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The role of technological knowledge in the pedagogical integration of film in disciplinary teaching at universities

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The role of technological knowledge in the pedagogical integration of film in disciplinary teaching at universities

Abstract

Many university lecturers have integrated feature films and television series (FF/TV) into their lessons to improve student engagement. Although film in teaching might seem like a well-established practice, it is reliant on a range of fast-changing technologies to effectively integrate FF/TV into instruction, learning activities and assessments. This study utilises the Technological Pedagogical and Content Knowledge (TPACK) model to analyse survey and interview data regarding (1) lecturers' familiarity with a range of concepts and skills related to film production, delivery and integration technologies; (2) their methods of learning about technologies that help optimise their FF/TV use; and (3) their institution's provision and support in implementing various technologies integral to teaching with FF/TV. A modified framework is proposed to add to the pedagogical benefits of effective teaching with FF/TV at universities.

Practitioner Notes

1. This study categorises technologies required for using feature films and television series (FF/TV) into three types: film production technologies, film delivery technologies and film integration technologies
2. This study integrates the TPACK framework to analyse lecturers' current levels of access, knowledge and skills about the three technology types in relation to their pedagogical use of FF/TV
3. This study proposes an extension to TPACK to illustrate how lecturers' technological knowledge/skills regarding these three technology types interact with their content and pedagogical knowledge/practice
4. This study summarises useful resources proposed by participants
5. This study provides recommendations towards raising awareness, encouraging institutional provision and support in assisting the improvement of technological knowledge of lecturers who teach with FF/TV.

Keywords

film in teaching, multimedia, pedagogy, TPACK, technological knowledge

Introduction

Film has a long history of use in education. In the 1920s Thomas Edison declared that film would take the place of books, making them obsolete (The Associated Press, 1923). While the demise of the book did not occur exactly as predicted, the modern era appears to justify this with YouTube videos playing a significant role in education (Fyfield, 2021). These are usually short clips used to communicate facts or for demonstration purposes. Integrating full-length feature films or television series (FF/TV) into lessons creates a more challenging space, and although university lecturers have introduced multimodal practices to improve student engagement with their teaching (Bonsignori, 2018; Djamàa, 2018; Lim & Tan, 2018), there has been little research focused on the technologies that enable this multimodal teaching practice. FF/TV has often been an appealing instructional resource for educators across disciplines – such as history (Donnelly, 2014), languages (Viebrock, 2016), psychology (Bluestone, 2000), math (Belrán-Pellicer et al., 2018), politics (Holland, 2014), and medicine (Recupero et al., 2021). Our paper aims to show how this rich and cross-disciplinary body of research informs understandings of how FF/TV can achieve positive learning outcomes by expanding disciplinary content knowledge. We draw on surveys and interviews with university lecturers to investigate their use of FF/TV in the classroom and map their responses to Koehler & Mishra's 'Technological Pedagogical and Content Knowledge', or TPACK, model (2006) that proposes the need for multiple domains of 'knowledge' for effective teaching. In other words, we seek to uncover the technological and pedagogical relationships between FF/TV and intended learning outcomes.

In the contemporary context of the 'digital university' where intersecting new technologies shape the landscape of university teaching and learning (Peters & Jandrić, 2018), lecturers are increasingly expected to innovate and mediatise their pedagogies to showcase a contemporary 'new communication order' or literacy (Snyder, 2011), and to draw on the high consumption of mixed media by many student populations (Fraser, 2018; Mayes et al., 2011). Institutions, therefore, are increasingly obligated to provide academic development for lecturers in the domain of integrating media technologies into teaching (Altbach et al., 2010).

However, there appears to be a mismatch in how universities and academics respond to these trends. On the one hand, universities seem more interested in risk management such as copyright infringements and academic dishonesty (Buckley & Cowap, 2013; Sagnak & Baran, 2020), rather than developing the pedagogies integral to media technologies. Universities' support provisions have been slow in addressing the educational and social implications of incorporating media technologies in teaching (Goodfellow & Lea, 2013). Instead of investing in long-term sustainable training opportunities and resources to lift the digital competencies of lecturers, universities tend to address this need by employing casual and 'third space professionals' in short-term roles (Smith & Guthrie, 2020; Witchurch, 2015). Many academics appear reluctant to learn to use new teaching tools, especially without institutional commitment and support (Birch & Burnett, 2009; Sánchez-Prieto et al., 2019; Veletsianos et al., 2013). Others who welcome the tech-driven changes by integrating multimedia such as FF/TV into their teaching have been largely left to themselves to experiment and develop their pedagogy via self-taught methods (Chadha, 2020; Hemmings et al., 2010). Amid all these trends, FF/TV have emerged as popular modes for practising technology-enhanced teaching thanks to their relevant, relatable, multimodal, interdisciplinary, and technologically accessible characteristics (Andrist et al., 2014; Holland, 2014; Marquis et al., 2020).

On the flip side of FF/TV's versatility and interdisciplinarity is the challenge of systematically sharing and organising relevant knowledge about teaching with FF/TV, as each discipline would likely present different pedagogical needs and encounter different technical issues and problems (Beltrán-Pellicer et al., 2018). It is not surprising then that most literature on the topic portrays FF/TV use in university teaching as largely individual-driven, experiment-based, improvised and self-assessed, with minimal guidance and support from institutions (Andrist et al., 2014; Marquis et al., 2020; Peacock et al., 2018).

While film can be used at any level of education, this study sets out to better understand the extent to which university lecturers were aware of and supported in using the technologies that enable their pedagogical use of FF/TV. The results of survey and interview findings were then viewed through the lens of Koehler & Mishra's TPACK model (2006) (Figure 1).

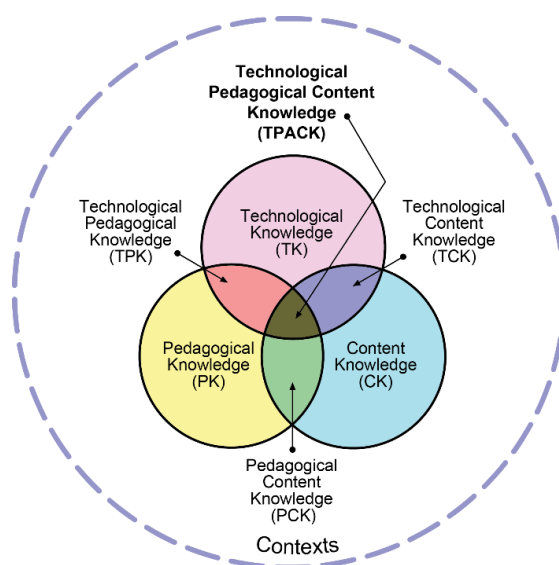


Figure 1:
The TPACK model, ©tpack.org

Koehler and Mishra's TPACK model recognises technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) as three basic forms of knowledge that educators require for effective teaching, regardless of discipline. TPACK also emphasises the intersections among the knowledge forms (Figure 1), which cover interactions between technologies and content (TCK), knowledge about teaching approaches and disciplinary content (PCK) and awareness that technology can enable or restrain teaching practices (TPK). TPACK therefore offers a way for educators to identify their own strengths and potential blind spots when using technologies in the classroom (Koehler et al., 2014; Koh, 2019; Saubern et al., 2020). That is, the model's three entry points contain a structural weakness (Koehler et al., 2014). If one approaches TPACK via PCK, the role of technology is obscured. If one approaches TPACK via TPK, the importance of content knowledge risks being sidelined. If one approaches TPACK via TCK,

pedagogical considerations are distanced. These blind spots will vary depending on a lecturer's existing strengths and therefore entry pathways.

The TPACK model is particularly useful in discussing how FF/TV intersect with CK, PK, TK and their overlapping segments. By incorporating this study's findings into the TPACK model, we identify film production technologies (FPT), film delivery technologies (FDT) and film integration technologies (FIT) as relevant elements for developing a pedagogy of effective FF/TV teaching in the classroom. Thus, we present a modified framework that captures the importance of technological training to optimise this pedagogy. Understanding the nature of FPT, FDT and FIT, and how educators understand and employ them in the classroom is key to the effective pedagogical application of FF/TV. Ascertaining the current levels of access, familiarity and skills that university lecturers possess in these areas will guide the types of institutional support and development needed in applying FF/TV to pedagogically sound, discipline-based teaching.

Methods

With ethics approval, a qualitative survey was created using SurveyMonkey and distributed to university lecturers across Australia. Questions were based on an extensive literature review of academic articles about teaching practices involving FF/TV (e.g., Bonsignori, 2018; Marquis et al., 2020; Swimelar, 2003) and analysis of FF/TV content (e.g., Thaler, 2017; Viebrock, 2016; Wang et al., 2019; Wang & Ji, 2015). The survey was checked for face validity by four experienced researchers, two of whom were experts in film and media studies. The themes from the survey results became the foundation for follow-up semi-structured interviews.

The questions explored:

- familiarity with technologies involved in teaching with FF/TV;
- challenges encountered when using FF/TV in teaching; and
- institutional support in implementing and using those technologies.

A follow-up series of 90-minute interviews was then instigated to explore issues in depth.

Participants.

Participants for the survey were a convenience sample of lecturers from any discipline and were recruited via newsletters of higher education networks, email invitations, flyers and snowball sampling. Participants in the survey were invited to be part of follow-up interviews.

Data analysis.

NVivo12 was used to identify themes and conduct thematic analysis (Braun & Clarke, 2006; 2021) of the survey and interview data. All potentially identifiable information was removed in the metadata. To distinguish participants, R1 to R50 will be used when quoting survey respondents and L1 to L18 when quoting lecturers who were interviewed. The survey results were analysed thematically with two other researchers checking the themes for consistency and accuracy.

Results

The survey yielded 50 anonymous responses and 18 interviews were conducted. Interviewees came from a mixture of HASS and STEM disciplines, including sociology, education, language teaching, politics, history, physics, biology, and gerontology.

Most respondents to the survey were permanent lecturers (68%), followed by casual teaching staff (12%) and 1-3 year fixed-term contractors (10%). The majority had between five to more than ten years of teaching experience (90%), and had taught courses using FF/TV more than five times (72%). Figure 2 presents the disciplines where respondents used FF/TV in their teaching. Some lecturers taught and used FF/TV in several disciplines, so the total number of disciplines exceeds 50.

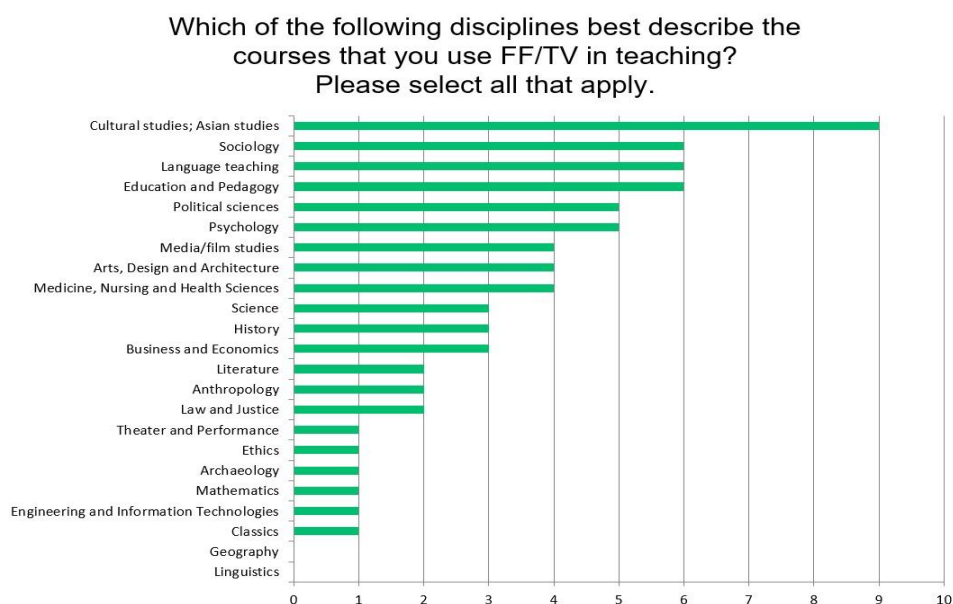


Figure 2:
Academic disciplines where survey respondents used FF/TV in their teaching

The results identified three types of technologies that involve in the pedagogical use of FF/TV in disciplinary teaching at universities:

- technologies relating to film production (FPT)
- technologies relating to film delivery (FDT)
- technologies related to film integration into teaching materials (FIT)

Survey results and interview results are interleaved around how blind spots in TK about each technology type influence teaching and learning related to FF/TV (Themes 1- 3), and how these blind spots can be overcome by applying TPACK (Theme 4).

Theme 1: Blind spots in knowledge about Film Production Technologies

(FPTs)

A scaling survey question directly targeted lecturers' familiarity with a range of basic concepts about cinematography and film grammar (i.e., the conventions that regulate cinematic techniques) such as auteur, flashback/flash-forward, story plot, scene sequence, etc. These concepts, and the knowledge they entail, are crucial to film analysis skills required to integrate any FF/TV content into disciplinary teaching (CK) and to inform lecturers' decisions about instructional design (PK). Knowledge of FPTs is also evidently necessary in cases where film or video production is part of the course's content or assessment.

Among the 46 survey respondents that indicated their disciplinary expertise (that is, their CK) was not film-related, 22 admitted that they were either *not aware of* or only *a little familiar* with 'basic concepts of cinematography and film grammar; another seven knew *a little* about the narrative structure of film and television (i.e., introduction – conflict – resolution). This lack of awareness or knowledge about FPTs may relate to the results that 18 survey respondents (81% of those 22 who claimed limited awareness) reported encountering no problems with using FF/TV in teaching, which suggests that blind spots in TK might have affect their pedagogical decisions in instructional design, as well as their judgement regarding the effectiveness of their FF/TV.

Similarly, among ten interviewees (56%) who initially reported 'no problem' with their use of FF/TV, seven corrected their statements to 'Yes' but after hearing about some examples of problems. One interviewee even confessed to possibly not noticing problems because they had used only short movie trailers in teaching.

Further confirming the detrimental effect of blind spots in TK about FPTs on pedagogical decisions, two survey respondents explained they used FF/TV as 'good fillers', which unfortunately does not add value to student learning and has been identified as potentially detrimental to learning (Hobbs, 2006).

Likewise, a few interviewees revealed their selection criteria of FF/TV as simply a 'nice story' with 'a happy ending' to make students feel good about studying. The most detrimental FF/TV selections, however, involves those that factually false or over-fabricated FF/TV representations. Many lecturers reported selecting them so that they could dismantle FF/TV's inaccuracies through their teaching and encourage students' critical thinking and media literacy. However, these attempts appeared vain:

For several years I showed [a film], then I spent the course demolishing its claims [...] but when I asked [students] in quizzes, that crappy black and white thing we showed in Week 1, for many students, remained the more powerful image even after 3 months doing my course. (L5)

I [use] films that contain different voices [...] and explain to [students] how they're not actually telling one story although it's presented as one story [...] but when I asked them in assignments about those films, they'd totally take it as 'Oh this is the truth'. (L1)

I've been very unsuccessful at dispelling this film [...] I think the techniques that go with the use of film matter most – I didn't have outside speakers, interesting exercises or a whole semester to dispel it. (L17)

These cases clearly showed sub-optimal judgement in their instructional design (or even limited PK) due to blind spots in their TK about FPTs, despite their disciplinary expertise (CK).

Conversely, TK about FPTs alone is not necessarily the solution. When asked if she provided any guidance for students about what to look for during film viewing, L6 – who was teaching film production and had hands-on experience with filmmaking technologies – reported facilitating discussion afterwards, but not priming students with instructions or guiding questions beforehand:

I guess [after film-viewing] we'll have a discussion about what [students] 've seen, but that is a good point. I guess if I want them to specifically look at something I could tell them first. (L6)

This emphasises the importance of integrating TK (about FPTs) with PK and CK to achieve the optimal effectiveness of FF/TV use in disciplinary teaching.

Theme 2: Blind spots in knowledge about Film Delivery Technologies

(FDTs)

Survey and interview data related to Film Delivery Technologies (FDTs) pointed to some problematic issues regarding both lecturers' and institutions' perceptions of technical issues, technological implementations and the subsequent provision of IT support as well as classroom facilities and FF/TV resources.

Perceptions of technical issues and IT support

Technical issues were pervasive in lecturers' reported experiences that hampered the pedagogical application of FF/TV in disciplinary teaching. Responding to the question 'What kind of problems have you encountered?', sixteen respondents selected survey options related to pedagogy, while eighteen other respondents chose 'Other' to describe their own problems. Among them, eleven wrote 'technical issues' with no further comments, perhaps implying their problems were without pedagogical implications. Only seven explained what the 'other' problems were; of these, five also involved one or more specific technical issues: 'lack of reliable IT support for specific softwares' (R40); 'films projected in the incorrect aspect ratio' (R28); 'DVDs that don't work' (R8); and 'Internet connection issues' (R20). Another interviewee explained:

I used to [embed] a video on PPT slide, but I realised that, depending on the lecture room computer expectations, the implanted video in PPT does not play. (R17)

When asked about challenges in using FF/TV, several interviewees immediately brought up technical issues, but they quickly trivialised them:

There are of course always technical issues. Things can fail, but you can't avoid that. (L8)

When asked about solutions to the problems they encountered with FF/TV use, 60% of survey respondents wrote their answers in the 'Other' textbox. A majority of these answers mentioned

technical support related to delivery technologies: ‘Get IT help’ (R38, R41); ‘Better tech support’ (R43); ‘Have technical support staff available’ (R20); ‘Teach institutions how to set up better screening rooms’ (R11).

In contrast, L13 and L18 recognised the connection between these technical issues with the quality of teaching and learning with FF/TV, that is, the intersection of TPK. They reported rarely encountering problems with technology yet discussed at length the technological domain of their practices. Both lecturers had extensive experience working with media technologies, including film, both in and outside teaching jobs, which motivated them to learn about their tools and stay pro-active and pre-emptive – rather than reactive – when dealing with technical issues. They therefore took it upon themselves to investigate potential problems and put in place preventive measures, or find practical alternatives to mitigate their impact on teaching and learning:

The changes in technology have made it easier to [use film in teaching] with the advent of terrific software like Keynote [...] it does it much better than PowerPoint in terms of quality and ease of dropping in and embedding film clips, so that's been my practice for 15-16 years. (L13)

If your access to a video material is digital [...] it's very hard to predict what might go wrong [...] but all the students that I teach here have [the same device] and it works beautifully for all sorts of online video content with retina display. I actually didn't have any kind of technical problems, which can be the case in a bring-your-own-device setting. (L18)

In general, lecturers seemed dismissive towards technical issues because of an insufficient awareness of how those these issues are connected to the effectiveness of their FF/TV use as explained by L13 and L18. This superficial understanding of technical issues associated with FDTs is also reflected in their insistence on IT support, rather than academic development that integrates technical and pedagogical issues. This subsequently indicates a blind spot in the relationship between TPK and TCK for lecturers.

Miscommunication in facilities and resources provision

Many interviewees reported multiple challenges to their FF/TV due to institutional provision of facilities, resources and IT support related to Film Delivery Technologies (FDTs). One survey respondent stated they had problems with a ‘mismatch between available resources and provided classroom facilities, technological change/advancement’ (R40). Likewise, several interviewees reported their universities’ decision to phase out DVD-compatible facilities without providing sufficient assistance to the large population of lecturers who still relied on their DVD collection:

Four or five years ago, the university suddenly took out all the DVD-playing capacity in lecture theatres across the university in one summer. My whole DVD collection became redundant. Many [films] were not available on YouTube or other public outlets, so I've actually used a lot less film because I haven't had time to find alternatives in many cases. (L5)

Several interviewees were also critical of institution-wide removal or suspension of on-campus screening facilities, which consequently excised the benefits of film-viewing for students:

Back in the day the department used to run film sessions of very rare films so I used to bring the class to them every now and again, but they don't do that anymore. (L10)

Overall, institutional understanding of technology-related issues appeared isolated from the pedagogical practices that utilise those technologies, leading to miscommunication and ineffective investment in facility, resource and training provisions.

Besides the withdrawal of facilities/services provision, four of the interviewed lecturers (L3, L5, L8, L10) also reported that their universities failed to provide sufficient support to help lecturers transition into newer film delivery technologies. This was particularly noticeable when it came to sourcing compatible and permitted FF/TV content from sources such as streaming platforms or programs recorded from broadcast TV. Instead, they felt that institutions seemed more concerned with risk management (copyright, trigger warnings) and budget saving. Copyright training remains one of the few areas connected to using FF/TV in teaching where most universities offer both training workshops and online guidelines. Nonetheless, 12 survey respondents (40% of those who reported problems), as well as five interviewees, still considered copyright a major barrier because it manifests fear around the legality of use, rather than informing or benefiting their teaching:

I probably use [film] less than I used to. We're in a different environment with copyright [...] now we record everything [...] frankly I find it a bit difficult to keep on top of the latest rules. (L17)

The copyright arrangement around downloads means that I can't use downloads, so as downloads become the dominant technology I'm going to have more problems. (L8)

Some lecturers even went outside the institutional system to obtain a copy of the FF/TV they needed, which was counter to the copyright training they had received:

I typically have clear ideas about the films that I want to show, sometimes the library might not [have them...] I'll order things online for my personal collection. (L14)

The university [...] is not putting its resources in that particular way [...] if I really want to use a film, I might buy the film and have it imported from overseas. (L3)

Apart from DVDs and downloads, as noted, copyright is also linked to the availability of FF/TV resources on subscription streaming platforms such as Kanopy, a video-streaming service that provides feature films and documentaries to public libraries and universities. At first, this seems a solution to screening copyrighted materials in class, but long-term users of the service point out its very limited range:

[Kanopy] got the rights on their platform so it's OK for me to record [...] but their feature films are mostly just romance stories [...] lots of the ones I used to use, the library's Kanopy subscription] hasn't got them anymore. (L1)

The library and Kanopy had a lot of trouble getting copyrighted access to Chinese movies [...] unfortunately copyright means that some of the Chinese movies that I wanted to use disappeared from YouTube [...] copyright has become a real problem for us teachers. (L5)

While many participants mentioned the need for access to more FF/TV content that met copyright regulations, only R25 and L10 specifically placed the responsibility onto their institutions:

Lobby library to purchase online streaming rights for films and maintain subscriptions. (R25)

At the university whole level, let's have a bank of film resources [...] we can get whatever academic article you like, why can't you get whatever film you like? Seriously! (L10)

Many interviewees expressed little hope for institutions to step up anytime soon due to severe budget constraints, since worsened by the COVID-19 pandemic. In the meantime, their go-to sources included No School Film; Alexander Street; Australian Screen; Metro Magazine; Australian Teachers of Media (ATOM); Twitter hashtags; IMDb/ other film rating sites, subscription to film studios; online blogs; academic papers; conference presentations; and recommendations from colleagues, students, friends.

There is a major issue of miscommunication at play here between universities and their lecturers; the data also highlights universities' misunderstanding of the relationship between provision and usage of FDTs and its subsequent effects on teaching. This failure of understanding resonates with concerns that universities traditionally tend to impose top-down technological implementations without carefully considering how they affect the actual users of these technologies (i.e., lecturers and students) (Reyes et al., 2017). In the case of FF/TV, both the miscommunication and the 'mismatch in supply and demand' regarding FDTs indicate a serious blind spot of TK on the institutions' part.

Theme 3: Blind spots in knowledge about Film Integration Technologies

(FITs)

The term 'film integration technologies' refers to software applications that allow FF/TV to be incorporated into teaching and learning activities. Typically, they involve video editing (trimming, montaging, separating sound and visual), public presentation (traditional and interactive), student response systems (e.g., live online discussions or polls), or built-in functions of online learning management systems. Unlike delivery technologies, FITs tend to be developed outside the context of FF/TV and therefore require lecturers to explore how they can be appropriated for teaching. This study found mixed approaches used by lecturers to integrate FF/TV into their teaching practices. Lecturers also varied in their attempts to learn about FITs to improve their pedagogies

with FF/TV (their TPK), ranging from reluctance to take the initiative in learning something new, through tentative trials, to enthusiastic pro-active experimentation.

A sense of reluctance to engage with FITs emanated from interviewees who seemed to have experienced long-term dissatisfaction with very limited institutional support (Heffernan and Heffernan, 2019) alongside their demanding academic roles. The lecturers seemed aware of the consequences the lack of institutional support had on their student learning as well:

I've been quite annoyed that the university made decisions about technology without any consultation, so I didn't want to spend to spend the time learning how to use [the new apps], that's the short answer. [Learning]'s possible but I personally find it one straw too many for the camel [...] the last time I tried [...] it drove me nuts [...] so I don't do it. (L5)

Mostly I show the trailer because I never figured out how to do a proper excerpt, so I don't really probably do a great job with integrating the film honestly. That would be a weakness. (L17)

When asked if they used any additional technologies to assist integrating FF/TV into teaching, only 14 out of 50 (28%) survey respondents answered 'Yes', and a few specified the computer software applications they used (PowerPoint, Kanopy, iMovie). Furthermore, nearly 40% of survey respondents identified 'time-consuming to prepare/plan lectures' as a major obstacle to using FF/TV in teaching. It became clear that this was exacerbated by the large number of technological tools available. However, most interviewees only shared brief and general descriptions of what they tended to do with FF/TV for teaching (e.g., trimming, embedding, taking screenshots of scenes) depending on their teaching goals (emotional engagement, illustration, skill training, model for filmmaking), and did not go into the specifics of the tools they used.

Only L13 and L18 confidently and comprehensively described how they integrated various computer software, learning models and theories in their FF/TV pedagogies. They brought up a wider range of technical applications and software, including Adobe Premiere, Hudl, DVD Shrink, DVD Ripper Pro, MPEG Cut, Collaborate, and Keynote that serve different purposes throughout various stages of FF/TV-inclusive lecture planning, and showed a clear understanding of the impacts of effective TPK.

Theme 4: Overcoming TK blind spots via TPACK

There is a crucial distinction between technical support services (delivery-focused) and support from Learning and Teaching staff who could advise on film integration technologies. R40 suggested that future technology services need to contextualise technologies (TK) within pedagogical concerns of lecturers (PK) when teaching their disciplinary courses (CK), which emphasises the idea of TPACK. To this end, collaboration between lecturers and other specialists might be a good solution:

Universities need to up their game so as to help lecturers become more adept and updated on teaching technologies. Lecturers need to reach out for help from learning design centres, ideally collaborate with a teaching specialist or learning designer to integrate disciplinary and pedagogical knowledge. Expand networks, be willing to learn new things. (R40)

Several interviewees advocated this view, sharing their positive experiences of collaborating with learning designers:

It's only in the last couple of years when I started teaching with [a colleague] and [a learning designer] from the Learning Enhancement and Innovation centre that I started using film again, also some new apps like Mentimeter in my tutorials [...] last time I tried activating the online discussion board myself, it drove me nuts. (L5)

Teaching and Learning centre has learning designers working with lecturers to figure out how to integrate media and technology into teaching. We can approach those designers so that film can become one of the official media technologies that they consider. (L8)

While appreciating the various informal initiatives around teaching with FF/TV operating in their departments/faculties, several participants were interested in the idea of formal training. They suggested that training resources should be available online 24/7 as tutorial videos or brief step-by-step instructions on relevant topics which could be further scaffolded into different levels. The topics are three-fold: (1) TK-related issues (e.g., copyright, software introduction and download, video usage); PK-related issues (e.g., presentational strategies and general teaching tips); and (3) CK-related (e.g., FF/TV content recommendations). Similar to the collaboration idea, these recommendations highlight the need to integrate TK, PK and CK in developing resources for lecturers regarding FF/TV use:

Step-by-step online tutorials [...] some software you can download [...] some film recommendations for your topic [...] a 20-minute tutorial or whatever on teaching tips on how you might use this stuff, so that late at night you could click onto and maybe learn something. (L17)

[Training] needs to be scaffolded [...] like beginner's or entry level pedagogy, and then more advanced, and then expert pedagogy. (L18)

Standardisation of devices was mentioned as a way of supporting staff and students. L18 attested to testing technologies with their own class to 'quickly bring user experience problems (tech issues) to the surface' and 'help educators experience how well (or not) their use of media and technology suits their pedagogy or discipline'. If lecturers and students use the same model of electronic devices, it becomes easier to develop effective TK. While such standardisation of equipment is costly in the short term, it likely mitigates the risk of the technical issues that occur in a 'bring-your-own-device' setting, thus reducing support issues.

Table 1 summarises the key findings of this study and its themes by firstly identifying the functions of each theme, followed by a list of the common barriers faced by lecturers in relation to each theme. Finally, it lists some recommended solutions identified by participants to some of the issues raised in this study.

Table 1.
Overview of FPT, FDT and FIT within the context of teaching with FF/TV

	FUNCTIONS	COMMON BARRIERS	RECOMMENDED SOLUTIONS
FILM PRODUCTION TECHNOLOGIES (FPT)	<ul style="list-style-type: none"> • Guide lecturers in analysing, assessing and choosing FF/TV content for teaching • Enable lecturers to teach students how to critically learn through FF/TV 	<ul style="list-style-type: none"> • TCK identified as a common blind spot for lecturers without a background in film/media studies • Lacking coverage of FPT in disciplinary expertise outside film/media studies, in teacher training and university induction • Lacking formal recognition of FF/TV as instructional materials • Disciplinary silos limiting lecturers' sharing of practices 	<ul style="list-style-type: none"> • Regular workshops/seminars coordinated by lecturers in film/media studies and/or academic developers with an expertise in cinematography • A teaching-focused and scaffolded online resource with glossaries, terms, definitions, examples and further readings on cinematography (e.g., Yale Film Analysis Website)
FILM DELIVERY TECHNOLOGIES (FDT)	<ul style="list-style-type: none"> • Source legitimate FF/TV content • Screen or share prepared FF/TV (clips or entirety) to students during class 	<ul style="list-style-type: none"> • Lacking formal recognition of FF/TV as instructional materials • Technological provision/updates isolated from teaching practices • Lacking effective communication channels between lecturers and institutions • Lacking integrated tech support and film integration support services 	<ul style="list-style-type: none"> • Functional classroom film delivery facilities (e.g., fast and secure Internet connection, built-in DVD player, working sound systems, projector, screens) • Functional online videotelephony software platform (e.g., Zoom, Microsoft Teams, Skype) • Ready access to physical copies of FF/TV (DVD), digital copies (downloads), and/or streaming sites with diverse and copyrighted materials (e.g., Kanopy) • Available funding for lecturers to request library purchase of new FF/TV
FILM INTEGRATION TECHNOLOGIES (FIT)	<ul style="list-style-type: none"> • Edit FF/TV content towards achieving learning outcomes and student engagement • Embed the edited FF/TV content into the broader lecture/lesson plan to create multimodal learning design 	<ul style="list-style-type: none"> • Similar barriers with using FDT • TPK identified as a common blind spot for lecturers using FF/TV in teaching • Fast-changing computer software applications and devices making it challenging to keep up 	<ul style="list-style-type: none"> • Available software applications (e.g., iMovie, Hudl) featuring editing features (e.g., trimming, visual-sound splitting, embedding clips) on • Tools within learning management systems (e.g., H5P) to integrate FF/TV into assessments • Compatible presentation software applications (e.g., PowerPoint, Keynote)
ACCESS TECHNOLOGICAL SUPPORT		<ul style="list-style-type: none"> • Training • Technological and pedagogical support • Standardisation of devices 	<ul style="list-style-type: none"> • An online, scaffolded and self-paced formal training course to deepen understanding of cinematography • An online resource that includes short tutorial videos or step-by-step instructions on how to use available technologies • Standardisation of electronic devices used by lecturers and students • Integrated technology support services (IT support, L&T centre) via collaboration (co-design, co-teach)

Discussion and recommendations

This study looked at survey and interview responses from academics and identified four key themes: film production technologies (FPT), film delivery technologies (FDT) and film integration technologies (FIT) as relevant elements for developing a pedagogy of effective FF/TV teaching in the classroom. It also identified areas related to the TPACK model that need to be addressed in order to develop a holistic approach to the use of FF/TV in higher education.

For universities to maximise the effectiveness of multimedia technology-enhanced learning, all stakeholders (lecturers, IT staff, learning designers and administrative managers) need to contribute to decision-making regarding available technologies. In this study, those who did engage in collaborations with IT staff or learning designers highly recommended this for others. This emphasises that lecturers are not just users of the media; they are designers of multimodal educational ‘products’ (i.e., lectures, seminars or tutorials) that include FF/TV representations. This requires a diverse skillset that includes a working knowledge of

- (1) Film Production Technologies (i.e., cinematography) to select suitable FF/TV content and assist students in film analysis;
- (2) Film Integration Technologies in video trimming, editing and embedding for learning activities and assessments; and
- (3) Film Delivery Technologies to make decisions on film screening techniques that suit their teaching contexts.

Much as lecturers need this three-fold TK of FPTs, FITs and FDTs to effectively navigate FF/TV in disciplinary teaching, they cannot acquire it in isolation from PK and CK. At the same time, institutions cannot effectively support such acquisition without considering lecturers’ and students’ needs when providing facilities and resources.

Unfortunately, survey and interview responses in this study show that lecturers who integrate FF/TV into their teaching typically are not sufficiently aware of the complexities behind FPTs, the nuanced relationship between technical issues related to FDTs and the effectiveness of FF/TV use, as well as the importance of staying updated about FITs that increasingly enable FF/TV integrating in teaching. The findings also show that most disciplinary expertise, teacher training and university academic development courses do not cover these skills. Echoing the institutional approaches to TPACK that prioritise Technological Knowledge over the other elements (Benson & Ward, 2013; Stover & Veres, 2013) and universities’ tendency to impose top-down technological implementation (Reyes et al., 2017), many participants in this study reported disruptive changes made to FDTs by universities, which resulted from institutions’ understanding of technology in isolation from teaching and learning.

Studies have shown that it can be very challenging for lecturers to develop their understanding and competence in technology-enhanced teaching without proper guidance and assistance (Heffernan and Heffernan, 2019; Rennert-Ariev, 2008). In this study, lecturers recognise they would benefit greatly from more coordinated support to learn about the complex pedagogies involving FF/TV. Once properly equipped with the necessary skillset, lecturers can become more capable of troubleshooting when problems arise (especially valuable in blended or remote learning environments), and may become more confident in facilitating more advanced, creative collaborations with students.

To facilitate a holistic understanding of the three-fold TK in teaching with FF/TV and subsequent decision-making by lecturers and institutions, we propose a framework that articulates how understanding of all three film-related technologies (production, delivery and integration) helps improve their appreciation of the inter-related nature of technological, pedagogical and content domains of knowledge (Figure 3). This figure combines the findings of this study and its three film-related technologies with the TPACK framework to illustrate how the findings are supported by theory. Learning how to use film delivery technologies (FDT), for instance, boosts lecturers’ general TK by exposing them to different methods of sourcing media content and screening them for teaching using the available classroom facilities available to them. Learning how to utilise film production technologies (FPT) integrates TK and CK (developing TCK), as lecturers need a working knowledge of cinematography to critically analyse and assess FF/TV’s suitability for disciplinary teaching. Finally, learning how to use film integration technologies (FIT) meaningfully combines TK and PK (developing TPK), as lecturers can better optimise student learning by understanding the technological tools that can enable the effective integration of FF/TV content into learning activities and assessments. The need for institutional support sits in an overarching role for this model to be effectively maintained.

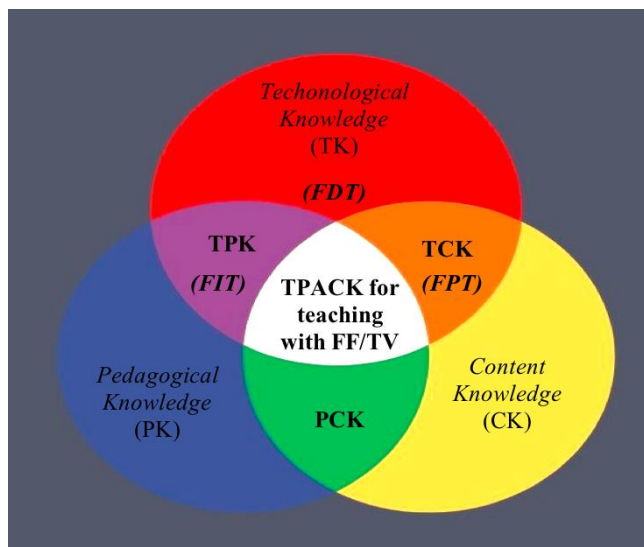


Figure 3:
Role of FPT, FDT and FIT in improving TK, TPK and TCK for teaching with FF/TV

In conclusion, the TPACK model provides a valuable framework for understanding how lecturers can successfully use FF/TV in their teaching. The modified framework that overlays film production, delivery and integration technologies (FPTs, FDTs, FITs) onto the overlapping elements of TK, PK and CK demonstrates a systematic approach for lecturers wishing to incorporate multimedia resources in their teaching, and emphasises the critical need for ongoing institutional support.

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