn independently outside of class, thus

having a positive effect on their future learning behaviors. Additionally, participants expressed that ITS is linked to a more relaxing and stress-free classroom environment, emphasizing the social aspect of humor which can help reduce strict hierarchies through positive affective interactions (Mu et al., 2023; Reddington & Waring, 2015), thereby facilitating students' learning and possibly reducing their perceived academic stress.

Our study is novel and contributes to the literature on humor pedagogy by finding that ITS has a positive effect on students' future behaviors (e.g. helping their peers). Prior research in this area was lacking in the HE context, with only workplace research showing that leaders' humor is positively associated with organizational citizenship behavior (Cooper et al., 2018). Further, our study found that ITS has an overall positive impact on students' learning across different academic disciplines in the HE sector in Hong Kong (an Asian city), predominated by a Chinese population. It should be noted that most prior studies on instructional humor have been done in western contexts (e.g. U.S., Germany, etc.), lacking applicability to Asian contexts (e.g. Bakar & Kumar 2019; Bieg & Dresel, 2018). Styles of humor vary in different cultures (Teslow, 1995) and their effectiveness on student learning may be different, as has been found in Zhang's (2005) study where the teacher's instructional humor made the classroom informal and went against the norm due to the high power distance between teachers and students in China, while Liu et al. (2017) found that instructional humor by physician teachers in China made learning enjoyable and increased student learning.

Notably, we systematically incorporated content-related humor into courses by adopting PHISTLE which meant using a standardized pedagogical framework comprising content-relevant and appropriate types of humor (i.e. wordplay, analogies, exaggeration) (Booth-Butterfield & Wanzer, 2016; Frymier et al., 2008; Wanzer et al., 2010), two modes of incorporation, and a specific frequency of use (i.e. not having more than three content-related humor for each 50-minute lesson) to standardize the way all courses were delivered by teachers. As gleaned from the findings, participants perceived the use of content-related humor through visual aids/memes used, verbal interaction, and other interactive classroom activities conducted by teachers. They endorsed the appropriate and relevant types of humor used and when specifically they were used (e.g., when students' attention started to wane). Overall, PHISTLE had a positive impact on participants' competence, personal attributes, and future behaviors. However, these results should be interpreted with caution as the qualitative data indicated that there is a need for a balance between humor and professionalism, meaning that teachers should be judicious in the use of humor and when they use it, the content and context of their humor so as to maintain credibility in the classroom. This aligns with the advice given by Bryant and Zillman (1989) that utilizing pedagogical humor "depends on employing the right type of humor, under the proper conditions, at the right time" (p.74). This highlights the importance of utilizing content-related humor in a systematic way to foster students' learning and providing training for teachers in the form of workshops in HE institutions to integrate it successfully into their courses. Using PHISTLE can possibly enable teachers to consistently achieve positive learning outcomes in a replicable and sustainable way.

Although the study has strengths, there are limitations within the design that should be considered when interpreting the results. Contextual factors may affect the effectiveness of content-related humor on students' learning such as when and how much humor is used as indicated in the findings. Teachers' competence and their self-efficacy in using humor were not examined, which may have an impact on how effectively their content-related humor impacted students' learning (Daumiller et al., 2020). Our study focused on content topics that were more general, and mostly not based on a specific culture (e.g. stem cells, viral structure, global consumerism, corporate social responsibility, how to write a story, etc.). Yet as noted, humor is affected by culture (Teslow, 1995), so it may be worth exploring how certain content topics

incorporating humor tinged heavily by culture (e.g. cultural humor) affect students' learning. As ITS was assessed by students using surveys, it cannot be ruled out that some assessments may have been biased (e.g. some students might have liked or disliked their teachers, and therefore, perceived their own competence, future behaviors, and personal attributes differently). For future studies, it might be better to include more survey items and possible bias variables (e.g. having positive feelings towards the teacher). Further, it might be beneficial to include other sources of content-related humor exhibited in the teaching style (e.g. observations of lectures delivered by teachers that are later analyzed). Apart from this, a retrospective pre-post survey design was employed which might have some problems arising from participants' memory lapse (i.e. participants might not recall how their learning competence was prior to content-related humor being used in the course). Future studies can utilize a pre-post survey design instead to avoid this potential problem.

5. Conclusion

This research developed a novel pedagogical framework by standardizing planned humor and systematically incorporating it into lectures, and then evaluated the framework's impact on student learning outcomes in HE in Hong Kong. To the best of our knowledge, this study is unique in being one of the first to investigate and demonstrate the impact of content-related instructional humor, as manifested in teaching style, on students' learning competence, personal attributes, future behaviors, and stress-reduction in the sciences, humanities, and social sciences disciplines in the Hong Kong HE context. In terms of theoretical contributions, our findings support the integration of the instructional humor processing theory, relational process model of humor, and self-determination theory in the classroom. Most humor pedagogical studies in the literature were conducted in western countries. Our research enriches the literature by demonstrating that the humor pedagogical approach based on these theories is feasible in the Asian context too, provided that the types of humor employed can connect with the audience. As for practical implications, our humor pedagogical system has the potential to increase students' understanding of difficult or complex topics in a cross-disciplinary manner. Drawing on our findings, educators can design teaching materials that can consistently enhance students' learning outcomes by adopting PHISTLE. In relation to policy, given that content-related instructional humor can motivate students to learn and create a more relaxing learning environment, HE institutions should consider widely promoting this planned humor pedagogical framework. The strategic use of PHISTLE can increase students' learning, motivation, and engagement in a replicable and sustainable manner, thereby improving student performance. Further studies could explore the use of PHISTLE in other disciplines and cultural contexts, as well as investigate its long-term impacts.

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CRedit authorship contribution statement

Cindy Sing Bik Ngai: Writing – review & editing, Writing – original draft, Software, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Rita Gill Singh:** Writing – review & editing, Writing – original draft, Validation, Resources, Funding acquisition. **Yueyue Huang:** Writing – review & editing, Software, Investigation, Formal analysis, Data curation. **Joanna Wen Ying Ho:** Resources. **Mei Li Khong:** Resources. **Enoch Chan:**

Resources. **Terrence Chi Kong Lau:** Resources. **Ho Yin Edwin Chan:** Resources. **Wing Tak Wong:** Resources. **Man Suet Michelle Law:** Resources. **Alex Chun Koon:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare no conflict of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.ijedro.2025.100438](https://doi.org/10.1016/j.ijedro.2025.100438).

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